WINSOME PUBLISHING
Pharma Scope and Advances in Drug Sciences

Short Communication Open Access

Pattern of antigen antibody reactions

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Received date: October 2, 2024; Accepted date: October 26, 2024; Published date: October 31, 2024

Citation: Nnodim Johnkennedy, Pattern of antigen antibody reactions, **Pharma Scope and Advances in Drug Sciences**, vol 1(1). DOI: 10.9567/ISSN.2024/WSJ.92

Abstract

Enzymes are biological catalysts (also known as biocatalysts) that speed up biochemical reactions in living organisms, and which can be extracted from cells and then used to catalyse a wide range of commercially important processes. This work covers the basic principles of enzymology, such as classification, structures, kinetics and inhibition and also provides an overview of industrial applications. In addition, techniques for the purification of enzymes are discussed.

Keywords: Pattern, antigen, antibody, reactions

Introduction

Antigen-Antibody reaction is a specific chemical interaction between antibodies produced by B cells of the white blood cells and antigen during immune reaction [1]. The antigens and antibodies combine by a process called Agglutination. It is the fundamental reaction in the body by which the body is protected from complex foreign molecules such as pathogens and their chemical toxins [2]. These reactions serve as a foundation for the detection of both specific and non- specific antigen such as enzymes that cause non-specific diseases. Serological reactions are referred to as antigen- antibody reactions when they occur in Vitro [3]. In the blood, the antigens are specifically and with high affinity bound by antibodies to form an antigen-antibody complex. The immune complex is then transported to cellular systems where it can be destroyed or deactivated [4]. There are 3 stages, to the interactions between antigen and antibody; the first stage of the reaction entails the formation of the antigen- antibody complex. The second stage results in visible phenomena like agglutination, precipitation, etc. The third stage involves the destruction of antigen or neutralization of antigen [5]. The first correct description of antigen-antibody reaction was given by Richard J. Goldberg at the university of wiscousin in 1952. It came to be known as “Goldberg’s theory” (of antigen-antibody reaction) [6]. There are several types of antibodies and antigens, and each antibody is capable of binding only to a specific antigen. The specificity of the binding is due to specific chemical constituent of each antibody [7]. The antigenic determinant or epitope is reorganized by the paratope of the antibody, situated at the variable region of the polypeptide chain. The variable region in turn has hyper-variable region which are unique amino acids sequences in each antibody. Antigens are bound to antibodies through weak and non-covalent interactions, hydrogen bonds, Van der waals forces, and hydrophobic interactions [8].

STAGES OF ANTIGEN- ANTIBODY REACTIONS.

1. PRIMARY STAGE: It is the initial interaction between antigens and antibodies. It is rapid, reversible and without any visible effects.

2. SECONDARY STAGE: It is the irreversible interaction between antigens and antibodies. It is slow and with visible effects [9]. The most widely used strategy in the laboratory to enhance the visibility of antigen-antibody reaction is centrifugation. After allowing sufficient time for antibody to recognize and react with antigen, which may be within seconds or may take much longer, up to one hour, test can be centrifuged to force the cells closer together. In this way, agglutination may be enhanced, whereas cells that have not reacted

3. TYPES OF ANTIGEN- ANTIBODY REACTION

The types of antigen-antibody reactions are as follows;

1) Haemagglutination. 2) Sensitization. 3) Haemolysis. 4) Neutralization. 5) Precipitation. Haemagglutination occurs when lgm antibodies react with their corresponding red cell antigen (11). Sensitization occurs when lgG antibodies react with their corresponding red cell antigens. Sensitization is not an observable reaction, and potentiators may be employed to allow sensitized cells to agglutinate. Haemolysis is the result of antigen-antibody reaction utilizing the complement cascade all the way to cell membrane attack and rupture. Neutralization of antibodies occurs in the presence of the corresponding antigen in soluble form. An antibody that has been neutralized cannot thereafter react with red cells containing the corresponding antigen. Precipitation of

soluble antigen and antibody is able to take place when the two reactants are present in the correct proportions [12]. Alternatively, immune diffusion allows for the development of a precipitin line between antigen and antibody, in an appropriate gel medium. Many factors influence antigens- antibody reactions; these include the member and site of antigenic determinants on cells, the distance between epitopes, the electric repulsions between red cells, the goodness of fit between antibody and antigen, the immunoglobulin class, the concentration of antibody as well as the effects of time, temperature PH and ionic strength of the surrounding test environment. Proteolytic enzymes are able to reduce zeta potential, causing sensitized cells to agglutinate.

Conclusion

The principles of specificity and cross- reactivity of antigen-antibody interactions are useful in clinical laboratory for diagnostics purposes. One basic application is determination of ABO blood group. It is also used as a molecular technique for infection with different pathogens, such as HIV, microbes, and helminth parasites.

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