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Concept Of Body Organisation

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Abstract:

The human organism being as single cell, the fertilized ovum, which gives rise to the entire body. The body is composed of various types of specialized cells. Cells, which have a similar origin and structure and sub- serve the same general function, are frequently found grouped together to from t issues. Sometimes a single cell or tissue may function fairly independently of all others but more commonly a number of tissue are intimately associated to form larger units called organs e. g. heart, liver, kidney, pancreas, etc. Finally, the last order in classification is that of the organ system, a collection of organs which sub- serve an overall function. For example, the kidney, the bladder and the tubes leading from the kidneys to the bladder and from the bladder to the exterior constitute the urinary system. While unicellular organisms like amoeba interacts directly with the external and internal environment. For example hepatic cells of amoeba and human both get required energy from the breakdown of organic nutrients and the chemical reactions resultant of intracellular processes are specially effective on hepatic cells. Besides, we can observe similarities in both types of cells. The only difference is that amoeba takes necessary oxygen and gives up carbon dioxide directly from and to the atmosphere while humans depend upon the internal environment for these. A treatable human, who is organized from reproductive cells, depends upon internal environment, which is given below.[01]

Keywords: *Organs, Body, Bladder, Internal Environment, Human*

Introduction:

1. Internal Environment[02]

A cell is very fragile chemical machine. Large fluctuations in the physical and chemical properties of the fluid medium immediately Surrounding it can disrupt the regulated flow of metabolism maintaining the life of the cell. Seawater, whose temperature and chemical composition do not change rapidly, provided the stable environment for the first living cells which appeared on earth about 3 billion years ago. These single, free-living- cells obtained nutrients from the excreted wastes directly into the external environment seawater. Thus, life at this early stage depended upon chemical exchanges between two fluid environments separated by a plasma membrane. A loose association of

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independent cells into small clusters was the first step in the evolution of multicellular organisms. Only the cells at the surfaces of such clusters were in immediate contact with the external environment, seawater. Within the cluster, cells were surrounded by other cells and by extra cellular fluid, which had been trapped between the cells. Thus, this extra cellular fluid provided the immediate environment for the interior cells of the cluster.

Even though organisms have grown in size and complexity from these simple clusters, they have within them a thin layer of extra cellular fluid, which bathes each of cells in the body. In other words, the environment in which the trillions of cells in the body l ive is not the external environment surroundings the total organism but is the local fluid environment that immediately surrounds each individuals cells. It from this fluid, known as the internal environment, that a cell receives nutrients and into which it is excretes was a multicellular organism can survive only as long as it is able to maintain the composition of its internal environment in a state compatible with the survival of its individual cell. The central importance of the cellular fluid of the extra cellar fluid of the body. It is the fix of the internal environment, which is the condition free and independent life. All the mechanism, is however varied they may be having only one object that of preserving constant the condition of life in the internal environment.

Thisconcept of the internal environment and the necessityfor maintaining its composition relatively constant is the single most

important unifying concept to be kept in main while, attempting to unravel and understand the function and structure of the human body.

Body – fluid Compartment:

The total body fluid is distributed amongst two major compartments. The extracellu fluid and the interacellar fluid. The extracellur fluid in turn is divided into the interstitial fluid and the blood plasma. There is another compartment of fluid that is referred to as transcellular fluid. This compartment include, fluid in the synoval, pericardial, and intraocular spaces and well as the cerebrospinal fluid, it is usually considered to be a specialized type of extracellular fluid, although in some cases, its composition may differ markedly from thatof the plasma of interstitial fluid. All the transcellular fluid although constitute about 1 to 2 liters. In a normal 70 - kilogram adult human, the total body water averages about 60 percent of the body weight, or about 42 - liter. This percent age can change, depending on age, sex anddegree of obesity. As a person grows older, the percentage of total body weight that is fluid gradually decreases. This is due in part to the fact that aging is usually associated with an increased percentage of body weight that fat, which in turn decreases the percentage of water in the body. Because women normally have more body fat than man, they contain slightly less water than man in body fluid compartment s we should realize that variations exist, depending on age, sex degree of obesity.

Inter Cellular Fluid Compartment

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About 28 of the 42 liters of fluid in the body are inside the 75 trillion cells and are collectively called the intracellular fluid. Thus the intracellular fluidconstitute about 40 percent of the total body weightin an average man.

The fluid of each cell contains its individual mixture of different constitutes, but the concentrations of these substance are reasonably similar from one cell to another. In fact, the composition of cell fluid is remarkably similar even in different animals, ranging from the most primitive microorganisms to humans, for the intracellular fluid of the different cells together is considered to be one large fluid compartment.

