

OVERVIEW OF HIV INFECTION

The Immune System

The immune system is the part of the body that identifies foreign invaders, like bacteria and viruses, and destroys them. Parts of the immune system are found throughout the body. They include:

- ⊙ organs such as the spleen and lymph nodes ('glands')
- ⊙ white cells such as lymphocytes and leucocytes
- ⊙ chemicals in the blood such as antibodies.

The cells that control the immune system are the lymphocytes – the 'B cells' and the 'T cells'.

When a foreign cell or virus (called an 'antigen') enters the body it is detected by the 'B cells'. They respond by producing particles called 'antibodies' which are designed to destroy the antigen.

'T cells' are also involved in fighting against invading organisms. They respond by stimulating other parts of the immune system to fight against these invading viruses and bacteria. The two main types of T-cells are called CD4 cells and CD8 cells.

The Virus

HIV (human immunodeficiency virus) is a member of the 'slow virus family' (lentiviruses). At the time of infection it enters the body and spreads rapidly through the blood stream. The virus is attracted to certain types of cells – especially to those in the immune and nervous system. Viruses, like HIV, are much smaller than cells. So small that they have to invade human cells and take over their internal functions in order to produce more of themselves. In the process the infected cells are damaged and may die. The most badly damaged cells are the CD4 lymphocytes – often called the 'T cells' for short.

Infection with HIV results in a gradual decline in the immune system in most people. If the immune system is severely damaged then the body can become susceptible to unusual infections (opportunistic infections), cancers and other illnesses. When this happens this is called AIDS (acquired immunodeficiency syndrome).

Opportunistic infections, or OIs for short, are the major cause of illness in HIV infection. We all contain large numbers of viruses and bacteria that are kept in check by our immune system. It is only when the immune system is depleted that these organisms can multiply and cause disease – that is why they are called 'opportunistic'.

Progression of HIV Infection

The effect of HIV on the body is very hard to predict. In most people HIV infection will progress over time to eventually cause health problems. How quickly this happens varies greatly from person to person. Also, good treatment has been proven to slow the onset of symptoms.

Following infection with the virus most people have a severe 'flu'-like illness with fever, rash and swollen lymph nodes (the 'seroconversion illness'). During this illness the virus spreads rapidly through the body. An HIV test performed at this time may not show up the virus. It can take several weeks or months for the test to become positive – this is called 'the window period'.

The immune system then reacts against the virus resulting in the production of antibodies against HIV which causes the level of virus in the blood to fall. During the next few years most people feel very well and are without health problems. It was previously thought that during this time the level of HIV in the blood was very low. Recent studies, however, have shown that there is a large quantity of HIV being produced in the body. This is matched by the immune system actively producing CD4 cells to fight the infection. It appears that even though the immune system is effectively destroying HIV some resistant strains of the virus survive. With time regular blood tests usually show a slow decline in CD4 levels (more details later). This represents the virus slowly wearing away at the immune system. However some people appear to have no deterioration in their health at all – the 'long term survivors'.

This period of stability is usually followed by a period of minor health problems such as occasional skin rashes, tiredness, oral thrush or diarrhoea. Later more severe problems arise such as major infections requiring hospital treatment. At this stage AIDS is diagnosed and life expectancy may only be a year or two for many people.

Stages

Progression of the infection is very variable – both in time and in the range of problems that the illness may create for you. Certainly deteriorating health or a decline in laboratory results will often cause great distress. One purpose of this record book is an attempt to give you as much information as possible about your health so that you make the best possible decisions.

Several systems have been developed to classify stages of HIV disease. It is helpful to understand these systems because they give you some information about the things that you may need to watch out for. Also, benefits such as medical pensions, are tied in with the stage of the infection. Your doctor will be able to explain this to you in greater detail.

The new CDC classification system that is now in use in Australia and elsewhere has the following categories:

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- Category A** Includes the seroconversion illness and the 'asymptomatic' (no symptoms period when you are well).
 - Category B** Many 'minor' health problems that fall short of an AIDS diagnosis including: oral thrush, weight loss, diarrhoea, skin problems, neuropathy and others.
 - Category C** Major health problems – called AIDS defining conditions such as Kaposi's sarcoma (KS), Pneumocystis pneumonia (PCP) or Toxoplasmosis. Under this system AIDS is diagnosed if you have a category C health problem.
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CDC 1987 system – this is the previous system which is still sometimes used in Australia.

