

# HIV infection in pregnancy

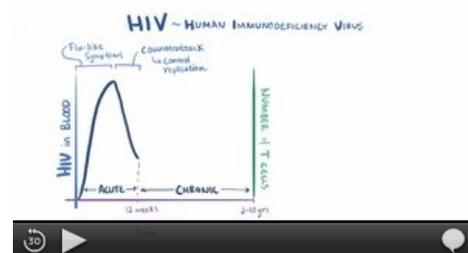
**HIV infection** can be passed from mother to fetus / newborn during pregnancy, childbirth, and breastfeeding. All pregnant women are tested for HIV using serological methods. HIV-positive women are given a combination of antivirals during pregnancy to reduce the risk of transmission of HIV to the fetus / newborn. The delivery takes place at a specialized clinic and is performed by caesarean section, during which an infusion of zidovudine is given. Newborns are given antiviral drugs (prophylactically zidovudine or antiretroviral combinations treatment) immediately after birth. Breast-feeding is contraindicated. Care for HIV-positive women is based in AIDS centers.

In neonates / infants, HIV is detected by PCR. The most common serious complication in HIV-positive children is pneumonia caused by *Pneumocystis jirovecii*. The peak of incidence is between 3 and 9 months of age and has a 50% mortality rate. Trimethoprim / sulfamethoxazole is used for prophylaxis from 6 weeks of age. Other serious complications during the first year of age include failure to thrive and progressive encephalopathy.<sup>[1]</sup>

Since the introduction of HIV screening in pregnant and antiretroviral treatment, the number of infected newborns has dropped significantly. The highest incidence of infected newborns is in sub-Saharan Africa, where access to the diagnosis and treatment of HIV in pregnant women is limited. In Europe, the highest prevalence of HIV is in Ukraine.<sup>[2]</sup>

## Pathophysiology

- HIV-1 attacks mainly CD4<sup>+</sup> T-lymphocytes, monocytes, and macrophages. After penetrating the cells, the viral RNA is transcribed into DNA. This DNA is transported to the nucleus and integrated into the genome of the host cell. Both cellular and humoral immunity are weakened. Hypergammaglobulinemia due to HIV-induced polyclonal B-cell activation often occurs in childhood. Impairment of B-cell function leads to impaired secondary antibody production and immune response. A serious disorder of cellular immunity allows the development of opportunistic infections (mycoses, pneumonia caused by *Pneumocystis jirovecii*, chronic diarrhea). The virus can penetrate the CNS and cause psychosis and brain atrophy.<sup>[3]</sup>



HIV & AIDS (video).

## Risk factors for vertical transmission of HIV (mother to fetus / newborn)

- large amounts of viruses (viral load) in the mother's blood (*in utero*), in cervicovaginal secretion during childbirth and in breast milk;<sup>[2]</sup>
- Maternal plasma levels of HIV RNA are a significant predictor for the risk of transmission to the child;<sup>[3]</sup>
- severe maternal immunodeficiency (CD4 cell level below 200 / mm<sup>3</sup>, presence of immune complex-dissociated p24 antigenemia);
- AIDS in mother;
- chorioamnionitis;
- time from outflow of amniotic fluid (rupture of amniotic sacs) to delivery;
- premature birth (children born before the 34th week of pregnancy have a 3x higher risk of infection than full-term infants);
- vaginal delivery (> caesarean delivery);
- breastfeeding.<sup>[1][2]</sup>

The risk of infecting a baby born to an HIV-positive mother (without using any precautionary measures) is about 12 to 40%. Following the introduction of screening for pregnant women, combination antiretroviral therapy, elective caesarean section, and lactation arrest, risk of transmission has dropped dramatically to less than 2%.<sup>[1]</sup>

## Diagnostics

- HIV DNA PCR during the 1<sup>st</sup> day of life, then at 1 month and 3 months of age, umbilical cord blood is not suitable (risk of maternal blood contamination);
- Diagnosis in children under 18 months: positive PCR (maternal IgG passes through the placenta into the fetal blood, seronegativity of healthy children usually occurs before about 9 months of age, rarely before up to 18 months of age);
- in older children: positive serology result.<sup>[2]</sup>

## Vertical transmission prevention (according to WHO):

- primary prevention of HIV infection in women;
- prevention of unwanted pregnancies;
- prevention of HIV transmission from infected pregnant women to the fetus / newborn;

- treatment and support of infected mothers and their families. [2]

## Treatment of pregnant women

- a combination of antiviral drugs is used for treatment with the patient's comorbidities are taken into account when choosing drugs;
- antivirals suppress the replication of the virus, which also improves cellular immunity;
- treatment includes prophylaxis, diagnosis and treatment of opportunistic infections, treatment of comorbidities, vaccination;
- treatment takes place in AIDS centers. [4]

