

Critique of the theory and practicalities of viral diagnostic methods essay

[Design](#)



Introduction:

Viral diseases are progressively going composite in the present medical universe.

There are a smattering of diagnostic methods that are available and helpful but merely to certain extend. In instance of U. K it was found that by the twelvemonth an norm of 3, 500 HIV diagnosings are performed. From past twenty old ages many new viruses and a few of them with subtypes are identified. A few are HIV with subtypes 1 & A ; 2, Human T-cell lymphotropic virus 1 & A ; 2 [10] .

Some of the betterments in nucleic acid based sensing techniques helped to acquire in deepness with viruses life rhythm, morphology, genotypes, sequence and its resistant forms. In recent old ages at that place in an addition in the development of antivirals for viruses of commercial and non commercial involvement. With addition in spread of viral infections there is a necessity of developing and traveling towards new diagnostic attacks.

Cardinal words: Cytopathic Effect (CPE) , Cytomegalovirus (CMV) , Transcription Mediated Amplification (TMA) , PCR.

Detection Methods:

The viral disease diagnosing is divided into two methods. One is the direct method and the other is indirect method. These methods are employed in common to observe most of the viruses. But in instance of certain specific viruses some specific diagnostic methods are employed. The major difference in between the direct and the indirect methods are ; the direct

method is an conventional method which uses cell civilization to insulate the virus and some other some other techniques for the sensing of viral antigens. While in instance of the indirect method it depends upon the antibody responses to viral infections in serum and other organic structure fluids [9] .

Cell Culture:

This is one of the conventional methods that come under the class of direct sensing method.

Weller and Enders [1] are the first people who isolated virus from the cell civilization. The major importance of this method is its ability to supply a feasible isolate which can be used for farther word picture. The virus nowadays in the cell civilization is identified based on the Cytopathic Effect (CPE) [1] , which is the alteration of morphological signifiers in the cells. Different cell civilizations are used for the isolation of different viruses. Enterovirus and respiratory viruses are isolated by utilizing monkey kidney cell line.

Cytomegalovirus (CMV) which found largely in urine samples is stray utilizing the human fibroblast cells [1] . Some alterations are made for the common civilization methods in order to diminish the clip taken for the civilization. Shell vial civilization method is a new method that reduces the clip period required for the viral growing and involves incubation of the centrifuged sample which is so detected by utilizing fluorescent antibody staining [3] . Genetically engineered cell lines are a new discovery in which the viral receptors are inserted straight into the index cell lines (contains

<https://assignbuster.com/critique-of-the-theory-and-practicalities-of-viral-diagnostic-methods-essay/>

transfected cistrons) that leads to the look of booster. The newsman enzyme I β -galactosidase is triggered by the activation of booster identifies the viruses like HIV [11] .

Electron Microscopy:

Many of the viruses like enteroviruses, reoviruses, adenoviruses, etc can be easy detected and diagnosed utilizing the Electron Microscopy (EM) [6] . As the viruses are divided based up on their size, construction it was easy to place a certain type of virus utilizing EM.

One of the major advantages of this method is its ability to observe viral atoms in assorted types of clinical samples like biopsy samples, urine samples, crust, plasma, etc and the easiness in readying of specimens [7] . Immune negatron microscopy is another subdivision of EM which helps to increase the sensitiveness in observing virus by utilizing a specific antiserum that attaches to the needed viral antigen. Even this method has the ability to place viral atoms at higher truth it lacks usage due to its drawbacks as it consumes more clip and deficiency of sensitiveness when compared to other methods as it can recognize 10⁵-10⁶ atoms per milliliter [8] .

