HEMATOLOGY

Session One

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Definition

Haima; means blood
Hematology is the science, or study, of blood.

BLOOD

Blood is a circulating tissue composed of fluid plasma and cells.
Composition of blood
A. Plasma (55%)
B. Cells (corpuscles) (45%)
The normal pH of blood is (7.35-7.45)
Average adult has a blood volume of about 5 liters.

A. Blood plasma

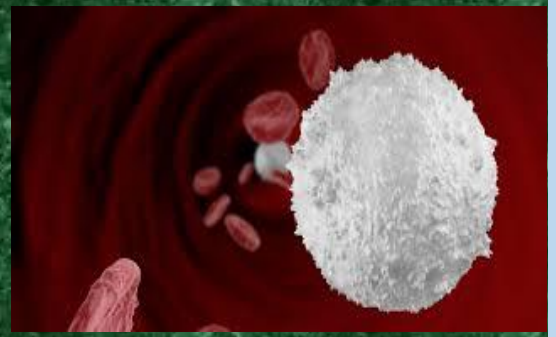
Composition: 91.5% water and 8.5% solutes (plasma proteins).
These proteins play a role in maintaining proper blood osmotic pressure.

B. Formed elements

1. Red blood cells (erythrocytes)

They are the most numerous cells in the blood.
Are non-nucleated
Source: marrow of the bones
Shape: biconcave
Color: Red
Function: Tissue respiration. (contain hemoglobin for 0_2 and $C0_2$ transportation)

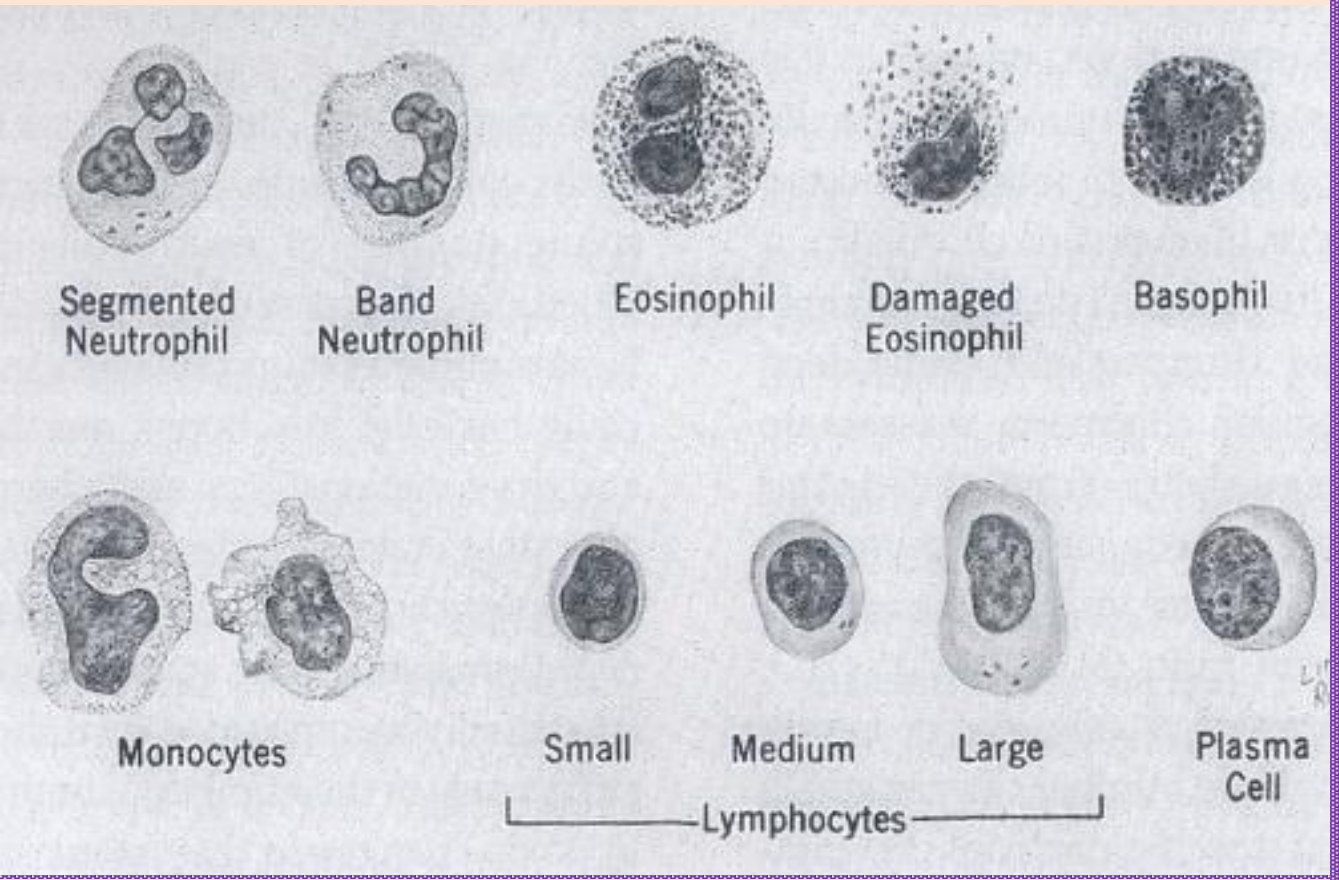
2. White blood cells (leucocytes)