### Recommended 3-combination antiretroviral therapy for HIV (first choice in adults)

1. nucleoside reverse transcriptase inhibitor (NRTI): *emtricitabine, lamivudine, abacavir*
2. nucleotide reverse transcriptase inhibitor (NtRTI): "tenofovir"; or NRTI
3. non-nucleoside reverse transcriptase inhibitor (NNRTI): "efavirenz, nevirapine"; or protease inhibitor "boosted" by ritonavir (PI / r): "lopinavir / ritonavir, darunavir / ritonavir, atazanavir / ritonavir ". [4]

### Treatment in pregnancy - Recommendations of the Society of Infectious Diseases of the Czech Medical Association of J. E. Purkyně (2010)

- A) A pregnant woman requires treatment for HIV infection:
  - already treated → continue combination antiretroviral therapy (without *efavirenz* - teratogenic)
  - previously treated → restart treatment (possibly with HIV resistance test)
  - untreated → start treatment in the 2nd trimester (up to the 28th gestational week) - 3 drug combinations
- B) A pregnant woman that does not require treatment:
  - start treatment in the 3rd trimester - 2-3 combinations. [4]

Preferred antiretrovirals in pregnancy:

1. *zidovudin*
2. *lamivudine* or *abacavir*
3. protease inhibitor. [4]

## Childbirth

- at a specialized workplace (At Bulovka);
- caesarean section (may be omitted if VL HIV RNA <50 copies / ml);
- is accompanied by zidovudine infusion [4]

Lactation is stopped (by prolactin antagonists) after delivery and the baby is not allowed to be breastfed. [4]

## Treatment for newborns

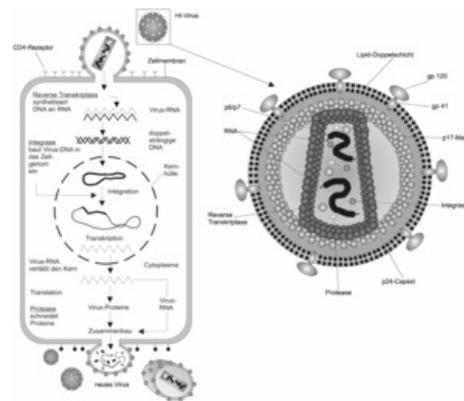
- antiretroviral therapy should be initiated in all neonates of HIV-positive mothers as soon as possible after delivery to reduce the risk of HIV transmission;
- low risk of HIV transmission (mother was treated during pregnancy and had low levels of viruses during pregnancy) → prophylaxis with zidovudine for 4 weeks;
- high risk of HIV transmission → combination of antiretroviral drugs (empirical treatment);
- treatment of HIV-positive newborns: 3 combinations of antiretrovirals in therapeutic doses. [5]

## Breastfeeding

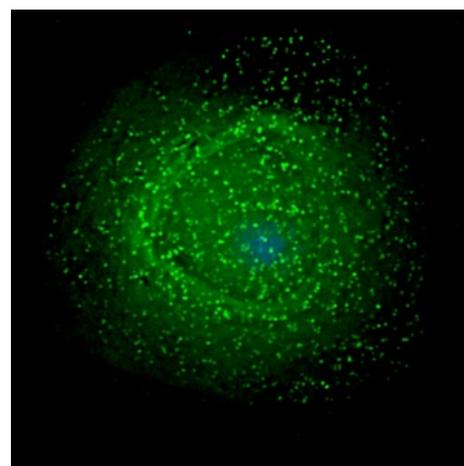
- *The Society of Infectious Medicine CzMA* and *American Academy of Pediatrics* do not recommend breastfeeding if a mother is HIV-positive.

## Prognosis of HIV - children infected during childbirth

- severe - 50% risk of developing AIDS and 25% risk of death under 5 years of age; AIDS development on average in 5 years, average life expectancy is 9 years; [6]
- the prognosis is worse in children born with hepatosplenomegaly or adenopathy, in children with low CD4+ levels at birth;
- coinfection CMV accelerates disease progression. [2]



HIV



HIV under a microscope

# References

## External links

- Národní referenční laboratoř pro HIV/AIDS (<http://www.szu.cz/narodni-referencni-laborator-pro-aids>)
- Gravidita a porod u pacientky s HIV (<https://www.levret.cz/publikace/casopisy/mb/2007-12/?pdf=42>)

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## Citations

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4. Recommended procedure of the Society of Infectious Medicine of the Czech Medical Society JE Purkyně. *Recommended procedure for comprehensive care for HIV-infected adults* . 2010. Also available from URL < <https://www.infekce.cz/DoporART10.htm> > .
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6. BARNHART, HX, MB CALDWELL and P THOMAS, et al. Natural history of human immunodeficiency virus disease in perinatally infected children: an analysis from the Pediatric Spectrum of Disease Project. *Pediatrics* [online] . 1996, vol 97, no. 5, pp. 710-6, also available from < <https://www.ncbi.nlm.nih.gov/pubmed/8628612> > . ISSN 0031-4005.