Difference Between Complete and Incomplete Antibodies

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Key Difference - Complete vs Incomplete Antibodies

Antibodies are composed of B cells and are immunoglobulins that take part in immune reactions. Antibodies can be of different classes depending on its structure, function, their type of reaction and the presence of accessory components. Antibodies are present in response to an antigen and thus, also termed as antigenic determinants. Once the antibody recognizes an antigen, it binds to the antigen specifically to form an antigen-antibody complex. The complex formation will eventually activate defense mechanisms or directly degrade the foreign body that enters the system. Agglutination is a type of antibody-antigen reaction that takes place as a host defense mechanism. During this reaction procedure, the antibody binds to the antigen and forms a complex which eventually clump together. Based on the property of agglutination, antibodies can be categorized into two main types; complete antibodies and incomplete antibodies.

Even though complete antibodies have the ability to agglutination with antigens after recognizing the antigen, incomplete antibodies do not have the ability to agglutination. Instead it only participates in recognizing and identifying the antigens. The **key difference** between the complete and incomplete antibodies is the ability or the inability of agglutination.

What are Complete Antibodies?

Complete antibodies are a type of B cell immunoglobulins which take part in agglutination reactions after binding with an antigen. Complete antibodies have a specific property to bind to antigens and form clumps or agglutins, which enable to host phagocytes to identify the large foreign particle. Immunoglobulin G is a common type of a complete antibody. This will result in the activation of host defense mechanisms. This will engulf the complex as a whole. The two main applications of complete antibodies are hemagglutination and leukoagglutination. Antibodies produced by red blood cells and white blood cells are complete antibodies and hence participate in agglutination reactions. Therefor these agglutination tests are done during blood transfusion procedures to check the compatibility of blood groups between the donor and the recipient. If the agglutination occurs, the blood groups are incompatible and vice versa. Complete antibodies are also produced against many bacterial infections, and these complete antibodies form agglutinations with bacterial pathogens and initiate phagocytic reactions.

Agglutination reactions are therefor used widely as diagnostic tests to identify the presence of a bacterial pathogen. Synthetic complete antibodies are tested in vitro for the suspect's blood sample, and the presence of agglutins confer the occurrence of the particular infection. This test is of high precision and reliability.

What are Incomplete Antibodies?

Incomplete antibodies are mostly immunoglobulin M, and they do not participate in agglutination reactions upon binding to the antigen. Instead, these antibodies are produced in response to a particular antigen. The presence of incomplete antibodies can be detected in the serum as free antibodies by using antiglobulins. This test is referred to as the Coombs' test.

