

INU Peshawar

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BASIC PHYSIOLOGY

Q No. 1: Briefly explain the process of hemato poiesis along with diagrammatic illustration.

HEMATOPOIESIS:

The process of formation of blood cells (RBC's, WBC's and platelets) is called as hemato poiesis. and sites where it occurs are known as hemopoietic tissues or organs (bone marrow, liver, spleen).

PROCESS OF HEMATOPOIESIS

It starts with first generation stem cell that is **pleuripotent stem cell** which divides into two to different types of multipotent stem cells.

These cells have a capacity to self renew by dividing. Two types of multipotent cells are

- 1) Common Lymphoid stem cells
- 2) Common Myeloid stem cells.

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1. Common Lymphoid Stem cells:

Further divide into three types.

A. PRO-NK Cells:

Enter into blood circulation called Natural Killer Cells.

B. PRO-T Cells:

Pre-mature cells, derivatives of pro-T cells enter into peripheral circulation. It enters into thymus for maturity after that come back to peripheral circulation as

T-lymphocytes known as CD-3 positive cells

T-lymphocytes divides into 2 types

CD-3 and CD-4 positive (T-Helper Cells) and again divided into T-H1 and T-H2.

T-H1 converted into active macrophages, epithelioid cells and giant cells.

T-H2 converted into Plasma Cells.

C. PRO-B cells

2. Common Myeloid Stem Cell:

Divides into 1

- Erythroid Megakaryoid Basophilic Stem cell
- Granulocyte monocyte Stem cells
- Eosinophiloid Stem cells.

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A. Erythroid Megakaryoid Basophilic Stem Cells:

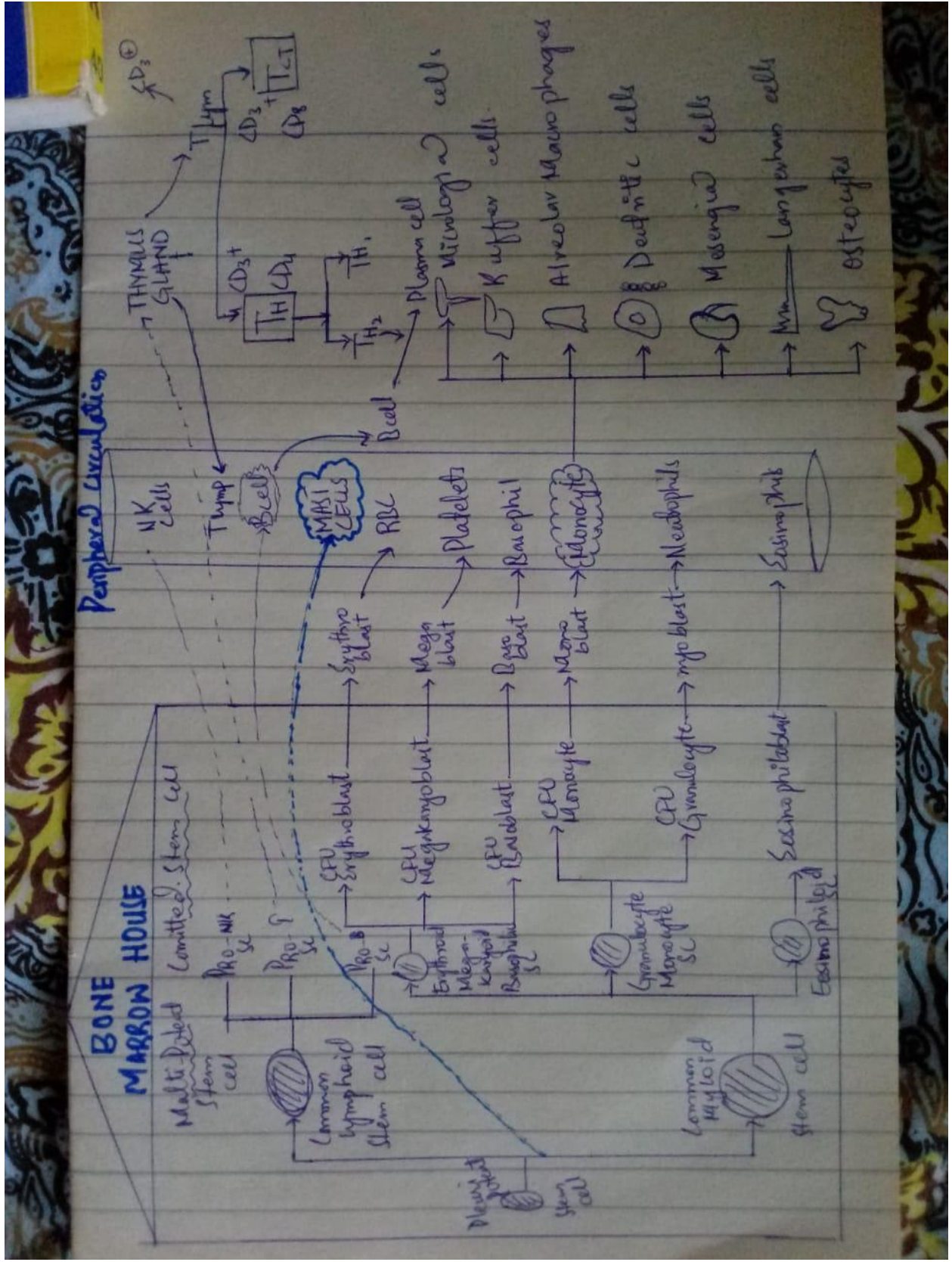
It is divided into 3 types of morphological precursors. cells.