Extra Cellular Fluid Compartment

All the fluids outside the cells are collectively called the extra cellular fluid. Together these fluids account for about 20 percent of the body weight, or about 14 liters in normal 70 kg adult. The two largest compartment of the extra cellular fluid are the interstitial fluid, which makes up about three fourth of the extra cellular fluid and the plasma, which makes up almost one fourth of the extra cellular fluid or about 3 liters. The plasma is the non- cellular part of the blood and communicates continuously with the interstitial fluid through the pres of the capillary membranes. These pores are highly permeable to almost all solutes in the extra cellular fluid except the proteins. Therefore, the extra cellular fluid is constantly mixing, so that the plasma and interstitial fluids have about the same composition except for proteins, which have a higher concentration in the plasma.

2. Units of Structural Organization

The cells of the body are combined to form a hierarchy of structural organization. Individual specialized cells are arranged into tissues, which are combined to form organs, which are linked together to form organ systems.
Four categories of specialized cells have evolved:

- Muscle cells, specialized for the production of forces whichproduce movement.

  Nerve cells specialized for initiation and conduction of electric signals over long distances.
- Epithelial cells specialized for the selective secretion of electricsignals over long distances.
- Connective t issue cells, specialized for the formation and secretion of various types of extra cellular connective and supporting elements

Elementary tissues of human body[03]

Most of the specialized cells in the body are associated with other cells of a similar

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kind. Forming multicellular aggregates known ast issues. Just as there are four general categories of specialized cell types in the body. There are, corresponding to these cell types, four general categories of tissues: muscle tissue, nerve tissue, connective tissue andepithelial tissue.

- Epithelial tissue, which covers body surface; lines holloworgans, body cavities, and ducts; and forms glands.
- Connective tissue, which protects and supports the body and its organ; binds organs together; stores energy reserves at fat and provides immunity.
- Muscle t issue, which is responsible for movement and generation of force.
- Nervous tissue, which init iates and transmits action potentials (nerve impulses) that help co-ordinate body activities.

Organs:[4]

The organs of the body are composed of the four kinds of t issues arranged in various proportions and patterns sheets, tubes, layers, bundles, strips etc. for example, the kidney consists largely of a series of small tubules, each composed of a single layer of epithelial cells. Blood vessels, whose walls consists of an epithelial lining and varying

Quantities of smooth muscle and connective t issue, nerve fibers with endings near the muscle and epithelial cells. A loose network of connective tissue capsules. The structural components of many organsare organized into small, similar sub units, each performing the

function of the organ. For example, the kidney 2 million functional units, the nephrons, are the tubules with their closely associated blood vessels. The total production of urine by the kidney consists of the sum of the amount formed by the individual nephrons.

3. Orientation to the Body[5]

In order to describe the location of a particular structure, a number of terms are used which specify directions. In the standard anatomic position the body in erect with the feet together, the arms hanging at the sides, the palms of the hands facing forward, and the thumbs pointing away from the body. All directions, including the various movements of the limbs, are described relatives to this standard anatomic position. Because of the erect posture of human beings, the terms posterior, towards the back and anterior, toward the front, are front, are used, as well as the when applied to human beings as compared with an animal that stand on dorsal surfaces the upper surface of the animal. In human beings, the cranial or superior direction is toward the head, and the caudalor inferior direction is toward the feet. In addition to the four primary direction- anterior (front), posterior (back), cranial (top), and caudal (bottom). One other set of directions is necessary to locate a position across the width of the body. The median sagittal plane divides the body symmetrically into toward it is medial. For

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example, the eyes are lateral to the nose and the nose is medial to each eye. Tow other primary planes of the body are the coronal plane and the transverse plane. Transverse planecan be placed though the body at any point along the cranial- caudal axis, passing through the head, the chest, or the legs, depending upon its location. Numerous sagittal and coronal planes can also be passed through various segments of the body in their respective planar

orientations. The terms used thus far refer to directions relative to the standard anatomic position. The two terms proximal and distal have a more generalized meaning referring to directions towards (proximal) oraway from (distal) the origin of a particular structures. For example,

the hands and feet are located at the distal ends of the limbs; the elbows and knees are located proximal to the hands and feet respectively, but still remain distal to the shoulder and hip.

The Body Cavities:

Most of the body's organs are located within two large cavities. The dorsal and ventral cavities, each of which has smaller subdivisions. The dorsal cavity consists of the connective cranial cavit y in the skull and smaller vertebral canal, which runs through the vertebral bones. The bones surrounding these cavities protect the delicate tissues of the central nervous system, the brain located in the cranial cavity and the spinal cord extending from the base of the brain though the vertebral canal. The dorsal cavity being surrounded on all sides by solid bone hasa fixed volume; any abnormal growth of tissue or accumulation of fluid within it exerts pressure on the brain or spinal cord, which can affect their functioning. In contrast to the dorsal cavity, the ventral cavity can vary in capacity a shape, depending on its contents and the muscular activity of the surrounding walls. The ventral cavity is divided into two distinct chambers, the thoracic cavity and the abdomino- pelvic cavity, by a sheet of muscle, the diaphragm.

