“MAA” OMWATI COLLEGE OF EDUCATION HASSANPUR (PALWAL)

AFFILIATED CRS UNIVERSITY, JIND

Notes

B.P.Ed.- Semester-1 (2021-22)
Anatomy and Physiology

E-mail: moce.principal@maaomwati.com

UNIT-II

Date
DELTA Pg No.

I Anatomy and physiology (Introduction)

* We must know that human body is a wonderful Machine in itself.
* Countless perfectly actions are taken and Coordinated perfectly at the same time such as Hearing, seeing, Breathing, and many other actions without our conscious efforts.
* If we stand up and walk almost all your body's system will be put into action enable you to perform this action.

the human body can defend itself against hundreds of diseases.
the body can also repair itself after most small injuries
Many body parts heart, kidney etc work Continuously.

human body has many parts/system such as skeletal, muscular, digestive, respiratory nervous, vascular, excretory, reproductive endocrine,
these systems have number of organs such as heart, lungs, kidneys, lever etc. which perform different fn

II Need and Importance in field of physical education and sports.

(1) It helps in evaluation of the players capacity.
(2) It helps in study the effects of excercise on human body.
(3) It helps in positioning of body during training sessions
(4) It helps in preventing sports injuries
(5) It helps in providing adequatic information of sports nutrition..

help in physical fitness. provides knowledge about body structure. helps in maintaining healthy body. helps to know about Individual differences.
helps in selection of games

Date
DELTA Pg No.

* Regional anatomy.
the study of anatomy based on regions or divisions of the body and emphasizing the relations Between various structures
e.g.
(Muscle and nerve and arteries etc.)

Systemic anatomy
the study of structures that make up a descrete body system that is..
a group of structures that work together to perform a unique body function
eg-
(a systemic anatomical study of the muscules system would consider all of the skeletal muscle of the body.)

Gross anatomy and deals with the structure of the body that are visible to the naked eyes structures such as muscles, bones, digestive organs, skin can be examined

Microscopic anatomy is a branch of anatomy that relies on the use of microscope to examine the smallest structure of the body-tissues, cells and molecules. Microscopic anatomy can be examined by the equipment available (more powerful microscope can found small tissues namely cells cytology))

Date
DELTA Pg No.

Normal anatomical position and its importance

Anatomical position is a standard position that serves as the refrence of the body

A person is said to be in anatomical position when they are standing erect with their feet together their hands at their sides with the palm facing forward, unless otherwise stated. Most anatomical descriptions will refer to a person when in anatomical position

have 2 positions below

(a) anterior FROM front side
(b) posterior FROM Back side

Date
DELTA Pg No.

the term Supine and prone are used to describe a body that is lying down supine refers to a body lying on its back while prone refers to a body lying on its belly (face down)
Anatomical position is designed to remove ambiguity when describing anatomical structures. this is particularly important when comparing the locations of multiple features using directional refrences.

(a) supine
(b) prone

Importance of normal anatomy

it Investigates organs, bones, structures, and cells that exist in animal and people there is related scientific dicipline called physiology which helps us to undesstand the fn of diffrent parts of the body But undesstanding Anatomy is essential for physiology

Date
DELTA Pg No.

II - Cell

A cell is the basic or the smallest unit or part of living thing that can carry on all life ph
According to the cell theory, all living things are made of countless cells
Thats how Cells are known as Building Blocks of life.

the human body cells mainly consists of wates, protien and nuclic acid
the molecules that make up the cells are not alive but cells themselves are living thing

Every cell of the body is able to take in food get rid of wastes and grow
Most of the cells can reproduce

(Cell is Basic unit of all living organisms)

structure and fh of cell
there are different kind of living organisms in the world. they vary in their shape, size colour and habitat. But all of them have some basic common characteristics
their fh and structural unit is cell.

Date
DELTA Pg No

Unicellular and Multicellular.

There are two types of cellular organisms

Organisms which are made up of one cell only are called Unicellular organisms.

Organisms which are made up of many cells are called Multicellular organisms.

Our body is multicellular where cells do different jobs that help to keep our body alive

eg.
Red blood cells carry oxygen
Nerve cells Message to and from the brain

Cells that do a certain job in a multicellular organism are called specialised cells
thus
RBC and Nerve cells are specialised cells.

Date
DELTA Pg No.

Shapes of cells

Cells are of different shape and sizes which are related to its need or to the job it done

e.g.-

* the long cells, (many branched nerve cells convey massege throughout the body)
* thin muscle cells, (can contract to do work)

Muscle cells expend and contract, their long thin shape helps them to do this

the outer layer of skin forms a protective cover over the body, their flat shape helps them to cover the large area.

Basic Constituents of a Cell

Protoplasm.

this is the viscous substance which is a spacial kind of matter that composes all cell protoplasm is a living matter and complex

protoplasm is of 2 types

Inorganic	organic.
it contain elements like oxygen Hydrogen, Carbon, nitrogen, sodium potassium etc it constitutes 3 to 4 % of the total mass	it contain compounds such as carbohydrate, fat, protien water etc. there are all nutrients substances which are taken through diet.

Cell Membrane.

A thin covering called the cell membrane of plasma membrane encloses the cell cell membranes from both the outer boundries of the cell itself and the boundy of most of its internal parts

Some of the fn of cell membrane are as

(1) it seprate inner content of cell from outer environment

(2) It absorbs and excretes the molecule one carried out.
(3) It acts as a communicator as it recieves the chemical message and passes onto cells
(4) It also works as Identifier because it distinguises cells of one individual from other.
(5) Membrane Catalyse cell's chemical rexn
(6) Some membranes also maintain immunity by changing harmful foreign proteins to harmless for the body.

