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Short Communication

The Importance of Molecular Diagnostic Methods for Infectious Diseases

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ABSTRACT

An infection is the invasion of disease-causing agents into an organism's body tissues, their replication, and the host tissues' response to the infectious agents and the toxins they create. An infectious disease, also known as a transmissible or communicable disease, is a condition caused by an infection. Infections can be caused by a variety of pathogens, the most common of which are bacteria and viruses, but there are also other forms. The immune system of hosts will help those combat infections. Mammalian hosts respond to infections with an innate, often inflammatory, response, which is followed by an adaptive response.

Keywords: Infectious Diseases; Molecular Diagnostic; Antibody; Biological assays

INTRODUCTION

An infection is the invasion of disease-causing agents into an organism's body tissues, their replication, and the host tissues' response to the infectious agents and the toxins they create. An infectious disease, also known as a transmissible or communicable disease, is a condition caused by an infection. Infections can be caused by a variety of pathogens, the most common of which are bacteria and viruses, but there are also other forms. The immune system of hosts will help those combat infections. Mammalian hosts respond to infections with an innate, often inflammatory, response, which is followed by an adaptive response [1].

The identification of genomic variants is referred to as molecular diagnostics, and it aims to make detection, diagnosis, sub-classification, prognosis, and tracking response to therapy easier. Molecular diagnostics is the result of a fruitful collaboration between laboratory medicine, genomics expertise, and technology in the field of molecular genetics, especially with recent breakthroughs in molecular genomic technologies. In the last decade, molecular diagnostics has experienced rapid development and growth. The integration of emerging technology and the application of new high-complexity tests into the clinical molecular diagnostics laboratory have been crucial in advancing toward the objective of precision medicine [2].

In the fields of cancer, infectious disease, and congenital defects, molecular diagnostics are rapidly being used to direct patient care from diagnosis to treatment. The rapid growth of molecular techniques in clinical laboratories has resulted from the increased demand for genetic and genomic knowledge. Maintaining good laboratory practises and regulatory adherence is critical to the success of clinical genomics, which can be difficult in the face of rapid development, new technologies, and an ever-changing regulatory environment [2].

Role of molecular diagnostic

Molecular testing tests have many benefits over serologic methods in the emergency room. For the acutely ill patient, molecular methods specifically assay for the presence of the microorganism at the moment the specimen is collected, which is ideal. Even for immunoglobulin M tests, serologic methods assay for an antibody response to the microorganism typically require at least a week of symptoms. Patients who are immune-compromised or immune-suppressed often fail to mount an adequate antibody response. As a result, testing a patient early in the course of the disease or testing a patient with immune dysregulation would often result in false-negative results for serologic assays [3].

If the assay can be done locally, molecular methods can also provide a faster aetiology diagnosis than culture, with results available within hours. Many infectious agents are difficult to culture (e.g., Mycoplasma pneumoniae) or fastidious (e.g., Bordetella pertussis), resulting in a high rate of false-negative outcomes [4].

Different methods for molecular diagnostics

In vitro biological assays such as PCR-ELISA or Fluorescence in

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situ hybridization are used in molecular diagnostics. In a sample taken from a patient, the assay detects a molecule, often in low concentrations, that is a marker of disease or risk. It's crucial to keep the sample safe before analysing it. Manual handling should be held to a minimum. The delicate RNA molecule faces a number of difficulties. It provides a measure of gene expression as part of the cellular process of transmitting genes as proteins, but it is susceptible to hydrolysis and degradation by the ubiquitous RNAse enzymes. Liquid nitrogen can be used to snap-freeze samples, or preserving agents can be used to incubate them. Sensitivity, turnaround time, cost, coverage, and regulatory approval differ widely among molecular diagnostic tests. They also differ in terms of the degree of validation used in the laboratories that use them. As a result, where the result can be used to inform a patient care decision, robust local confirmation in compliance with regulatory requirements and the use of appropriate controls is required [5,6].

CONCLUSION

Infectious diseases like chlamydia, influenza virus, and tuberculosis, as well as unique strains like the H1N1 virus, are diagnosed using molecular diagnostics. A loop-mediated isothermal amplification test, for example, diagnoses the malaria parasite quickly and is rugged enough for use in developing countries

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