



# VIRAL LOAD TESTS

## WHAT IS VIRAL LOAD?

The viral load test measures the amount of HIV virus in your blood. There are different techniques for doing this:

- The **PCR** (polymerase chain reaction) method uses an enzyme to multiply the HIV in the blood sample. Then a chemical reaction marks the virus. The markers are measured and used to calculate the amount of virus. Roche and Abbott produce this type of test.
- The **bDNA** (branched DNA) method combines a material that gives off light with the sample. This material connects with the HIV particles. The amount of light is measured and converted to a viral count. Bayer produces this test.
- The **NASBA** (nucleic acid sequence based amplification) method amplifies viral proteins to derive a count. It is manufactured by bioMerieux.

Different test methods often give different results for the same sample. Because the tests are different, you should stick with the same kind of test to measure your viral load over time.

Viral loads are usually reported as copies of HIV in one milliliter of blood. The tests count up to about 1 million copies, and are always being improved to be more sensitive. The first bDNA test measured down to 10,000 copies. The second generation could detect as few as 500 copies. Now there are ultra sensitive tests for research that can detect less than 5 copies.

The best viral load test result is "undetectable." This does **not** mean that there is no virus in your blood; it just means that there is not enough for the test to find and count. With the first viral load tests, "undetectable" meant up to 9,999 copies! "Undetectable" depends on the sensitivity of the test used on your blood sample.

The first viral load tests all used frozen blood samples. Good results have been obtained using dried samples. This will reduce costs for freezers and shipping.

## HOW IS THE TEST USED?

The viral load test is helpful in several areas:

- For **medical researchers**, the test proved that HIV is never "latent" but is always multiplying. Many people with no symptoms of AIDS and high CD4 cell counts also had high viral loads. If the virus was latent, the test wouldn't have found any HIV in the blood.
- The test can be used for **diagnosis**, because it can detect a viral load a few days after HIV infection. This is better than the standard HIV (antibody) test, which can be "negative" for 2 to 6 months after HIV infection.
- For **prognosis**, viral load can help predict how long someone will stay healthy. The higher the viral load, the faster HIV disease progresses.
- For **prevention**, viral load predicts how easy it is to transmit HIV to someone else. The higher the viral load, the higher the risk of transmitting HIV.

Finally, the viral load test is valuable for **managing therapy**, to see if antiretroviral drugs are controlling the virus. Current guidelines suggest measuring baseline (pre-treatment) viral load. A drug is "working" if it lowers viral load by at least 90% within 8 weeks. The viral load should continue to drop to less than 50 copies within 6 months. The viral load should be measured within 2 to 8 weeks after treatment is started or changed, and every 3 to 4 months after that.

## HOW ARE CHANGES IN VIRAL LOAD MEASURED?

Repeated tests of the same blood sample can give results that vary by a factor of 3. This means that a meaningful change would be a drop to **less than 1/3** or an increase to **more than 3 times** the previous test result. For example, a change from 200,000 to 600,000 is within the normal variability of the test. A drop from 50,000 to 10,000 would be significant. The most important change is to reach an undetectable viral load.

Viral load changes are often described as "log" changes. This refers to scientific notation, which uses powers of 10. For example, a 2-log drop is a drop of  $10^2$  or

100 times. A drop from 60,000 to 600 would be a 1, m2-log drop.

## VIRAL LOAD "BLIPS"

Recently, researchers have noticed that the viral load of many patients sometimes went from undetectable to a low level (usually less than 500) and then returned to undetectable. Careful study suggests that these "blips" do not indicate that the virus is developing resistance.

## WHAT DO THE NUMBERS MEAN?

There are no "magic" numbers for viral loads. We don't know how long you'll stay healthy with any particular viral load. All we know so far is that lower is better and seems to mean a longer, healthier life.

Our treatment guidelines suggest that **anyone with a viral load over 100,000 should be offered treatment.**

Some people may think that if their viral load is undetectable, they can't pass the HIV virus to another person. This is not true. **There is no "safe" level of viral load.** Although the risk is less, **you can pass HIV to another person even if your viral load is undetectable.**

## ARE THERE PROBLEMS WITH THE VIRAL LOAD TEST?

There are some concerns with the viral load test:

- Only about 2% of the HIV in your body is in the blood. The viral load test does not measure how much HIV is in body tissues like the lymph nodes, spleen, or brain. HIV levels in lymph tissue and semen go down when blood levels go down, but not at the same time or the same rate.
- The viral load test results can be thrown off if your body is fighting an infection, or if you have just received an immunization (like a flu shot). You should not have blood taken for a viral load test within 4 weeks of any infection or immunization.

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