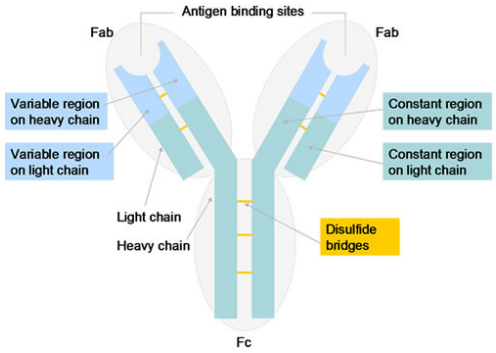
Antibody Basics

What is an antibody?

The recognition of a foreign antigen is the hallmark of an adaptive immune response. In this process, two distinct types of molecules, immunoglobulins and T-cell antigen receptors (TCRs), are presented. Immunoglobulins are a class of glycoproteins present in the serum or tissue fluids of all mammals. They are produced by plasma cells in response to an immunogen and function as antibodies. The immunogen is a specific type of antigen, which is able to trigger an adaptive immune response if injected on its own. Antibodies are found free in the blood or lymph. They recognize and bind to a specific region of an antigen, called an epitope or antigenic determinant. There are five distinct classes of antibody in higher mammals, namely IgG, IgA, IgM, IgD and IgE. They differ in size, charge, amino acid composition and carbohydrate content, but they share a similar basic structure. The antibody molecule is bifunctional, the Fab component is used to bind antigen while the Fc region mediates the biological effect and is designated the effector region.

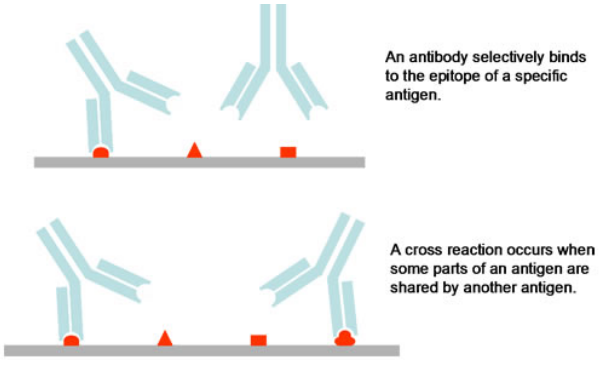
Antibody structure

The basic structure of an antibody consists of two identical short polypeptides (light chains) and two identical long polypeptides (heavy chains), which are connected by covalent and non-covalent bonds. Light chains consist of two distinct regions: CL (Constant: Light chain) is in the C-terminal half of the chain and is constant except for certain allotypic and isotypic variations; and VL (Variable: Light chain) which represents the N-terminal half of the chain and shows much sequence variability. Similar to light chains, heavy chains are also composed of two distinct constant and variable regions. The constant region of the heavy chain defines the class (IgG, IgA, IgM, IgD and IgE) and subclass of the antibody.



Antibody interaction with antigen

Antibodies form multiple non-covalent bonds with antigen in the binding site, including hydrogen and electrostatic bonds and Van der Waals and hydrophobic forces. The binding site is usually complementary to the conformation of the target antigen. However, cross-reactivity may occur when some regions in the epitope of an antigen are shared by another antigen.



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