

Resistance tests

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This factsheet provides basic information on tests designed to measure resistance to anti-HIV drugs.

Resistance testing has been used in HIV research for some time to increase our knowledge of how resistance to anti-HIV drugs develops. The British HIV Association (BHIVA) also recommends that resistance testing should be used in HIV clinics to inform treatment decisions.

Your HIV clinic will take a blood sample to be tested for resistance and this sample will be sent for specialist analysis.

The BHIVA guidelines recommend resistance testing for people who have recently been diagnosed. If you didn't have a test for drug resistance at this point, then your clinic should perform the test when you are thinking about starting treatment.

Once you've started taking HIV treatment, your doctor will monitor how well it is working by looking at your viral load. The aim of treatment is for your viral load to go down to a level so low that it cannot be detected by standard tests. This is called an 'undetectable viral load'. If your viral load is not being suppressed by treatment, or it stops being suppressed by treatment, resistance testing may be used to check if drug resistance is the reason.

Resistance testing is recommended if your viral load is still detectable (over 50 copies/ml) six months after you start treatment, but your doctor may decide to test sooner than this.

For the test to be accurate, it is important that the sample is taken while you are still taking treatment, or at least within two weeks of stopping treatment.

Types of resistance test

There are two methods of testing for drug resistance:

- genotypic tests which look for specific changes, or mutations, in HIV's reverse transcriptase or protease genes that are linked to resistance to anti-HIV drugs.
- phenotypic tests which measure the concentration of a drug required to reduce viral replication. When resistance to a drug begins to develop, higher levels of that drug will be needed to stop the virus growing.

There is no clear indication that one type of test is more useful than the other at present. Each has its pros and cons. The BHIVA guidelines generally recommend genotypic testing.

Genotypic tests

The advantages of genotypic tests are that results are available relatively quickly, in four to five days; they are cheaper than phenotypic tests; they employ relatively simple technology; they don't require highly skilled staff; and they are predictive – genotypic changes occur before phenotypic changes. The disadvantages are that they provide an indirect measure of resistance; and they require complex interpretation.

Phenotypic tests

The advantages of phenotypic tests are that they directly measure the sensitivity of the virus to a drug, and that they are relatively easy to interpret. The disadvantages are that they are slow to turn around, requiring two to three weeks; they are more expensive; and they employ complex lab equipment.

Guidance on resistance tests

- Test results should be considered alongside a full treatment and care history, rather than in isolation.

- Resistance is not the only reason why drugs fail; adherence, poor absorption and drug interactions are other possible causes to consider.
- Resistance tests will be more accurate if performed while you are still taking a failing combination rather than after you have stopped it. This is because when you stop your current drugs, resistant viruses will usually be less likely to reproduce than sensitive viruses. Resistant viruses that once predominated will then grow alongside sensitive viruses until they form one of many sub-groups of viruses within your body. Most tests are unable to spot resistant sub-groups that form less than 10 to 20% of your viral population. Restarting a drug to which a pool of viruses are resistant will allow this group to grow again, causing the treatment to fail.
- One of the most important times to test for resistance could be before you start HIV treatment. If you were infected with HIV that is resistant to one of the drugs in your first combination, your treatment may fail quickly.
- Resistance testing may be helpful in guiding treatment choices in people very recently infected however, because resistant viruses will not have disappeared at this point.
- UK treatment guidelines advise that resistance tests should be used when you are newly diagnosed (before you start HIV treatment) and whenever treatment is changed.