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HIV/AIDS Diagnostics: Problem Identification

The development of an effective and efficient HIV/AIDS diagnostic test is accompanied by many problems that need to be taken into consideration, closely monitored and addressed. Some of them include cost, accessibility, training, usability, record and information management, adaptability, efficiency, security, resources and support, testing conditions, etc.

Adaptability of the diagnostic tests to different strains of the virus
HIV-1 can be subdivided into three main groups, M, N and O, where group M (Major) is responsible for the majority of the worldwide spread. Group O and N have mainly been found in low prevalences in Cameroon. Group M can be further divided into subtypes (A-D, FH, J and K), sub-subtypes and recombinant variants, the latter called Circulating Recombinant Forms (CRFs) if their geographical spread is significant (there are currently 12 designated CRFs).

Subtype designations have been powerful molecular epidemiological markers to track the course of the HIV-1 pandemic. The predominant viral forms in the global epidemic are subtypes A and C, followed by the recombinants CRF01_AE, CRF02_AG and subtype B. The greatest genetic diversity of HIV-1 has been found in Africa, especially Central Africa, where all currently known subtypes have been found. The global distribution of different forms of HIV-1 is a dynamic process. As more HIV-1 variants intermix in different parts of the world, the likelihood that new recombinant viruses will be formed will inevitably increase.

Recombination between divergent strains, such as group M and O, could contribute substantially to the emergence of new HIV-1 variants. This could have important implications both for diagnosis and monitoring of HIV infection by serological and molecular tests. Sera from group O patients gave false negative results in several HIV screening assays (and indeterminate results in confirmatory tests) when the group O viruses were newly discovered. This has now been corrected for the majority of commercial HIV antibody assays. However, several studies have reported that commercial HIV plasma RNA assays also had subtype problems. New assays are constantly under development, but as even greater variability of HIV-1 emerges, tests will need to be continuously monitored for possible insufficiencies associated with viral variation.

Appropriate and necessary conditions for effective HIV/AIDS diagnostic

In contrast to those in industrialized countries, most patients from resource-poor countries are already in an advanced stage of the disease when they are identified as HIV-positive and treatment is initiated. The diagnosis of HIV infection is often delayed due to the lack of testing and treatment services and absence of information. Therefore patients are more likely to have coexisting morbidity which may affect the choice of therapy, and may limit the scope of the potential spectrum of drug interactions and toxicity. Due to the high cost of ARV, the complexity of the regimens, and the rapid emergence of resistant viruses when treatment regimens are not optimal, reliable laboratory diagnostic and monitoring services have to be in place when introduction of ARVs is considered.

Initiation of ARV treatment requires the following:

- Appropriate diagnosis of HIV infection
- Recognition of opportunistic infections
- Determination of the immune status of the patient

Monitoring ARV treatment requires

- Monitoring of immune status
- Recognition of opportunistic infections
- Monitoring of adverse affects from the drugs
- Monitoring of viral load in some cases
- Detection of resistant HIV variants in some cases

References

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