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- Stage I** **Seroconversion illness** – this is the 'flu' like illness that many people have when they first become infected.
 - Stage II** **Asymptomatic infection** – the period when you are HIV antibody positive and are well.
 - Stage III** **Persistent generalised lymphadenopathy (PGL)** – this is the same as stage II but you will have swollen lymph nodes ('glands') around your body.
 - Stage IV – A** **Constitutional disease** – including chronic weight loss, fever, diarrhoea.
 - Stage IV – B** **Neurological disease** – dementia, neuropathy, myelopathy.
 - Stage IV – C** **Secondary infectious diseases** – including Pneumocystis pneumonia, Toxoplasmosis, CMV, MAC and others.
 - Stage IV – D** **Secondary cancers** – Kaposi's sarcoma, lymphoma.
 - Stage IV – E** **Other conditions.**
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ARC or 'AIDS Related Complex' is the old name for all Stage IV illnesses.

AIDS is diagnosed if you have certain of the conditions listed under stage IV such as PCP or KS.

COMMON HEALTH PROBLEMS CAUSED BY HIV

Each of these sections describes common symptoms and health problems related to HIV infection. The information is organised into sections based on the part of the body that is most commonly affected. Note that most of these problems occur in advanced HIV infection and not in the years shortly after infection.

Some of these problems can occur at any stage of HIV infection. Others will only happen when your immune system is weakened. The commonest measurement of damage to the immune system is your CD4 ('T cell') count. This is described more fully in a later section. Where a health problem usually happens at a certain level of CD4 then this level will be given in brackets next to the health problem. The levels used are:

Normal	above 500	Healthy level.
Medium	200 – 500 cells	At this level the immune system is showing signs of damage.
Low	below 200 cells	At this level the immune system is severely weakened and serious infections or other health problems may occur.

General

During the primary (or seroconversion) illness HIV enters the body and stimulates the immune system. Most people experience this illness as a severe 'flu' with fever, rash, aches and pains, sore throat and tiredness. After this illness most people are free of symptoms for many years. As the immune system becomes depleted many people experience vague symptoms such as fever, tiredness and night sweats. These symptoms can have a number of causes which are briefly summarised below.

<i>Problem</i>	<i>Cause</i>	<i>Action/Treatment</i>
<i>Fever</i>	Any sort of infection. HIV infection itself. Most mild fevers are caused by minor viral illnesses and will to away themselves Most serious infections cause high fevers and other symptoms (eg. Bad cough).	Measure your temperature (normal is less than 37.5 degrees) Take paracetamol (Panadol, Panamax) for mild fevers. See your doctor if you feel very unwell, the fever is high or not resolving after a day or so.
<i>Night sweats</i>	HIV infection itself. Other infections such as Tuberculosis.	No good Western treatment – Chinese herbs reported to be useful. Have a check-up to exclude other causes.

<i>Problem</i>	<i>Cause</i>	<i>Action/Treatment</i>
<i>Weight loss</i>	Not eating enough. Trouble swallowing. Depression. Diarrhoea and bowel problems. Worsening HIV infection. Most serious illnesses will cause weight loss.	Maintain a good diet. See your doctor for a check-up See a dietitian. Multivitamins and supplements.
<i>Tiredness or Lethargy or Weakness</i>	Many causes including – HIV itself, other infections, anaemia (low iron in the blood), depression, weight loss, drug and alcohol use, dehydration.	See your doctor for a check up, have a blood test, treat the cause, maintain a good diet, regular exercise, avoid drug and alcohol Excess.
<i>Dehydration</i>	Fever, not drinking enough, diarrhoea, any major illness.	Drink extra fluids if you are unwell – especially with fever or diarrhoea. If you are very dehydrated you will need a special rehydration mixture – see your doctor.

Psychological Problems

HIV infection creates huge psychological difficulties for most people who are antibody positive. In early HIV infection these are related to the great stress caused by discovering that one is infected with a serious and feared illness. After receiving a positive result most people experience a period of intense anxiety, grief and depression often lasting many months. At this time the support of a partner, friends, family and a good counsellor are very helpful.

Over the next few years most people begin to feel more accepting of their HIV status. At this time the virus is largely 'dormant' and is not causing any health problems. If symptoms begin to develop this can again be a time of new stress. This is especially so if health problems cause unpleasant symptoms like weight loss and tiredness. Transition times are often difficult – deciding to start on treatment, leaving work or entering hospital. Again the most common problems at this time are anxiety and depression.

