

# ASPEKTE

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## The scientific background: viral replication and HIV treatment

To understand the mechanisms of antiretroviral therapy, one has to look at the HIV lifecycle and how the virus multiplies. In order to infect a cell, HIV first attaches to certain structures on the surface of the human CD4 cells. This allows the virus to enter the cell. In the next step of HIV-replication, the genetic information of the virus is transcribed from its so-called RNA form to a DNA form. This newly generated DNA is transported into the cell nucleus and subsequently integrated into the human genome. From this genetic information the infected cell produces HIV-particles, which assem-

ble to new viruses and leave the cell. The antiviral drugs inhibit this replication cycle at different steps. Until now, there are 4 different types of drugs approved for HAART: "entry inhibitors" are blocking the entry of HIV into the cell, "reverse transcription inhibitors" block the transcription from RNA to DNA, "integration inhibitors" block the insertion of HIV into the human genome and "protease inhibitors" block the production of new viral particles. In this way, HAART stops HIV from making copies of itself.

## What are the problems in medical research and development?

Due to two main characteristics of HIV, researchers still have not been able to develop a prophylactic vaccine or cure, and HIV treatment may occasionally fail. The first peculiarity is the integration of HIV into the human genome. As soon as the virus is anchored in the human genetic information, it cannot be removed anymore. This is the reason why a cure is not in sight. The second peculiarity of HI-viruses is the

transcription from its RNA into DNA. This process is not very accurate and many times little mistakes are made. Thereby viruses with little differences are generated during viral replication. In this way it happens that viruses develop a resistance to antiretroviral drugs and the therapy has to be changed. Also, due to this ability to change, it has yet not been possible to develop an effective vaccine.

## What are possible problems in living with HIV?

Although information about HIV/AIDS, ways of transmission and treatment is widely available, many people living with HIV are confronted with threatening situations in their daily lives. Discrimination, stigmatisati-

on and even criminalisation are common all over the world. Especially vulnerable groups like MSM (men having sex with men), women, sex workers, transgender people, young people or intravenous drug users are

affected. Prevention work and educational programmes in order to reduce social and

political exclusion of people living with HIV/AIDS remain an indispensable issue.

## Where to get information, testing and counselling in Austria?

The AIDS-Hilfen Österreich are non-governmental organisations available in different parts of Austria. They provide anonymous HIV testing, counselling by medical and social experts and information concerning HIV/AIDS. With their work they seek to address people living with HIV, their

relatives and friends but also the general public by seminars, workshops and public campaigns. Information about all AIDS-Hilfen, their testing times and activities can be found under [www.aidshilfen.at](http://www.aidshilfen.at)

This booklet does not replace counselling by a doctor.

## Contact

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HIV/AIDS – THE BASICS IN ENGLISH

Die AIDS-Hilfen  
Österreichs 

# A S P E K T E

## HIV/AIDS – THE BASICS

### What is HIV/AIDS?

HIV is a virus, called the “Human Immunodeficiency Virus“. It infects specific human cells (named CD4 cells), which play a key role in the immune system – the body’s defence against diseases. Many of these cells are destroyed by becoming infected and therefore the immune system can no longer work properly and protect the body. When someone is described as living with HIV, they have the HI-virus in the body.

AIDS stands for “Acquired Immune Deficiency Syndrome“. AIDS is not a single disease itself but a collection of different symptoms and medical conditions which can develop due to an impaired immune system as a result of an untreated HIV-infection.

An HIV infection can not be cured, but treatment can keep the virus under control and the immune system stable. This treatment is called HAART: Highly Active Antiretroviral Therapy.

### How is HIV passed on?

HIV can be passed on through infected blood, semen, vaginal fluids or breast milk. Also the brain and spine liquid contain HIV-viruses. Other human body fluids (for example saliva, tears, sweat or urine) are not infectious.

The most common ways HIV is passed on is through vaginal or anal sex without a condom with someone living with HIV. Transmission through direct blood to blood

contact mainly occurs due to needle sharing among intravenous drug users. HIV can also be passed from an HIV-positive mother to her child (termed vertical transmission) during pregnancy, childbirth or breastfeeding. Transmission through contaminated blood products has been largely eliminated by HIV screening of blood products and occurs very rarely.

