

2 Virology, HIV and viral load

Answers

1. What kind of infection is HIV? what does HIV stand for?

HIV is a virus. Human immunodeficiency virus.

2. What percentage of HIV is circulating in the blood?

Only 2% of HIV is circulating in the blood.

3. Where is most HIV in the body?

HIV and HIV-infected CD4 cells are mostly in the lymph system and lymph nodes.

4. Why are blood tests used for viral load?

Blood tests are easy to do for regular monitoring.

Even though only 2% of HIV is in your blood, studies have shown that this is a reliable way to find out how much HIV is in your body.

5. What are sanctuary sites?

A sanctuary site is the term for a compartment of the body that has barriers that limit both HIV and HIV drugs from moving freely. The main compartments are the genital tract, the cerebral spinal fluid and the brain.

6. How do sanctuary sites affect (1) viral load (2) resistance (3) anti-HIV drugs?

Viral load levels can be different in each compartment. For example someone can have undetectable viral load in blood but detectable viral load in semen. Resistance can also develop independently in different compartments. HIV drugs get into some compartments better than others.

7. List four causes of infections

Bacteria, fungi, viruses and parasites/protozoa.

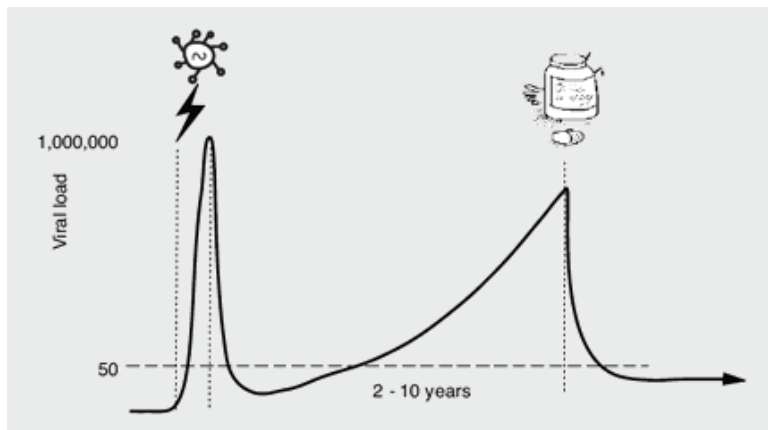
8. What happens to your viral load:

- **in the first few days and weeks after infection?**
- **after seroconversion?**
- **in chronic infection?**
- **in response to ARV treatment?**

How high or low would your viral load be at each of these times?

During the first few days and weeks after the infection, the viral load (VL) goes very high, very quickly. Its levels can reach over 1,000,000 copies. Then, during the seroconversion, the immune system starts producing antibodies in order to fight back. As a result the viral load goes down (sometimes to below 50 copies). During the chronic infection the viral load progressively and consistently goes up to the point when the person starts ARV therapy. After that, with proper treatment regimen the VL becomes 'undetectable' (below 50 copies).

9. Draw a graph to show what happens to your viral load from infection to a successful response to treatment.



10. In which decade was viral load testing developed? What was the lowest amount of HIV viral load tests could measure when they were first developed? What is the lowest amount of HIV routine viral load tests can measure today?

The viral load test was developed as a research tool during the 1990s. The first test in 1995 could only measure down to 10,000 copies/mL. By 1996-7 the tests were able to measure down to 400-500 copies/mL. Since 1998 the most routinely used test measure down to 50 copies/mL. Some tests are even more sensitive and can measure down to 5 copies/mL.

11. Name 3 kinds of viral load test

1. PCR (polymerase chain reaction) – the most widely used test
2. bDNA (branched DNA)
3. NASBA (nucleic acid sequence based amplification)

12. What is the margin of error for viral load tests?

All tests have an approximately 3 fold margin of error (eg a test result of 30,000 means that the real number could be anywhere between 10,000 and 90,000).

13. What is the importance of viral load tests for someone who is taking HIV treatment?

A viral load test shows whether combination therapy is working after starting treatment. Viral load should go down by at least 90% (1 log) after 1 month of treatment, and to below 50 copies/mL after 3-6 months.

In someone who is on treatment with an undetectable viral load, monitoring with viral load tests every 3-6 months confirms that the drugs are still working.

14. What is the importance of viral load tests for someone who is not yet taking HIV treatment?

A viral load is very high (above 100,000 copies/mL) may be a reason to start treatment even at a CD4 over 200. But viral load is not as important as the CD4 count for predicting the risk of opportunistic infections .

15. Describe how HIV can become resistant to ARVs.

HIV makes tiny mistakes when reproducing. Those mistakes are called mutations.

Mutations are usually weaker than the original 'wild-type' HIV. When wild-type HIV is controlled by drugs, mutations can establish themselves because there is no competition. These mutations can reproduce in spite of the drugs. This is called resistance.

Resistant mutations that continue to reproduce eventually become the major type of HIV in your body. Having resistant mutations means HIV drugs do not work as well, sometimes not at all.

Mutations resistant to a drug are often resistant to other similar drugs. This is called cross-resistance.