

Hiv-1 detection by western blot and dna rna microarray

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HIV DETECTION BY WESTERN BLOT AND DNA/RNA MICROARRAY due:

Introduction The HIV virus The human immunodeficiency virus type 1 abbreviated as HIV-1 is a retrovirus, which is the cause of AIDS. Infection by the virus results to progressive degradation of the immune system, such that the body cannot defend itself against other infectious disease agents such as bacteria, fungi and other viruses. Once the virus infects a cell, it integrates into the host genetic material where it either starts cycles of replication (symptomatic) or remains inactive. This results to latent infection in cellular reservoirs (asymptomatic) (Kassutto & Rosenberg 2004, p. 1447). The structure of the virus consists of RNA particles, reverse transcriptase (a DNA polymerase) protein layer and a lipid double layer obtained from the host cell membrane. Unclear understanding of the interactions between the body and the virus limits progress in detection, treatment and prevention of the disease.

The Western blot analysis

The Western blot is also referred to as the Enzyme-Linked Immunosorbent Technique. It is used to detect antibodies to HIV-1 in exposed or infected patients (Syed et al. 2005, 443). The analysis basically involves the transfer of protein bands from an agarose or polyacrylamide gel to a charged nylon membrane where they can be analysed. The transfer is done through electrophoresis by capillary flow or application of vacuum in special chambers. The transferred protein is then viewed through staining the membranes using protein dyes. To view specific proteins, further treatment with a secondary antibody and enzyme is done to produce chromogenic

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products that can be easily viewed on the nylon membrane. The Western blot technique has been utilized in many tests, although it is prone to some degree of error where false negative or false positive results can be obtained. It is, therefore, advisable to perform several different tests to ascertain the presence of HIV-1 in a specimen (Owen 2007, p. 19).

DNA/RNA Microarrays

This technique uses DNA/RNA microarray chips to detect gene expression of thousands of specific genes (Sealfon & Chu 2011, p. 3). Miniature DNA sequences are arranged on a microscope slide by robotic machines. mRNA obtained from a patient is then converted by reverse transcriptase to cDNA, and a fluorescent light attached to it in the process. The cDNA is then put on the glass slide and binds to the DNA strands on the slide. The resulting combination can be viewed using special scanners and indicate the level and type of gene expression in the cell (National Human Genome Research Institute 2011, para 3). Since HIV-1 alters the expression of gene expression in host cells, it is possible to test and know if one is infected with the virus using this technique. However, the method faces challenges due to the frequent mutation of the virus

Aims of the experiments

The objective of the Western blot analysis experiment is to understand the concepts and methodology involved with Western blots by testing for simulated viral proteins from hypothetical cell cultures infected with serum from HIV seropositive individuals. The DNA/RNA microarrays experiment aims at using DNA/RNA microarrays for host cell genes to identify infection of a patient by HIV.

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