

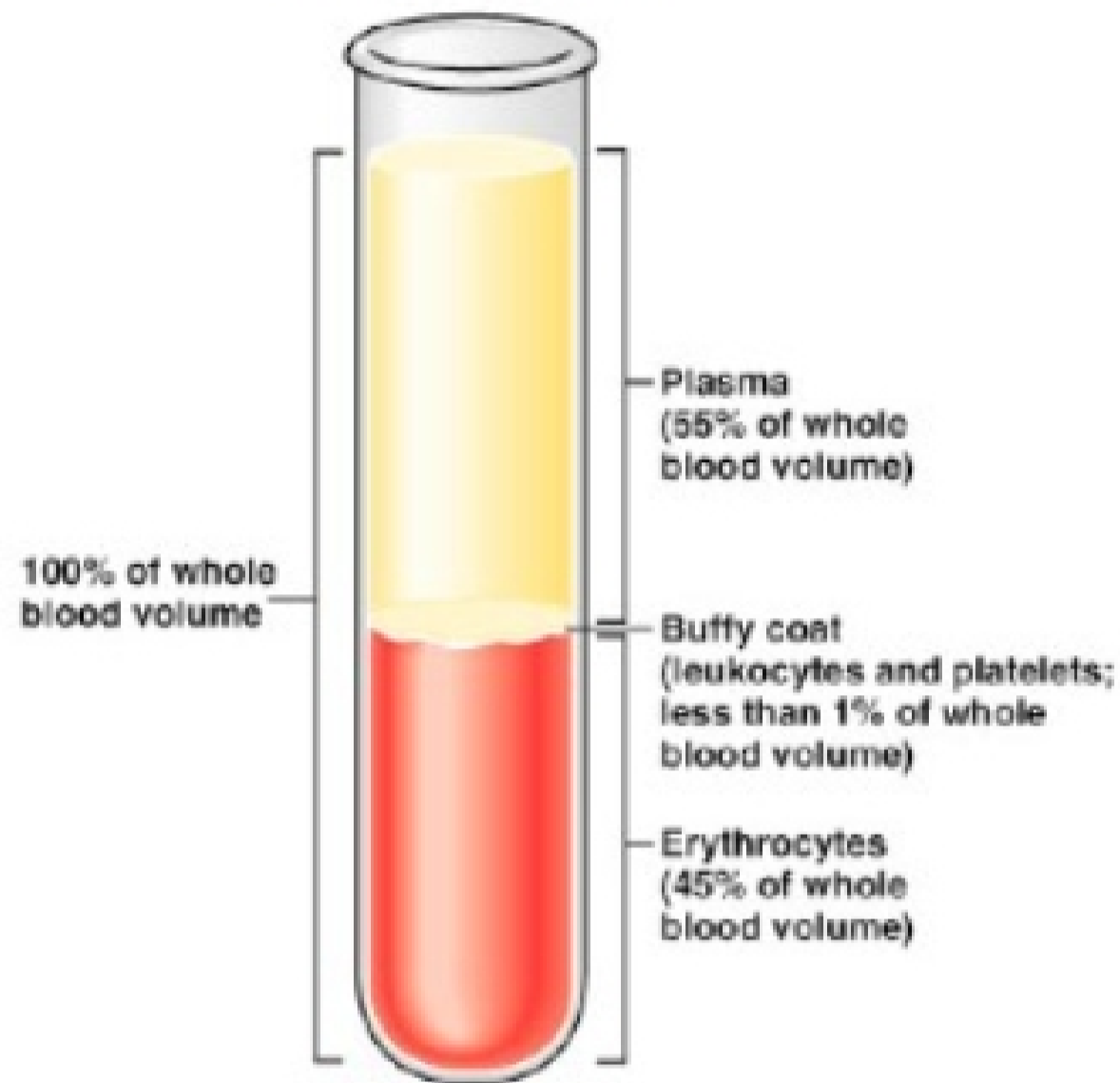
- **Blood**

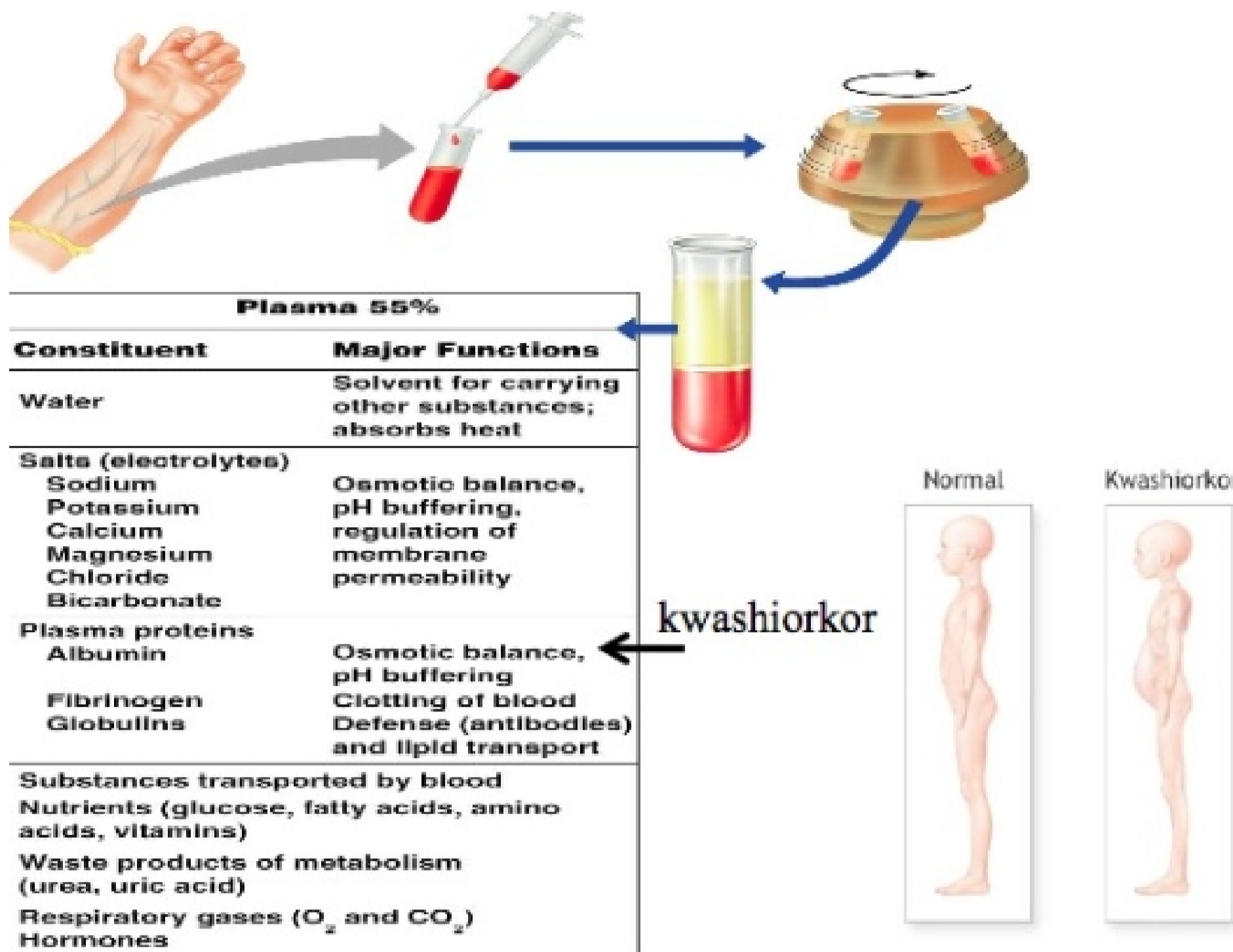
- Blood is the body's interior "river of life." It is blood's uniqueness as a "liquid tissue" that makes it so interesting to study. In the previous chapter, blood's role in transporting hormones around the body was explained—in this chapter, this key role of transport extends to nutrients, metabolic wastes, agents that combat injury and microbial infection, and, of course, oxygen.
- Blood is composed of formed elements and plasma. The formed elements are erythrocytes, leukocytes, and platelets. The physical characteristics of blood, including color, pH, and temperature, are presented, followed by a description of the plasma composition. The next section provides a detailed analysis of each of the formed elements. The function of erythrocytes as carriers of oxygen is explained, highlighting the role of hemoglobin in this capacity. General characteristics of leukocytes are described and then differentiated into granulocytes and agranulocytes, with the role of the cell types each category presented. Platelets, also called thrombocytes for their clotting ability, are the last of the formed elements to be analyzed.
- Hematopoiesis of the formed elements is presented in detail, including the role of erythropoietin, with the differentiation of hemocytoblasts into lymphoid and myeloid stem cells. The phases of hemostasis, or clot formation, are outlined next, followed by a summary of the homeostatic imbalances associated with hemostasis, which include undesirable clotting and bleeding disorders, such as thrombus formation or hemophilia.
- The final section of the chapter explains blood, blood type, and its impact on blood transfusions. The four ABO blood groups are presented first, along with a discussion of the phenomenon of agglutination, which elicits the symptoms of a transfusion reaction. Accompanying the presentation of Rh blood groups is an explanation of erythroblastosis fetalis, or hemolytic disease of the newborn.