Nucleic Acid Detection:

Nucleic acerb sensing method is one of the land interrupting accomplishments in the field of diagnostic virology. Using these methods it is easy to place a virus due to higher sensitiveness of the techniques. Some of the techniques used for this method are bDNA (branched concatenation Deoxyribonucleic acid) , Transcription Mediated Amplification (TMA) and Polymerase Chain Reaction (PCR) . Among these three techniques PCR is

<https://assignbuster.com/critique-of-the-theory-and-practicalities-of-viral-diagnostic-methods-essay/>

widely used [1] . In instance of the bDNA engineering it is easy to supervise curative responses in instance of viruses like HIV-I based up on the rise or autumn of the transcript figure.

bDNA achieves higher sensitiveness through signal elaboration of the bDNA investigation [12] . PCR is the most widely used technique as this can be applied to virus of any sort [4] . Another advantage of PCR is its sensitive sensing ability of observing specific nucleic acids [1] . PCR has the capableness to observe more than one virus. Other type of PCR called RT-PCR (Reverse Transcriptase-PCR) which is run by the add-on of an enzyme called contrary RNA polymerase it can besides observe the viral RNA [10] .

Real Time PCR is besides a widely used due to its high sensitiveness, velocity of reaction, low hazard of merchandise taint as it being a closed system and its ability for mutational analysis. Another Nucleic Acid sensing technique called Transcription Mediated Amplification is used to observe the sexually familial diseases [13] . Some of the major drawbacks of PCR are quantification of variables largely at the early phases of elaboration procedure, expensive, seldom available and require considerable expertness.

Immunofluorescence & A ; Antigen Detection:

Immunofluorescence is really utile technique in seeking the location of virus specific antigens accumulated in the karyon or cytol of the infected cell [5] . This technique was foremost found by Coons et Al. One of the major advantages of this technique is to name the disease instantly in the patient ' s specimen.

Some of the immunofluorescent methods are Fluorescent Antibody (FA) [4] staining and immunoperoxidases staining. Gel diffusion and latex agglutination are the two techniques that are used antecedently for direct sensing of viral antigens but presently really rare in usage [4] . The FA labelling technique was used majorly for the sensing of respiratory viruses and the method is improved drastically by specimen readying through cytocentrifugation and uninterrupted staining with different antibodies of different fluorescent labels [16] . Some of the viruses that are detected are influenza, RSV, parity grippe, HSV and adenovirus [1] .

The major advantage of this method is its celerity.

Enzyme Immuno Assays (EIA) :

EIA is a technique which is largely employed on worlds (herpetic infections, etc) for serodiagnosis [15] . This technique is extremely sensitive (detects antiviral antibodies) , specific and can be easy performed [3] .

In application with viral sensing, the drawback for this method is, as it has a limited clinical public-service corporation. The viruses that are specific for the IgM antibodies to the viral mirid bug antigen are CMV, hepatitis A virus, EBV and for IgM antibodies to the hepatitis B nucleus antigen are hepatitis B, parvovirus, Mumps, Measles and Rubella [1] .

Diagnosis of Specific viral Diseases:

The diagnostic methods of specific viral diseases vary depending upon the nature of infection. In Mucocutaneous infections method employed for these infections in FA staining and had a specificity of 80 % [1] . While in instance

of Respiratory Infections the methods employed for most of these infections are FA and EIA and had a specificity of 80 % -100 % . CNS infections (acute meningitis, acute phrenitis and timeserving infections) the major bases of diagnosing are Nucleic Acid Amplification Tests (NAAT) .

For HIV and human retroviruses the common diagnostic method is EIA and had a specificity of 99. 9 % ` [1] .

Problems and Possible Solutions:

Some of the jobs that are majorly associated with in the molecular nosologies are quantitative techniques which can be solved utilizing existent clip elaboration techniques [2] . Most of the molecular diagnostic methods are clip devouring so an machine-controlled system is ever recommended which is ever helpful for disease direction. More work has to be done on major harm doing viruses like HIV, Hepatitis B, C viruses, CMV and Human papilloma virus [2] . Apart from these some of the common jobs which may take to hapless consequences or harm to the procedure are traveling through the procedure of fixing specimen to obtaining terminal consequences and managing mistakes. These mistakes can be overcome by keeping rigorous hygiene conditions, use of colored reagents, rechecking the labelling and use of information systems (barcodes, RFID Tags, etc) to obtain 100 % preciseness starting.