

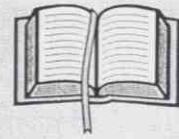
## MODULE 3 - ABO/Rh BLOOD TYPING

### BACKGROUND

Around 1900, Karl Landsteiner discovered that there are at least four different kinds of human blood, determined by the presence or absence of specific agglutinogens (antigens) on the surface of red blood cells (erythrocytes). These antigens have been designated as A and B. Antibodies against antigens A or B begin to build up in the blood plasma shortly after birth, the levels peak at about eight to ten years of age, and the antibodies remain, in declining amounts, throughout the rest of a person's life. The stimulus for antibody production is not clear; however, it has been proposed that antibody production is initiated by minute amounts of A and B antigens that may enter the body through food, bacteria, or other means. Humans normally produce antibodies against those antigens that are not on their erythrocytes: A person with A antigens has anti-B antibodies; a person with B antigens has anti-A antibodies; a person with neither A or B antigens has both anti-A and anti-B antibodies; and a person with both A and B antigens has neither anti-A nor anti-B antibodies. Blood type is based on the antigens, not the antibodies, a person possesses.

The four blood groups are types A, B, AB, and O. Blood type O, characterized by the absence of A or B agglutinogens, is the most common in the United States, in 45% of the population. Type A is next in frequency, found in 39% of the population. The incidences of types B and AB are 12% and 4% respectively.

In 1940, Landsteiner and Wiener discovered another group of antigens on the surface of red blood cells called Rh factors. They are called Rh factors because they were first found in Rhesus monkeys. An individual who possesses these antigens is designated Rh<sup>+</sup> and an individual who lacks them is designated Rh<sup>-</sup>. Unlike the ABO system, antibodies to the Rh factors are not normally present in the plasma, but are produced upon exposure to Rh factors. Exposure to Rh factors can occur during blood transfusions (if Rh<sup>+</sup> blood is transfused to an Rh<sup>-</sup> recipient), or when an Rh<sup>-</sup> mother carries an Rh<sup>+</sup> fetus.



#### **Agglutinogens (Antigens):**

Agglutinogens are substances found on the surface of erythrocytes.

#### **Agglutinins (Antibodies):**

Agglutinins are antibodies found in plasma.

Figure 1

Blood Type	Antigens on Erythrocytes (Agglutinogens)	Antibodies in Plasma (Agglutinins)	Can Give Blood To	Can Receive Blood From
A	A	Anti-B	A, AB	O, A
B	B	Anti-A	B, AB	O, B
AB	A and B	Neither Anti-A nor Anti-B	AB	O, A, B, AB
O	Neither A nor B	Both Anti-A and Anti-B	O, A, B, AB	O