Blood

- The only fluid tissue in the human body
 - Classified as a connective tissue
 - Components of blood
 - 1) Living cells called **FORMED ELEMENTS**
 - o Erythrocytes - red blood cells transports oxygen and carbon dioxide
 - o Leukocytes - white blood cells defend body against pathogens
 - o Platelets - cell fragments formed, from megakaryocytes, important in blood clotting
 - 2) Non-living matrix: plasma is the fluid and solutes
- Blood Hematocrit and Beyond
- When blood is centrifuged

- Erythrocytes sink to the bottom (45% of blood, a percentage known as the hematocrit)
- **BUFFY** coat contains leukocytes and platelets (less than 1% of blood), the buffy coat is a thin, whitish layer between the erythrocytes and plasma
- Plasma rises to the top (55% of blood)
- Average blood volume
 - o Women = 5.0 L
 - o Men = 5.5 L





Physical Characteristics of Blood

- Blood is used as a vehicle of transport □ Color range
 - o □ Oxygen-rich blood is scarlet red
 - o Oxygen-poor blood is dull red
- pH between 7.35–7.45 (7.4)
- Blood temperature is slightly higher than body temperature at 38° (**100.4 degrees**)
- Blood makes up 8% of body weight

Blood Plasma is ~90% Water

- 6-8% proteins which: increase osmotic pressure, buffer H⁺, increase blood viscosity, provide fuel during starvation
- 3 Major Classes of Plasma Proteins (synthesized in liver, except some globulins synthesized by lymphocytes)
 - Albumins: Major contributor to plasma oncotic osmotic pressure and act as carriers
 - Globulins: Carriers, Clotting factors, Precursor proteins (angiotensinogen), Immunoglobulins
 - Fibrogen: BLOOD CLOTTING
- Nutrients: glucose, amino acids, lipids, vitamins
- Wastes: urea, bilirubin, creatinine
- Gases (dissolved): oxygen, carbon dioxide
- Hormones