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CORPUSCULAR ELEMENT OF BLOOD

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ABSTRACT:

Blood is a body fluid in the circulatory system of humans and other vertebrates that delivers necessary substances such as nutrients and oxygen to the cells, and transports metabolic waste products away from those same cells.Blood is composed of blood cells suspended in blood plasma. Plasma, which constitutes 55% of blood fluid, is mostly water (92% by volume), and contains proteins, glucose, mineral ions, and hormones. The blood cells are mainly red blood cells (erythrocytes), white blood cells (leukocytes), and (in mammals) platelets (thrombocytes). The most abundant cells are red blood cells.These contain hemoglobin, which facilitates oxygen transport by reversibly binding to it, increasing its solubility. Jawed vertebrates have an adaptive immune system, based largely on white blood cells. White blood cells help to resist infections and parasites. Platelets are important in the clotting of blood.

INTRODUCTION. Physiology of the human body. The Corpuscular Elements of Blood Blood is a fluid tissue with many various functions. Not only important physiological process takes place in the blood but it determines the activity of widely separated body cells.Blood is composed of plasma and the corpuscular elements which are called red corpuscles or erythrocytes, white cor¬puscles or leucocytes and blood platelets or thrombocytes. It is generally considered that no sex differences exist in the count of white corpuscles or leucocytes. The count of leucocytes in the blood of a healthy person is 4,500 to 9,500 per cu mm (cubic millimetre).When the number of white blood cells (WBC) is counted after mental or physical exertion, meals and mild activity it may increase to 10,000

and more per cu mm. It is estimated that the erythrocytes are the most numer¬ous cellular elements, ranging from 4,000,000 to 5,000,000 per cu mm. The red blood cell count (RBC) may change with age; when the red blood cell count is done after phys¬ical exertion and emotions it may increase. One knows that red corpuscles have two physical fea¬tures which are very important in the function of respiration. They have great elasticity and flexibility.These features give them the possibility to pass through very small capillaries. The discoid form of the corpuscle gives it a maxim¬al surface for a given mass. The most important part of the red cell is its red colour¬ing substance or hemoglobin which on an average forms about 36% of its mass. The total blood volume is divided into circulating and reservoir volumes.The average human blood volume is not less than 7.5% but not more than 10% of the body weight. It is generally stated that the circulating volume averages smaller in the females than in the males.The circulating volume of the blood depends on the changes of the air temperature. Blood is circulated around the body through blood vessels by the pumping action of the heart. In animals with lungs, arterial blood carries oxygen from inhaled air to the tissues of the body, and venous blood carries carbon dioxide, a waste product of metabolism produced by cells, from the tissues to the lungs to be exhaled. Blood is bright red when its hemoglobin is oxygenated and dark red when it is deoxygenated. Medical terms related to blood often begin with hemo-, hemato-, haemo- or haemato- from the Greek word αἷμα (haima) for "blood". In terms of anatomy and histology, blood is considered a specialized form of connective tissue, given its origin in the bones and the presence of potential molecular fibers in the form of fibrinogen.

Blood accounts for 7% of the human body weight, with an average density around 1060 kg/m3, very close to pure water's density of 1000 kg/m3. The average adult has a blood volume of roughly 5 litres (11 US pt) or 1.3 gallons, which is composed of plasma and formed elements. The formed elements are the two types of blood cell or corpuscle – the red blood cells, (erythrocytes) and white blood cells (leukocytes), and the cell fragments called platelets that are involved in clotting. By volume, the red blood cells constitute about 45% of whole blood, the plasma about 54.3%, and white cells about 0.7%.

About 55% of blood is blood plasma, a fluid that is the blood's liquid medium, which by itself is straw-yellow in color. The blood plasma volume totals of 2.7–3.0 liters (2.8–3.2 quarts) in an average human. It is essentially an aqueous solution containing 92% water, 8% blood plasma proteins, and trace amounts of other materials. Plasma circulates dissolved nutrients, such as glucose, amino acids, and fatty acids (dissolved in the blood or bound to plasma proteins), and removes waste products, such as carbon dioxide, urea, and lactic acid.

The term serum refers to plasma from which the clotting proteins have been removed. Most of the proteins remaining are albumin and immunoglobulins. Blood pH is regulated to stay within the narrow range of 7.35 to 7.45, making it slightly basic (compensation). Extra-cellular fluid in blood that has a pH below 7.35 is too acidic, whereas blood pH above 7.45 is too basic. A pH below 6.9 or above 7.8 is usually lethal. Blood pH, partial pressure of oxygen (pO2), partial pressure of carbon dioxide (pCO2), and bicarbonate ($HCO3^-$) are carefully regulated by a number of homeostatic mechanisms, which exert their influence principally through the respiratory system and the urinary system to control the acid–base balance and respiration, which is called compensation. An arterial blood gas test measures these. Plasma also circulates hormones transmitting their messages to various tissues. The list of normal reference ranges for various blood electrolytes is extensive. Blood is considered unclean, hence there are specific methods to obtain physical and ritual status of cleanliness once bleeding has occurred. Specific rules and prohibitions apply to menstruation, postnatal bleeding and irregular vaginal bleeding. When an animal has been slaughtered, the animal's neck is cut in a way to ensure that the spine is not severed, hence the brain may send commands to the heart to pump blood to it for oxygen. In this way, blood is removed from the body, and the meat is generally now safe to cook and eat. In modern times, blood transfusions are generally not considered against the rules. Robin Fåhræus (a Swedish physician who devised the erythrocyte sedimentation rate) suggested that the Ancient Greek system of humorism, wherein the body was thought to contain four distinct bodily fluids (associated with different temperaments), were based upon the observation of blood clotting in a transparent container. When blood is drawn in a glass container and left undisturbed for about an hour, four different layers can be seen. A dark clot forms at the bottom (the "black bile"). Above the clot is a layer of red blood cells (the "blood"). Above this is a whitish layer of white blood cells (the "phlegm"). The top layer is clear yellow serum (the "yellow bile"). In general, Greek thinkers believed that blood was made from food. Plato and Aristotle are two important sources of evidence for this view, but it dates back to Homer's Iliad. Plato thinks that fire in our bellies transform food into blood. Plato believes that the movements of air in the body as we exhale and inhale carry the fire as it transforms our food into blood. Aristotle believed that food is concocted into blood in the heart and transformed into our body's matter. Blood for transfusion is obtained from human donors by blood donation and stored in a blood bank. There are many different blood types in humans, the ABO blood group system, and the Rhesus blood group system being the most important. Transfusion of blood of an incompatible blood group may cause severe,

often fatal, complications, so crossmatching is done to ensure that a compatible blood product is transfused. Other blood products administered intravenously are platelets, blood plasma, cryoprecipitate, and specific coagulation factor concentrates. Many forms of medication (from antibiotics to chemotherapy) are administered intravenously, as they are not readily or adequately absorbed by the digestive tract. After severe acute blood loss, liquid preparations, generically known as plasma expanders, can be given intravenously, either solutions of salts (NaCl, KCl, CaCl2 etc.) at physiological concentrations, or colloidal solutions, such as dextrans, human serum albumin, or fresh frozen plasma. In these emergency situations, a plasma expander is a more effective life-saving procedure than a blood transfusion, because the metabolism of transfused red blood cells does not restart immediately after a transfusion.

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