

## Coombs Test : Antiglobulin Test-Direct and Indirect

Coombs test is also known as the antiglobulin test. This test is used to demonstrate the coating of red blood cells with immunoglobulin G antibodies and [complement](#) (C3d).

Before we look at the procedure and interpretation of its results it is prudent that we have a look at the basics of the Coombs test.

### Basics of Coombs Test

Normally the body doesn't produce antibodies against its own cells. However, in some conditions such as autoimmune hemolytic anemia, the body mistakenly produces antibodies against the antigens on red blood cells causing immune-mediated action that destroys the red blood cells causing anemia. Coombs test then is used to detect these autoantibodies.

### Types of Antiglobulin test

There are two types of Coombs tests.

1. Direct Coombs test
2. Indirect Coombs test

The direct test looks for antibodies that are stuck to red blood cells. The indirect test looks for antibodies floating in the liquid part of your blood, called serum.

### Coombs Reagent

Coombs reagent is made by taking blood from a human then separating the serum with autoantibodies.

Then the serum is injected into a laboratory animal and the animal produces antibodies against the autoantibodies.

Then the blood from the animal is drawn and separated to give the formed antibodies.

A positive test requires about 200 antibody molecules to attach to each red cell.

### Direct Antiglobulin Test (DAT) or Direct Coombs Test

The direct antiglobulin test detects the presence of antibodies attached to the red blood cell surface.

The patient's red cells are mixed with Coombs reagent, which contains antibodies against human immunoglobulin G /immunoglobulin M/ complement.

If the red cells have been coated by antibody in vivo, the Coombs reagent will induce their agglutination and this can be detected visually. This is interpreted as Positive.

Direct antiglobulin test only tells you that there are antibodies attached to the red blood cells but it doesn't tell you which kind of antibodies they are.

## Findings

*Direct Antiglobulin Test is positive in:*

- Autoimmune hemolytic anemia (warm-IgG) or cold -IgM
- Alloimmune hemolysis due to recent transfusion,
- Hemolytic disease of the newborn
- Transfusion reactions
- Drug-induced hemolysis ie Methyldopa, levodopa, etc

## Indirect Antiglobulin Test (IAT)/Indirect Coombs Test

This second type detects which type of antibodies against red blood cells are in the plasma. The antibody then can be obtained from the red blood cell surface and then tested against a panel of typed red blood cells in order to determine against which red blood cell antigen it is directed to.

## Indication Of Indirect Antiglobulin Test

Indirect Coombs Test is indicated for:

- Antibody screen in pre-transfusion testing
- Screening in pregnancy for [hemolytic disease of the newborn](#)

The standard Coombs reagent will miss IgA or IgE antibodies.