### How to protect oneself from HIV?

If someone is sexually active they can be at risk from getting HIV. It is necessary to always use a condom (or femidom) when having vaginal or anal sex, and to use a condom or dental dam during oral sex. For intravenous drug users protection from HIV means avoiding needle sharing.

Women living with HIV can still have a healthy baby. Steps can be taken to reduce the possibility of passing on HIV to the child to less than two per cent. This includes giving mother and child antiretroviral medication, delivering the child preferably by Caesarean and not breastfeeding the baby.

### How is HIV diagnosed?

The most commonly used test is the HIV antibody test. When the immune system is exposed to HIV it develops antibodies against the virus to fight the infection. The antibodies can be detected in a quite straightforward procedure. But to develop a detectable amount of antibodies in the blood, it takes some time. Therefore the HIV antibody test can only provide a reliable result after approximately 12 weeks.

### What is the window period in HIV testing?

The “window period” is the time it takes until reliable test results can be received. The window period for HIV antibody tests covers 12 weeks. During this period, people infected with HIV have no antibodies in their blood that can be detected by an HIV antibody test, even though the person may already have high levels of HIV in their blood, sexual fluids or breastmilk. The window pe-

### Progression from HIV infection to AIDS

The progression from the moment of infection until the development of AIDS can last many years. The development is divided into three stages. Acute (or primary) infection describes the first period directly after infection. The HIV-virus replicates extremely fast and concentrations of several million viruses per ml blood can be reached. 50 to 90% of patients develop symptoms during this period like fever,

fatigue, headache or general sickness, but in most cases they are not recognised. The following stage (called latency stage or clinical latency) varies individually and can last many years (the average is about 10 years). Although no specific symptoms occur, the ongoing viral replication and subsequent continuous immune reaction damages the body. Over time, the amount of CD4 cells declines

and the immune system becomes weaker. When a certain stage of immune deficiency is reached, AIDS is diagnosed. There are two different parameters to define the diagnosis:

Another possibility is a so-called PCR test. It detects viral genetic material in the blood. Although this test is highly sensitive, a certain amount of virus is necessary for detection. This occurs approximately two weeks after infection.

If a blood sample is tested positive, the result has to be confirmed by an additional test.

riod for HIV PCR tests covers two weeks.

A person who has been newly infected cannot be diagnosed in this period, but can transmit the virus to others. Since the viral load (amount of HIV in the blood and body fluids) is extremely high in the first weeks after infection, transmission during this phase probably contribute a high number of new infections.

### How is HIV treated?

HIV infections still cannot be cured. But an antiretroviral therapy (HAART) is available and can inhibit replication of the virus, thus protecting the immune system and preventing AIDS. By continuous development and improvement of the therapeutic options, quality of life and life expectancy of people living with HIV has steadily increased.

All together there are approximately 30 different drugs available today and a common

### Are there side effects?

Like almost every medication HIV therapy (HAART) may also produce side effects. Many people starting with HAART develop symptoms like fatigue, general sickness, headache or nausea. Also symptoms like dizziness, depression or sleep disorders may appear. But side effects need not necessarily to develop in every person. Most of the side effects are temporary or treatable and they vary depending on the medication. Since HAART is a life-long medication, long-term effects may also occur. The therapy can have an influence on organs,

either the amount of CD4 cells drops below 200 cells/ $\mu$ l (a healthy immune system counts about 800-1400 CD4 cells/ $\mu$ l) or opportunistic infections occur.

HAART combines three of them. In order to gain the optimal benefit of HAART, the medication has to be taken every day following a strict schedule. The point in time, when someone starts with HIV-treatment, differs individually and depends on the persons CD4 cell count, viral load and occurrence of opportunistic infections. International guidelines for HAART are regularly revised by experts according to the state of the art.

the nervous system, the bones or the cardiovascular system. These long-term effects depend on the drugs taken and the specific therapy regime.

Of course, with ongoing improvements, the new generation of drugs have fewer effects than the very first ones. And it has been shown that possible negative effects of HAART are much less severe than ongoing viral replication and the permanent activation of the immune system in a long term untreated HIV-infection.