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T-cells (or T-lymphocytes) are white blood cells that play an important part in the immune system. There are two main types of T-cells. **T4 cells** (also called **CD4** cells). One type has molecules called CD4 on its surface; these '**helper**' cells orchestrate the body's response to certain microorganisms such as viruses. The other T-cells, which have a molecule called CD8, destroy cells that are infected and shut down the immune response once the infection has been dealt with.

HIV is able to attach itself to the CD4 molecule, allowing the virus to enter and infect these cells. Even while a person with HIV feels well and has no symptoms, billions of CD4 cells are infected by HIV and are destroyed each day while billions more CD4 cells are produced to replace them.

The CD4 cell count is the best known, most studied and readily available prognostic marker. It makes sense as a marker because decline in CD4 cell numbers is an effect of HIV, and CD4 T-cell depletion causes immune deficiency

Uses of CD4 counts

A blood test 'counts' the number of CD4 cells in a cubic millimetre of blood. A normal count in a healthy, HIV negative adult can vary, but is usually between 450 and 1660 CD4 cells/mm³.

Most people with HIV find that their CD4 count falls over time. This often happens at a variable rate, so that the count can still be quite stable for long periods. It is useful to have your CD4 count measured regularly for two reasons:

- to monitor your immune system and help you decide whether and when to take anti-HIV drugs and treatments to prevent infections.
- to help monitor the effectiveness of any anti-HIV drugs you are taking.
- to decide when it is safe to stop prophylaxis against opportunistic infections.

If your CD4 count drops below 200 (for an adult) you are at increased risk from serious infections. At this point your doctor should offer drugs to try to prevent such infections, such as co-trimoxazole for **PCP pneumonia**. Likewise, if your CD4 count starts to drop rapidly or falls below a certain point, or you develop symptoms, you will be advised to consider taking **anti-HIV drugs**.

One effect of anti-HIV drugs is to improve the state of your immune system. This is crudely reflected in an increase in your CD4 count. The cells' ability to fight infections might also be improved. However, over time anti-HIV drug therapies tend to become less effective, as drug resistance may develop. As a consequence the CD4 count could fall back to its 'baseline' starting level and may continue to drop.

Monitoring the changes in your CD4 count while you are taking anti-HIV drugs can help you and your doctor decide whether your treatment is working or whether it is time to try different options. However, the CD4 count is not the only consideration when making these decisions; you should also take account of how well you feel, your weight and whether you have any symptoms. Measurement of the viral load (the amount of HIV itself in the blood) provides valuable additional information (see Viral Load factsheet).

Understanding the results

Factors other than HIV can affect your CD4 count, including **infections, time of day, smoking, stress** and the laboratory measuring the blood sample. So it is very important to watch the trend in your CD4 count over time, rather than to place too much emphasis on a single test which may be misleading.

Only about 2% of the body's CD4 T-cells are in the blood; the rest are in tissues such as lymph nodes. Changes in your CD4 count (which only looks at the blood) may reflect the movement of the cells into and out of the blood, rather than changes in the total number of CD4 cells in your body.

Doctors will normally suggest measuring your CD4 count every **six months** if you have a relatively high count, no symptoms and are not taking anti-HIV drugs. They will suggest more frequent counts if you are facing decisions such as starting treatments, if you develop HIV-related symptoms, or if the decline in your CD4 cells seems to be speeding up.

CD4 percentage

In addition to the CD4 count, the proportion of all lymphocytes that are CD4 cells is measured. This is called the CD4 percentage. In HIV-negative people, a normal result is 40%. Among HIV-positive people the CD4 percentage tends to decline as HIV disease progresses. A CD4 percentage 14 is thought to represent a risk of opportunistic infections equivalent to an absolute CD4 count of about 200.

Some argue that this is potentially the most accurate CD4 test, although it is not very sensitive to small changes. It can be particularly useful if you receive a CD4 result that you are not expecting, for example a sudden drop. If the immune system is being damaged by HIV, then one could expect the percentage of all lymphocytes to have decreased. However, if the percentage stays the same it is

more likely that you had an infection which your immune system was dealing with, which caused your CD4 count to drop.

This information was produced by The Information Exchange of the HIV/GU Medicine Directorate of the Chelsea and Westminster Hospital. For more information please call 020 8746 5929.

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