Smaller in number than the red blood cells
Are nucleated cells
Source: bone marrow and lymphoid tissues (lymph nodes, lymph nodules and spleen).

Function: Body's defenses by phagocytosis.

Types of white blood cells (5): Neutrophils, Eosinophils, Basophils, Monocytes, Lymphocytes, Mononuclear lymphocytes, Polymorphonuclear, leucocytes/granulocytes



a. Neutrophils

Size: 10-12µm in diameter.
Color: Their nucleus that stain purple violet, cytoplasm (light pink)
Function: Fight bacteria

b. Eosinophils

Size: same as neutrophils
Color: Nucleus stains a little paler than that of neutrophils. Cytoplasm are pink.
Function: React against allergic reactions and helminthic infections.

c. Basophils

Size: 10-12µm in diameter.
Shape: Kidney shaped nucleus
Color: Nucleus stains deep purple/blue.
Function: React against inflammation and chronic myeloid leukemia.

d. Mononuclear Leucocytes (Lymphocytes)

There are two varieties:

a.Small Lymphocytes
Size: 7-10µm in diameter.
b. Large Lymphocytes
Size: 12-14µm in diameter.
Color: Both lymphocytes nucleus stains deep-purple. Cytoplasm (pale blue)
Function: Act against viral infections especially in children.

Monocytes

Size: Are the largest white cells with a size of 14-18µm in diameter.
Shape: 'horseshoe' shaped nucleus
Color: Nucleus stains pale violet. Cytoplasm stains pale grayish blue
Function: Act as "scavenger cells" by ingesting bacteria (e.g. tuberculosis) and protozoan infections.

3. Platelets (thrombocytes)

These are smallest
Are non-nucleated
Size: 1-4µm in diameter.
Color: Stain pale blue
Source: Bone marrow
Function: Prevent blood loss from haemorrhage (Blood cloting).

Function of blood

a. Transportation

0_2 and $C0_2$ within lungs and cells
Nutrients from the gastrointestinal tract to the cells
Heat and waste products away from cells
Hormones form endocrine glands to other body cells.

