



Monitoring Tests

HIV Resistance Testing

What is resistance?

Resistance usually occurs when one or more of the drug(s) used to treat HIV are not strong enough to completely stop the HIV virus from reproducing. When HIV is resistant to a drug, it can keep reproducing rapidly when you are taking that drug. Whenever HIV reproduces, it may develop changes, or mutations, and become slightly different. Some of the mutations may help HIV become resistant to a drug even if the original form of the virus was not. Over time, the more resistant form or strain of the HIV virus will become the main type of virus in the body and can continue to multiply rapidly despite the continued use of anti-HIV medications.

Resistance to an anti-HIV drug can happen:

- when a person gets infected with a different strain of HIV that is already resistant to the drug
- when a person does not take all of his or her anti-HIV medications regularly, there may not be enough of the medication in the body to prevent the HIV virus from multiplying. The more that HIV multiplies, the more mutations can occur. Some of these mutations will cause resistance.

What is HIV resistance testing?

HIV resistance testing is a test that gives information about whether your HIV is resistant to the various anti-HIV medications. This test is done with a blood test.

There are two ways of assessing HIV resistance: **genotypic testing** and **phenotypic testing**.

What do the tests measure?

Genotypic testing is an indirect way of measuring resistance. This test looks for specific mutations in the HIV genes. Each mutation that is identified has been assigned a code name (such as, K103N). Because other studies have identified specific mutations that are linked to resistance to each anti-HIV drug, knowing the mutations present in the sample will help predict which drug the virus is likely to be resistant to.

Phenotypic testing is a more direct way of measuring resistance. It measures the amount of drug needed to reduce virus reproduction. When the virus develops resistance to a drug, a higher amount of that drug is needed to stop the virus from growing. The test result is usually reported as a number. For example, the number 15 would mean that the virus grows 15 times as much as it normally should in the presence of the drug, or that 15 times the normal amount of the drug is needed to prevent the virus from growing. This is called 15-fold resistance.

A third type of test, virtual phenotype test, combines information from the above two tests. First, genotypic testing is done on the sample. The pattern identified is then compared and matched with a database of previously done phenotypic test results. The matched report of the phenotypic test from the database is then used to determine how the virus is likely to behave.



When should HIV resistance tests be done?

In general, HIV resistance tests are done whenever a change in the combination of anti-HIV medications is being planned, usually when there is an increase in the viral load test to level above 1,000 copies/ml.

Resistance testing may also be helpful in helping people choose their first anti-HIV drug combination to see if they have been infected with a drug-resistant virus.

What are the problems with the tests?

There are a number of problems with the HIV resistance tests:

- They are not available in some places.
- They are expensive.
- It may take up to two to three months before you can get the result.
- The results are not always clear and can be difficult to understand.
- The tests may not work unless your viral load is more than 1,000 copies/ml
- Resistance tests may not always work on strains of HIV from outside the Americas, Western Europe or Australia.

Even though resistance testing does not give all the answers, it can still be helpful. Keep in mind that resistance is not the only reason drugs fail. Other factors that can affect how a drug works include missed doses, poor absorption and drug interactions. When making decisions about changing treatments, test results must be considered along with the full picture of a person's health, including reviewing all the anti-HIV medications taken.

How can I prevent resistance?

The best way to prevent resistance is to control HIV by taking an appropriate combination of anti-HIV medications, exactly as prescribed by your doctor, without missing doses. This is called adherence to treatment. The less that HIV can reproduce, the less chance there is for mutations to occur that can lead to resistance.

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