BLOOD WORK:

TWO COMMON TESTS TO USE FOR MONITORING HIV DISEASE

■

cd4 cell counts and viral load tests and what they mean

A PUBLICATION FROM

PROJECT inform

Information, Inspiration and Advocacy for People Living With HIV/AIDS

JANUARY 2008

Two of the most common tests that you and your doctor will use to monitor your health are CD4+ cell counts and viral load tests. CD4+ cell counts indicate the state of your immune system—your body's defense against disease. Viral load tests indicate how active HIV is. Coupled with information about how you're feeling, these two values give a clearer picture of your state of health. They also help to assess your risk of disease progression and response to anti-HIV therapy that you may be taking. This publication explains these two tests in detail and how the information can be used to inform you and your doctor when making decisions about your health ca

CD4 cell count tests

Your doctor normally will order tests of several types of white blood cells (WBCs). One is a B cell, which is involved in the production of antibodies. B cells also deal with infections that are outside cells. Another type of WBC is a CD8+ cell, which deals with infections that are inside cells. The third type is a CD4 cell, which "helps" B cells and CD8+ cells do their jobs. All three of these WBCs are also called lymphocytes.

In HIV-negative people, normal CD4 cell counts are 600–1,500/mm3 of blood. Normal CD8+ cell counts are 300–800/mm3. In general, people have 2-to-1 ratios of CD4 to CD8+ cells. So for every two CD4 cells, an HIV-negative person has one CD8+ cell in their blood.

However, in most people living with HIV, the virus normally causes a slow decline in their CD4 cells over time. And, among those who are not on anti-HIV therapy, it's common for the normal CD4/CD8+ ratio to be reversed.

Besides looking at these cell counts, it's also helpful to look at the relative percentages of CD4 and CD8+ cells in a blood sample. The CD4 percentage is the percentage of CD4 cells in the total lymphocyte count. The normal range is 28–58%.

Why do you use CD4 cell counts?

CD4 cell counts tell you how many of these cells are present but not how they function. Using CD4 counts along with viral load tests and information about your general health provides a more complete picture of your health and response to therapy. It also is the best way to foresee problems that are developing from HIV disease. CD4 cell counts are the best guide for when to start preventive therapy for opportunistic infections, or OIs.

CD4 cell counts may vary and do not fully define your level of health or illness. Tests can vary due to the time of day, an active infection, lack of sleep, stress and other factors. Variations in the lab that's used, as well as how quickly the test is done after your blood is drawn, can also affect test results. Therefore, it's important to look at your CD4 cell count trends over time and not be alarmed by any one test result.

CD4 cell counts and when to start therapy

There's no single, right answer to the question of when to start anti-HIV treatment. A cautious approach suggests checking CD4 cell counts more often when a person is not on therapy. A more aggressive approach suggests offering therapy. In spite of the actual CD4 cell count, therapy may be justified if there's a dramatic falling trend in the CD4 cell count over time.

Research shows that anti-HIV therapy benefits people with CD4 cell counts below 200, best started when counts fall to 200. Other research suggests that therapy may benefit people when their CD4 cell counts are 200–350. In this range, thinking about other factors like viral load, falling trends in CD4 cell counts and overall general health may persuade a person to start therapy when his or her CD4 cell count is above 200. It's unknown if starting therapy when CD4 cell counts are above 350 will provide a person with long-term results that outweigh concerns from short- and long-term side effects of anti-HIV therapies.

What do CD4 cell counts mean?

Above 500 CD4 cells

- No unusual conditions are likely. Emphasize good health habits and maintain good health care, including vaccines and nutrition.

200–500 CD4 cells

- Increased risk for shingles (zoster), thrush (oral or esophageal candida), skin infections, bacterial sinus and lung infections, and TB.
- Serious OIs are rare, such as PCP, MAC and CMV.
- Anti-HIV therapy is generally recommended when CD4 cell counts reach the 200–350 range.

50–200 CD4 cells

- Increased risk for PCP and other serious OIs.
- Preventive treatment for PCP is indicated. (Read Project Inform's publication, PCP Prevention.)
- If counts are below 100, consider preventive treatment for MAC, CMV and invasive fungal infections. (Read Project Inform's publications, MAC/MAI, CMV, and Systemic Candidiasis.)

Below 50 CD4 cells

- Increased risk for serious OIs, including MAC and CMV.
- Continue preventive medications.

Viral Load Tests

Viral load tests measure the amount of HIV in about a teaspoon of blood. The genetic material that the test measures is called HIV RNA. Testing viral load is important for monitoring HIV disease and how well therapy is working. When HIV levels decrease, it's a sign that potent anti-HIV therapy is working. When HIV levels increase, it's often a sign that a regimen is no longer working. In this case, CD4 cell counts also will likely fall and disease progression will likely increase. Changes in viral load usually happen more rapidly than changes in CD4 cell counts.

How often should viral loads be tested?

