Serological diagnosis of HIV infection

The diagnosis of HIV infection is mainly based on the detection of antibodies or the combined detection of antibodies and antigens. For screening, the most used assays are ELISA tests. All tests performed in Belgium are third or fourth generation tests using recombinant proteins or synthetic peptides. Fourth generation tests are more and more used. They combine the detection of antibodies with the detection of p24 antigens of HIV-1. They allow an early diagnosis of seroconversion (about 2 to 5 days earlier than antibody-based tests).

All these tests detect antibodies against HIV-1 of groups M and O, as well as HIV-2. Their sensitivity and specificity are excellent (99,2 – 99,8%). However, due to the low prevalence of HIV infection, the positive predictive value of these tests is only 50%. Each positive or equivocal result has to be confirmed by a Western blot or immunoblot, in order to exclude falsely reactive results.

In the Western blot, HIV-1 or HIV-2 proteins are denatured, separated by electrophoresis in function of their molecular weight and transferred on a nitrocellulose strip. The presence of antibodies against one or several of these proteins is revealed by an immuno-enzymatic reaction producing a color reaction. The result is interpreted with well defined criteria. Incomplete profiles can be observed during seroconversion: it is always necessary to follow the evolution of antibodies on subsequent samples.

The immunoblot tests are based on the same principle but use recombinant proteins or synthetic peptides which are spotted on nylon or nitrocellulose strips.

The detection of the p24 antigen is particularly useful in primary infection, when antibodies are still undetectable.

The screening tests for HIV infection are performed in all clinical biology laboratories. When the result is reactive or equivocal, and if the patient is not already known to be infected by HIV, the sample has to be sent for confirmation to one of the seven AIDS reference laboratories (ARL).

The ARL performs ELISA tests, Western blot or immunoblot tests and/or the detection of p24 antigen following an algorithm following common principles for all ARLs to confirm or exclude an HIV infection and to specify if it is an infection with HIV-1 or HIV-2.

When an HIV infection is confirmed for a patient, this result has to be confirmed on a second sample, since sample errors, labeling errors and contaminations are possible.

In case of suspect contact, it is advisable to perform a serological test 4 to 6 weeks after the contact and then to repeat it at 3 months after the suspected contact or after cessation of treatment. A control after 6 months can be considered for reasons of liability. If a primary infection syndrome is suspected on basis of clinical signs (flu-like syndrome, …), it is recommended to perform the test immediately, without taking these intervals in account. It is important to communicate this clinical information to the ARL.

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