- > CFU Erythroid System.
- > CFU Megakaryoid System
- > CFU Basophils System

B. Granulocyte Monocyte Stem cells:

It is divided into 2 types of morphological precursor cells.

- > CFU For Granulocyte
- > CFU For Monocyte



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QNO.2: What are the factors that influence the respiratory rate, explain in detail.

→ FACTORS INFLUENCING RESPIRATORY RATE:

• Physical Factors:

→ Increased Body Temperature:

The increase in temperature enhances the rate of cellular respiration. It is due to heat speeds up the reactions, means kinetic energy is higher. When temperature decreases, in order to conserve energy, cellular processes slow.

→ Exercise:

The heart rate increases during exercise. The depth of breathing increases and more oxygen is absorbed into blood and more carbon dioxide is removed from it.

→ Talking:

In speech respiration the duration of inspiration decreases and its velocity increases. The duration of expiration increases and the volume of air flow decreases.

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• Chemical Factors:

→ Carbon Dioxide level:

level of carbon dioxide in the blood is the main regulatory chemical for respiration. The amount of carbon dioxide in blood exerts a strong influence on respiratory rate.

Increased carbon dioxide, increases respiration. Changes in CO_2 act directly on the Medulla Oblongata.

→ Oxygen level:

Blood oxygen content exerts a secondary influence on respiratory rate. Normally oxygen level is 80 to 100 mm Hg. Respiratory rate is stimulated if it drops below 50.

Changes in oxygen concentration in blood are detected by chemoreceptors in the aorta and carotid artery.

• Other factors:

There are many factors that influence respiratory rate: age, gender, size and weight, exercise, pain, effect of medicine, drugs and excitement level.

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Q NO. 3: Enlist different layers of skin, write a detailed note on epidermis.

SKIN:

The skin is the largest organ of the integumentary system made up of multiple layers of ectodermal tissue, and guards the underlying muscles, bones, ligaments and internal organs.

LAYERS OF SKIN:

The human skin is composed of two primary layers.

The epidermis → which provides waterproofing and serves as a barrier to infections.

The dermis → which serves as location for the appendages of skin.

Dermis is the layer of skin beneath the epidermis that consist of connective tissue and cushions the body from stress and strain. The dermis is tightly connected to the epidermis by a basement membrane.

It consist of hair follicles, sweat glands, sebaceous glands, apocrine glands, lymphatic vessels and blood vessels.

EPIDERMIS:

The epidermis is the outermost layer of the skin. It forms the waterproof, protective wrap over the body's surface and is made up of stratified squamous epithelium with an underlying basal lamina.

It is divided in:

Stratum corneum

Stratum lucidum

Stratum granulosum

Stratum spinosum

Stratum germinativum.

Stratum Corneum:

It is outer layer of epidermis. It is made up of mostly keratin and lipids.

Stratum Lucidum:

It is a thin, clear layer of dead skin cells. It is visible by light microscope. It is found in palms of hands and soles of feet.

Stratum Granulosum:

The stratum granulosum is a thin layer of cells in epidermis. Keratinocytes migrating from the underlying stratum spinosum become known as

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granular cells in this layer.

Stratum Spinosum:

The spinosum is a layer of the epidermis found between the stratum granulosum and stratum basale.

Stratum Germinativum:

The stratum germinativum, which translates to germinative layer. This layer is composed of germinative keratinocytes. These cells are actively dividing to provide new cells to replenish lost skin from normal shedding.

QNO.4: Define lymphatic System, what are different components of lymphatic system?

Lymphatic System:

The lymphatic system is a system of capillaries, vessels, nodes and other organs that transport a fluid called lymph from the tissues as it returns to the bloodstream.

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The lymphatic tissue of these organs filters and cleans the lymph of any waste, abnormal cells, or pathogens. The lymphatic system also transports fatty acids from the intestines to the circulatory system.

Components of Lymphatic System.

The lymphatic system is a network of tissues and organs that primarily consists of

- lymph vessels
- lymph nodes (600 to 700 lymph nodes in human ^{body})
- lymph
- the tonsils (large clusters of lymphatic cells)
- Adenoids
- Spleen (largest lymphatic organ)
- Thymus (producing several hormones & closely related to immune system)

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Q. NO. 5: What is blood Pressure? How will you check and record blood pressure of a patient?

BLOOD PRESSURE:

The heart produces pressure, the force of blood on the wall of the arteries is known as blood pressure.

Blood pressure decreases as the heart relaxes, but the rest of circulatory system is still under pressure.

How to check?

When blood pressure is taken, the cuff is wrapped around the upper portion of the arm and pumped with air until blood flow in the artery is blocked.

→ As the pressure in the cuff is relaxed, 2 numbers are recorded.

- **Systolic pressure** the first number taken, is the force felt in the arteries when the ventricles contract.

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• **Diastolic pressure** - The second number taken, is the force of the blood on the arteries when the ventricles relax.

• The Normal BP range is $120\text{mmHg}/80\text{mmHg}$

• High Blood Pressure = $140/90$

• Low Blood Pressure = $90/60$

— X — X —

THE END