The thoracic or chest cavity is surrounded by a protective rib cage, the diaphragm forming its floor. The major organs located in the thoracic cavity are heart and lungs, each of which is enclosed in its own separate chamber surrounded by a membranous lining.

The heart is suspended in a fluid filled sac, the pericardial cavity. On either side of a pericardial cavity are the tow lungs, each of which is enclosed in a separate chamber, a pleural cavity. The region of the

thoracic cavity located between the pericardial cavity and the two-pleural cavities is the mediastinum. The major blood vessels to the lungs and heart, the trachea, and the esophagus pass through the mediastinum; thethymus gland is also located there. The volume of the

thoracic cavity and the pressures in this cavity vary with each respiratory cycle, as

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the muscles of the diaphragm and surrounding rib cage contract and relax.

The largest single cavity in the body is the abdominopelvic pelvic cavity, which forms the second portion of the ventral cavity. It is within this cavity that the organs often referred to, as the viscera are located. Although the abdominopelvic cavity forms one continuous, undivided chamber, it has arbitrarity been divided into an upper abdominal cavity and a lover region, the pelvic cavity, which is partially protected by the surrounding pelvic bones.

The abdominal cavity is the least protected by bone structures of any of the bodys cavities located between the rib cage of the thoracic cavity and the pelvic bones of the pelvic cavity, its walls are composed of except for the segments of the vertebral column at the back. The major organs in the abdominal cavity are the liver, stomach, pancreas, spleen and intestines. The inner surface of the abdominal cavity is lined with a membranous tissue, known as the parietal peritoneum. The peritoneum also extends from the walls of the cavity to cover various abdominal organs and provides a loosely folded sheet of tissue to which the various
organs and blood vessels are attached. The space between the parietal and visceral peritoneum is known as the peritoneal cavity; in a normal individual this space contains only a very small amount of serous fluid. The two kidneys lie behind the peritoneum on the dorsal abdominal wall and are thus retroperitoneal. On top of each kidney is located an adrenal gland. The stomach, spleen, and pancreas are located in the upper right segments, of the large intestine occupy most of the remaining space of the abdominal cavity.

The pelvic cavity contains the bladder as well as portions of the intestines; the latter terminate in the short segment of the rectum leading to the anus. Also located in the pelvic region are the reproductive organs of the female – the vagina, uterus, oviducts, and ovaries or, in the male, the prostate gland, seminal vesicles, and

portions of the vas deferens. The gonads of the male, the testes, are located outside the pelvic cavity in a separate scrotal sac suspended from the lower abdomen. The other major organs not located in one of the body cavities are the special sense organs associated with the eyes, ears, nose and mouth and the glands of the neck, the thyroid and parathyroid glands.

ORGANS AND TISSUES ARISING FROM THE THREE GEM LAYERS[06]

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Nervous System Brain Spinal cord Parimande nerve Ganglia Special sensory Receptors of eye, ear, nose, and mouth General sensory receptors Posterior pituitary(neurohypophysis) Adrenal medulla Skin (epithelium of the integument) Epidermis Hair Nails Sweat Glands Sebaceous glands	Muscle Cardiac Smooth Connective tissue Fibrous connective tissue Adipose tissue Bone and bone marrowBlood cells Lymphatic tissue Reticuloendothelial system Skin (fibrous connective tissue) Dermis Epithelium of: Thoracic and abdominal cavities (pleura, peritoneum, pericardium)	Epithelium of:Larynx Trachea Lungs Esophagus Stomach Intestines Liver Gallbladder Pancrease Bladder Urethra Vagina Inner ear cavity Auditory tubes Thyroid

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Mammary glands Epithelium of: Salivary glands Nasal cavity Mouth Anal canal Enamel of teeth Anterior pituitary(adenohypophysis)	Kidneys Ureters Gonads and associated ducts Adrenal cortex Lining of heart (endocardium) and vessels (endothelium)	Parathyroid Thymus

Discussion & Conclusion:

The major cavities of the human body are the spaces left over when internal organs are removed. There are additional body cavities which we will only discuss in lecture. These are the cavities created by serous membranes–the pleural cavities, the pericardial cavity, and the peritoneal cavity–and the mediastinum. Dorsal body cavity–the cranial cavity and the spinal cavity in combination.

Cranial cavity–the space occupied by the brain, enclosed by the skull bones.

Spinal cavity–the space occupied by the spinal cord enclosed by the vertebrae column making up the backbone. The spinal cavity is continuous with the cranial cavity.

Ventral body cavity–the thoracic cavity, the abdominal cavity, and the pelvic cavity in combination.

Thoracic cavity–the space occupied by the ventral internal organs superior to the diaphragm.

Abdominopelvic cavity–the abdominal cavity and the pelvic cavity in combination.

Abdominal cavity–the space occupied by the ventral internal organs inferior to the diaphragm and superior to the pelvic cavity.

Pelvic cavity–the space occupied by the ventral internal organs that are bordered by the bones of the pelvic girdle.[07]

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