IMMUNE TESTS

HIV Antibody Test

The HIV antibody test ('HIV test' or 'AIDS virus test') is the usual test performed to determine if you have been infected with HIV. It is really a test of your immune system's response to HIV infection. At the time of infection there are no HIV antibodies present. After a few weeks 'incubation time' following infection your immune system responds to HIV by producing antibodies. The time between infection and the appearance of antibodies is called the 'window period'. A test performed in that time will be negative even though you have been infected with HIV. That is why you will be advised to have a test 2 – 3 months after exposure to the virus to be reasonably sure of detecting infection.

In the routine antibody test your blood sample is tested for antibodies against HIV. This test is called an ELISA. If this is positive than your blood sample is further tested using a more accurate test called a Western Blot. You will only be informed that you are HIV antibody positive if the result is repeatedly positive.

Sometimes, if your doctor suspects that you may be experiencing a 'seroconversion illness', he or she may also order an HIV antigen test. This test will be positive a short time before the antibody test shows signs of the virus.

What are the benefits of testing and counselling?

Having a HIV antibody test tells you whether or not you are infected by HIV. For those who are not infected, testing and counselling mean they can make changes to their sexual or drug-use practices to make sure they stay uninfected.

For those who are infected, testing and counselling give an opportunity to do a number of things to protect their health. They can:

- ⊙ ***Have further tests to find out how far HIV infection has progressed.***
- ⊙ ***Begin treatment with antiviral drugs that slow the progress of infection and reduce the chances of developing AIDS.***
- ⊙ ***Begin treatments that will reduce the chances of developing pneumonia (the biggest killer of people with AIDS).***
- ⊙ ***Make changes to their lifestyle (diet, exercise, stress, smoking, drug use) that may improve their chances of resisting illness.***
- ⊙ ***Make informed decisions about relationships, pregnancy, career and other long-term plans.***
- ⊙ ***Ensure they do nothing that may pass HIV infection on to their sexual partners.***

What are the risks of testing?

Many people who are tested and discover they are infected by HIV experience shock, anger, distress and depression. Nobody should be tested for HIV without first talking to an experienced medical practitioner or counsellor and preparing for the possibility of a positive test. If the test is positive, ongoing counselling will be necessary.

Many people fear they will experience prejudice or discrimination if it becomes known that they are HIV infected, or even that they have been tested for HIV.

These are real possibilities, although Victorian law makes it illegal to discriminate against people who are known or alleged to be HIV infected. Test results must be kept strictly confidential, and the person being tested should be very careful how and when they tell other people about their test result.

How is a test performed?

The HIV antibody test is a simple and painless blood test performed in a laboratory on a small sample of your blood. The sample can be taken by your doctor, or in a government or community clinic or health centre. The confidentiality of your test result, and even of the fact that you have been tested at all, is protected by law.

A small fee may be charged as there is no Medicare rebate for this service.

You should ensure your doctor has a full understanding of issues related to HIV/AIDS and HIV testing. If your doctor does not, or if you do not feel you wish to discuss aspects of your lifestyle with your usual doctor, you can contact one of the agencies such as:

AIDSLINE – Tel: (03) 9347 6099, 1800 133 392

They can refer you to doctors who know about HIV/AIDS and who will understand your concerns.

Test results are usually available within 14 days. If the test detects no HIV antibodies, the person is said to be HIV-negative (sometimes the term anti-body-negative is used). This almost certainly means they are not infected by HIV.

However, as sometimes the body takes several months to produce antibodies after infection occurs, a repeat test may be necessary, depending on how recently possible exposure to HIV took place.

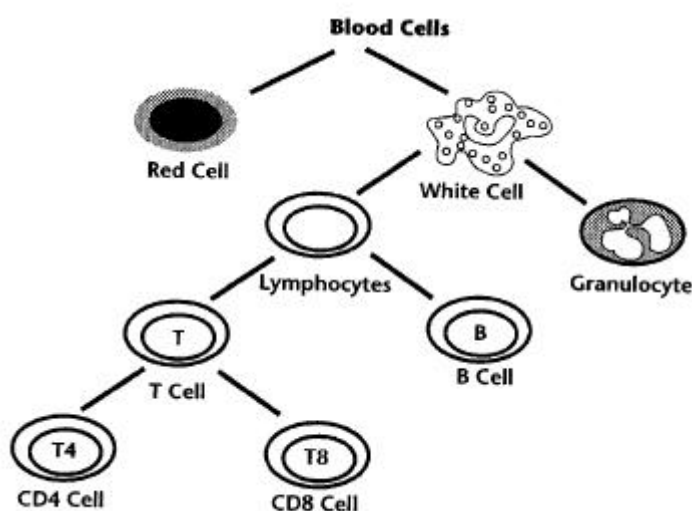
**FROM: "Being Tested for HIV/AIDS",
Department of Human Services
January 1998**