At first, two viral load tests should be taken about 2–4 weeks apart to establish a baseline level. After that, tests should be repeated every 3–4 months along with CD4 cell counts. Because other infections that you may have can briefly cause higher HIV levels, a sudden rise in viral load should be checked with another test 2–4 weeks later.

People should generally avoid having viral load tests done during an active infection (like a cold or flu), after routine vaccinations (like flu or tetanus) or during flare-ups of infections (like a cold sore). These factors can all cause HIV levels to increase 10 to 100 times, but usually returns to normal within a few weeks after a vaccination or the end of the infection.

Viral load tests should be done more often when making decisions about treatment. A test should also be done 3–4 weeks after starting or changing therapies. Because the tests can vary slightly in their results, people using a specific test should continue to use that test to get accurate results and trends over time.

What tests are used?

The three main viral load tests are Q-PCR, bDNA and NASBA. Q-PCR is the most commonly used. It is also the most sensitive and can detect very low levels of virus in the blood. bDNA is the most accurate in counting high levels of HIV. Every test has a certain error level, some as high as 20%. In addition, they need different amounts of blood, which may be an issue for some people giving blood for other tests at the same time. It's also important to use the same lab and test each time to correctly check any change in your viral load.

Getting viral load tests

Both Roche and Bayer, who make Q-PCR and bDNA respectively, offer Patient Assistance Programs to supply their tests for free to people who have no other means to pay for them. These programs may not be able to help all individuals. For more information, call Bayer (bDNA) at 1-888-HIV-LOAD and Roche (Q-PCR) at 1-888-TEST-PCR. Medicaid and most insurance providers will pay for tests once they are approved by the FDA. Q-PCR is FDA-approved. Check with your health care provider for coverage.

Viral load and women

HIV levels are thought to be somewhat different for women and men, although there remains some degree of debate about this. Women may have a "naturally" lower viral load than men, especially in early HIV infection. Because the current federal guidelines base its decisions for starting anti-HIV therapy more on CD4 cell count than on viral load, this probably does not impact treatment for many women. However, women should be aware that a viral load above 30,000, or even 60,000, might indicate a "high" viral load for them.

Interpreting test results

Results from viral load tests can be difficult to understand. Some general guidelines can be found below. As with CD4 cell counts, the trend of viral loads over time is the most important and not an individual result. Both the size (how large a change) and duration (how long it lasts: week, month, year) of changes in HIV levels are important in assessing these results. Some guidelines to use include:

- Viral load below 10,000 copies/ml is generally considered "low."
- Viral load above 100,000 copies/ml is generally considered "high."
- Low, stable and decreasing viral load is considered a good thing.
- High or increasing viral load calls for attention as it may point to the failure of a regimen.

The minimum reliable change in a viral load test is a three-fold change, or a 1/2 log. This means three times larger or smaller than the last test result. Thus, a change from 20,000 down to 10,000 (two-fold) would not be deemed significant. One would want to see a ten-fold (1 log) or more decrease in HIV levels when starting a new anti-HIV regimen. (For more information on "logs," read Project Inform's publication, Blood Work.

People with "undetectable" viral load should remember that it does not mean that their HIV is gone. What it does mean is that it's simply present in an amount below what the test can measure. For example, if the level of sensitivity of the test that you have done is 50 and you have fewer than 50 copies of HIV in your blood sample, then your viral load is said to be undetectable. HIV may actually be there, but just in too small of a quantity for the test to detect.

Viral load, disease progression and anti-HIV therapy

Higher HIV levels often relate to lower CD4 counts, more rapid declines in CD4 cell counts and more rapid disease progression. People with HIV levels over 100,000 are ten times more likely to move on to AIDS over the next five years than those with levels below 100,000. People with constant HIV levels below 10,000 seem to have a lower risk of disease progression.

Viral load tests provide information on how effective an anti-HIV regimen is. This helps people make decisions about starting, stopping and switching therapy. As stated before, effective therapy should result in a major drop in HIV levels—at least 90% or 1 log. A viral load that doesn't change significantly after starting therapy is a sign that the therapy isn't working. An increasing viral load while on anti-HIV therapy is a sign that the regimen is no longer working.

Viral load is only measured in the blood. Most of the time there's a strong relationship between levels of HIV in the blood and in other body fluids like semen and vaginal fluids. However, sometimes people have undetectable levels of HIV in their blood yet have detectable levels in these other fluids. For now, there isn't enough research to fully understand this issue.

Commentary

Using viral load tests, CD4 cell counts and other information about your health help provide a clearer picture of your risk of disease progression, the state of your immune system, and your body's ability to fight HIV. Together this information helps to monitor your HIV disease and assess how well your treatment regimen is working. If viral load decreases and CD4 cell counts increase, in general treatment is working. When no change occurs or when viral loads rise and/or CD4 cell counts fall, treatment is probably not working.

Changes in viral load in the blood usually, but not always, relate to changes in HIV levels in semen and vaginal fluids. What that means is just because your HIV level is undetectable it doesn't mean that you can't pass HIV onto another person. For more information about safer sex and prevention concerns for positive people, read Project Inform's publication, *Sex and Prevention Concerns for Positive People*.