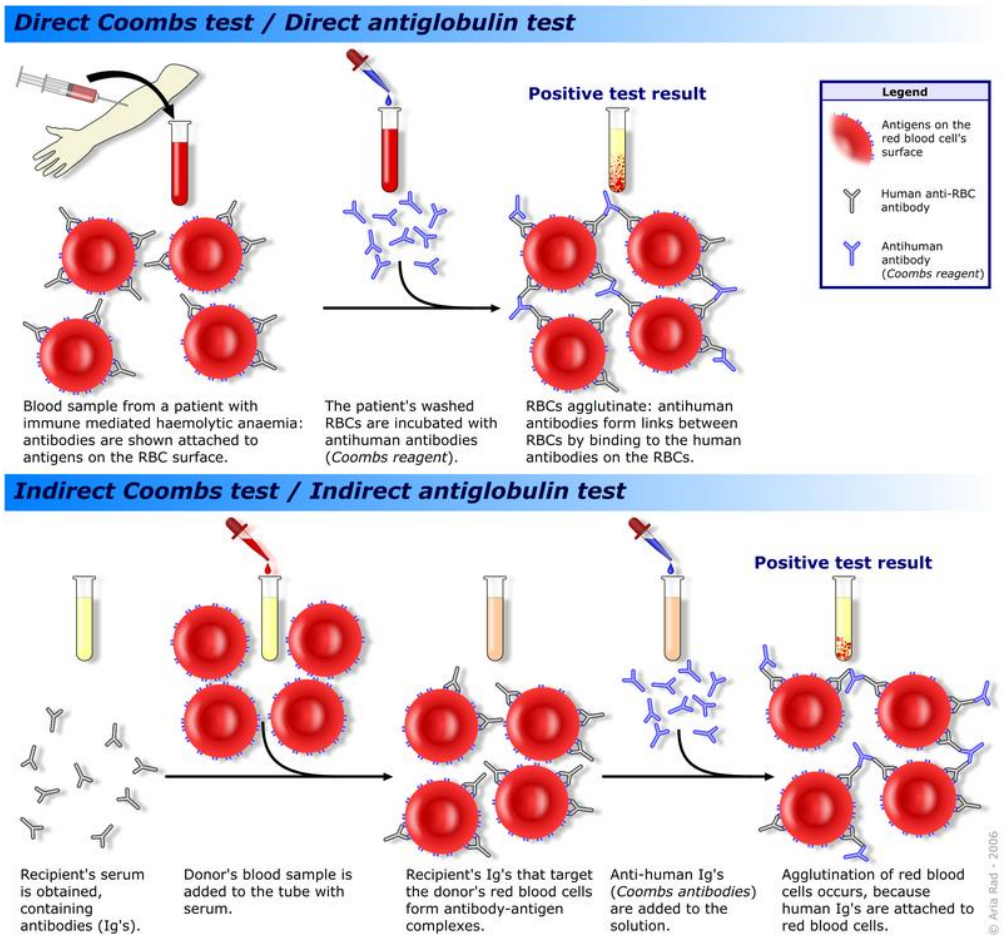

Fig 02: Coombs' test

In this test, the incomplete antibodies are allowed to bind to synthetic, specific target molecules known as antiglobulins. This is analyzed in order to determine the presence or the absence of the particular antibody in the serum. By doing this test procedure, a specific condition can be diagnosed and conformed. The incomplete antibodies are involved in indirectly activating an immune defense mechanism other than agglutination.

What are the Similarities Between Complete and Incomplete Antibodies?

- Both are composed of B cells.

- Both show high specificity.
- Both are involved in recognizing an antigen of a foreign cell.
- Both are used in *in vitro* diagnostic test procedures especially to determine the onset of infection.
- Samples such as serum or blood can be used for diagnostic tests of these antibodies.

What is the Difference Between Complete and Incomplete Antibodies?

Complete Antibodies vs Incomplete Antibodies	
Complete antibodies have the ability to form agglutinations with antigens after recognizing the antigen.	Incomplete antibodies do not produce Instead, it is produced an only response to the antigens.
Mechanism	
Complete antibodies form complexes with antigens which results in clumps or agglutinations.	Complex formation with an antigen does not occur in incomplete antibodies. Hence they stay as free antibodies in response to an antigen.
Type of test reactions	
Agglutination reactions are detecting as a test reaction for the identification of complete antibodies.	Coombs' test – serum analysis of incomplete antibodies using antiglobulins is done for incomplete antibodies.
Examples	
Immunoglobulin G and blood group antibodies are examples of complete antibodies.	Immunoglobulin M is an example of incomplete antibody.

Summary - Complete vs Incomplete Antibodies

Antibodies play a pivotal role in a host defense mechanism and participate in protecting the host from external attack by infectious agents or foreign substances. Identification of these foreign bodies is important to avoid any clinical manifestations arising from these agents. Complete and incomplete antibodies are types of antibodies which differ in their ability and inability to participate in agglutination reactions. Due to this contrast mechanisms of complete and incomplete antibodies, the diagnostic test procedures based on these antibodies are also differed significantly. This is the difference between complete and incomplete antibody.

Reference:

1.“Agglutination (Biology).” Wikipedia, Wikimedia Foundation, 9 Sept. 2017. Accessed 2 Oct. 2017. Available here
2.“Coombs test.” Wikipedia, Wikimedia Foundation, 13 Aug. 2017, Accessed 2 Oct. 2017. Available here

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