T Cell

The blood is made up of two main groups of cells – red cells that carry oxygen and white cells that fight infection (see diagram below). The white blood cells are the most important cells in the immune system. There are several types of white blood cell – the most important in HIV infection are the lymphocytes. The lymphocytes are divided into 2 main groups – the T and the B lymphocytes. Infection with HIV damages the T lymphocytes. The particular group of T lymphocytes that are damaged the most are called CD4 cells, T4 lymphocytes, T helper cells or just T cells for short. Calling them T cells is slightly confusing however as this could also mean that you are talking about all the T lymphocytes including the CD8 cells.

All these different blood cells can be counted using complex tests. By measuring the CD4 cells it is possible to determine the damage that is being done to the immune system by HIV.

Cells of the Blood



How your CD4 count is calculated

One machine examines your blood and counts the number of red and white blood cells. The white cells are further examined and the number that are lymphocytes is determined. This produces a result called a Full Blood Count (FBC).

A different machine examines your blood and works out the percentage of lymphocytes that are B lymphocytes, CD4 cells and CD8 cells.

These numbers are then multiplied together to give you your CD4 count.

For example:

Your white cell count is 6.0×10^9 / litre.

25% of the wbc are lymphocytes = 2.0×10^9 / litre

The Lymphocyte counter shows that 25% of the lymphocytes are CD4 cells.

This gives you a CD4 count of $2.0 \times 10^9 / 1 \times 25\% = 0.5 \times 10^9$ / litre

Or as it is more often expressed 500 CD4 cells / MM^3 blood.

A great deal of attention is directed at the CD4 cell count. Certainly it is very useful in telling you a lot about the health of your immune system. However there are problems in relying too much on the T cell count. Some of these problems are:

- ⊙ the test is not always very accurate and the result can vary depending on factor such as time taken to transport samples to the laboratory and the laboratory doing the test.
- ⊙ the T cells go up and down during the day by as much as 100 or so cells.
- ⊙ The minor illnesses may make the count go up or down.

The CD4 cells are normally above 500 cells per cubic mm of blood. It is probably best to look at the results of the test as being:

Normal	above 500	Healthy level.
Medium	200 – 500 cells	At this level the immune system is showing signs of damage.
Low	below 200 cells	At this level the immune system is severely weakened and serious infections or other health problems may occur.

As well as the CD4 count it is often helpful to look at the percentage of lymphocytes that are CD4 cells. The percentage is often more consistent than the actual count. The normal percentage is above 34%.

The other major type of 'T-cell' is the CD8 lymphocyte. These are also damaged by HIV infection but the significance of this remains controversial.

Viral Load

This test measures how many particles of HIV are in your blood. The result is given as 'viral copies' per ml of plasma. This means the number of HIV particles present in a ml of the clear part of the blood (the plasma). The viral load test is now widely available and gives you a lot more information about how well your system is fighting the infection. If your level of 'T-cells' tells you how healthy your immune system is at the moment then the viral load test tells you how well your system is likely to cope in the future.

When you first become infected with HIV the viral load is very high. Then, after your body begins to fight the infection, the viral load drops to a certain level and then remains fairly constant for some time. It is thought that this level of viral load has a lot to do with how quickly you develop AIDS. If you have a low viral load early in your illness then you are likely to remain well for many years. Long term survivors (long term non-progressors) have low levels of viral load – usually less than 5000.

With time the viral load gradually increases. This shows that your immune system is no longer able to keep the HIV in check. If you are taking medication and the viral load is high it usually means that the virus is resistant to the medication.

<i>Viral load</i>	<i>What it means</i>	<i>Likely time to developing AIDS</i>
1 million	very high	very fast
100,000	high	fast
10,000	medium	medium
1,000	low	slow
100	'undetectable' virus	very slow
10	'undetectable' virus	very slow

SOURCE: *The HIV Resource Booklet written by David Baker.
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