b. Regulation

pH through buffers.
Adjusts body temperature
Adjusts blood osmotic pressure

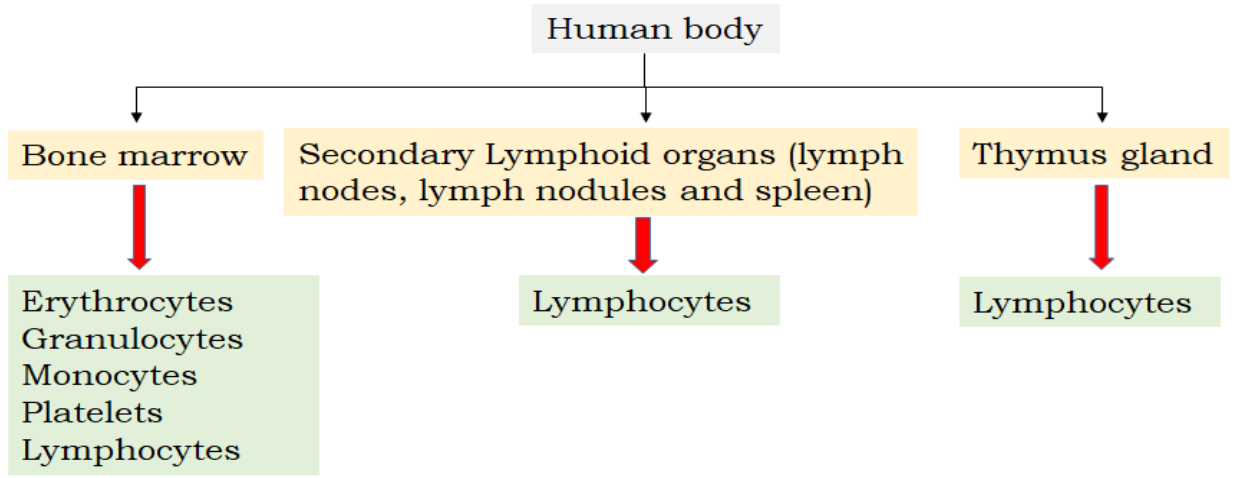
c. Protection

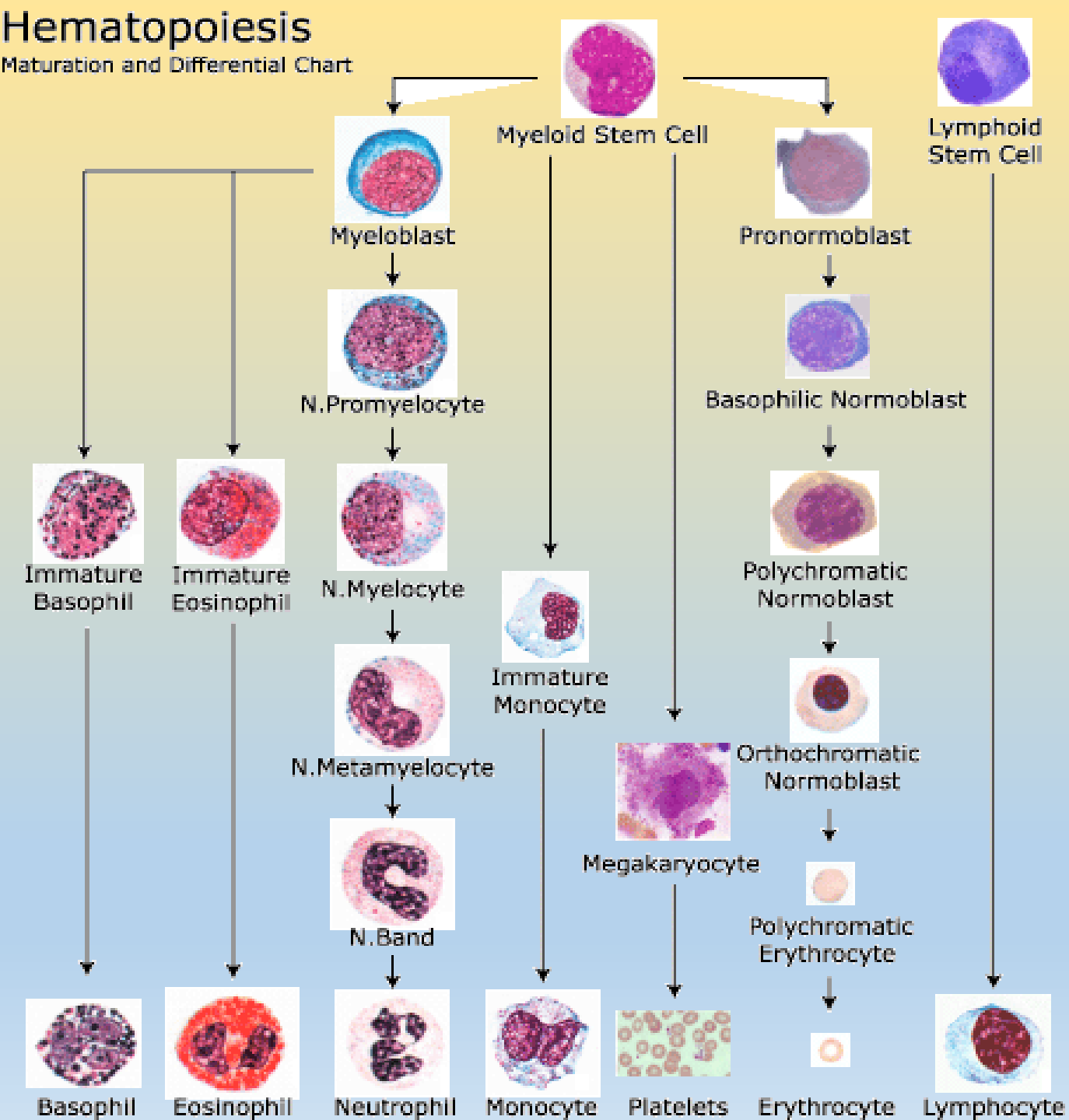
Blood clotting prevents blood loss
WBCs, plasma proteins (antibodies, interferon) protect against foreign microbes and toxins.

Formation of blood cells

Hemopoiesis/hematopoiesis: Formation and development of all types of blood cells from their parental precursors.

Location of cell formation





Group Discussion and personal studies

1. Regulation of Hematopoiensis
2. Formation of blood cells
   A. Erythropoiesis
   B. Leucopoiesis
   C. Thrombopoiesis