Cytoplasm

it is the part of the cell B/w its membrane and nucleous this is protoplasm (living matter) located B/w cell membrane and nucleous.

Organelles

it means little organs, there are thousands of little organs in cell. some are with in the membrane (thin covering) such as endoplasmic reticulam. Mitochondria, golgi apastus, lysosomes and some are without membrane such as ribosomes and centrosomes.

Date
DELTA Pg No.

Endoplasmic reticulam.

It forms the walls of network of canals which serve as a channel for transport of Metarials from one part to the cell to another

it is also connected to nucleus thus. Substance can move readily from nucleus to this network and through cytoplasm.

Endoplasmic reticulam is vast system of Membranes within the cytoplasm outside the nucleus

fn ⇒ is to synthesis of proteins and Harmones.

Mitochondria

they are small microscopic sacs throughout the cytoplasm. they are composed of an outer smooth membrane and an inner membrane that contain many folds.
these folds contain most of the Enzymes which are used in Conversion of food energy into a form of energy which the cells can do cellular work

eg -

to grow, divide and to do its other works.

Date
DELTA Pg No.

fh =

(a) Mitochondria are the principal centre for production of energy and known as powerhouse of the cell.

(b) It contains enzymes.

(c) Mitochondra transfers ATP (Adinosine triphosphate) to the place where it is required.

Golgi apparatus

Golgi apparatus consists of stack of flat membrane sacs near nucleus thus sacs process protiens and other substance produced in the cell.

fh -

(a) In Golgi Apparatus Enzymes are present in the Concentration form which are required for the digestion

(b) it regulates the movement of fluids in the cells and expletion (pushing out) of recretery products from the cells.

Lysosomes.

Lysosomes are small membrane enclosed sacs. That contain enzymes capable of breaking down protien and ~~liquid~~ lipids.

fn =

(a) lysosomes break down large molecules within the cells

(b) it contain digestion enzymes that break down protien, fat and nucleic acid.

(c) React with bactarias and nullify their action with enzymes.

Centrosome

(a) Centrosome is spherical body near centre of the cell. (near nucleus)

(b) Centriols are located in Centrosome which are tiny cylinders. they are composed of nine groups of tubules, three tiny tubules in each group.

fn

Centriols and Centrosome acts in cell devision

Date
DELTA Pg No.

Ribosome

Every cell contain thousands of ribosomes which are small spherical organ attached to the endoplasmic reticullam, and scattered through the cytoplasm.

fn.
Ribosoms are molecules machines that make protien.
also called protien factory of the cell.

Vacuoles

they are sac like structure

fn:

(a) it contain water and various water soluble substances.
(b) it does excretory fn
(c) some vacuoles also store food particles.

Nucleus

the nucleus is the control centre that directs the activity of the cells - A nuclear membrane surrounds the nucleus and seprates it from the cytoplasm.

nucleus contain two important structures.
(a) chromosomes
(b) Nucliol

Chromosomes	Nucleoli
These are long. Thread like strands of a matter containing DNA and certain protiens DNA Makes up the Genes These are basic unit of heridity. Genes Control the passing on of characteristics from parents to children	These are bodies that form in certain places specific chromosoms. nucleoli help in the formation of ribosomes Neocleoli are made up of protein and RNA RNA plays imp role in Making protien

ph

(a) The nucleus is the cell's control centre.

(b) It directs the cells growth and controls all the activities that go on within the cell.

(c) it stores genetic info in DNA molecule.

(d) it also controls the genetic information

Cilia and Flagella.

Cilia are tiny brush like hairs and flagella are slender whiplike appendages used to push or pull the cell through a fluid environment or to move the fluid surrounding the cell.

Cilia are generally short and present in great numbers. their beat is oarlike

Date
DELTA Pg No.

They are found in the human respiratory tract where they move the mucus that traps foreign particles and keep them from reaching delicate lung tissues.

Cell Division

When a cell is formed it is small it grows after digesting food However its growth is limited after reaching a certain critical size it divides to form new cells this is known as cell division
New cells are required for growth and to replace the dead cells
Some cells in our body keeps on dividing throughout life
In human body 30 lakh blood cells dies and replace every second.
Skin cells also keeps dividing
some cells of brain cannot be replaced once they die, Because of this reason (body can heal in all part of our body except nervous system)

Date
DELTA Pg No.

III ⇒ Tissues

Next level in organism after cell is tissue
tissues are organisations of cells that do some special function and serve the body as whole
Blood have two or three types of cells whereas others like muscle have only one type of cell Similarly
the tissues that form organs may be of the same or diffrent type
each type of tissue is an organ performs a special fn

the muscular part of intestine consists of group of muscle cells that make up the muscular tissues
the internal line of the intestine consists other types of cells.
the muscular tissue has a diffrent job than the living tissue
the muscular tissue contracts and expand to allow the food to move forward
the living tissue secrates the digestive juices to digest the food
each type of tissue of body is specialized in its ways.

there are four main kind of tissues

(1) Epithelial tissue
(2) Connective tissue
(3) Muscle tissue
(4) Nervous tissue

Epithelial tissue

the main fn of epithelial tissue is to protect the body it covers the whole body and the organs. it also covers the internal surface of the body organs such as mouth, oesophagus, stomach, intestine, lungs, trachea, blood vessels and urinary bladder.

Epithelial cells have different shapes depending on their fn and location. they may be cuboidal, flat or columnar (tall) the individual cells are tightly packed with no spaces B/w them thus make the epithelial tissue an ideal protective tissue

Apart from protecting the body and its organs epithelial tissue perform other functions too.

(a) In the stomach the cells of this tissue form glands, which secrete digestive juice in the intestine

(b) epithelial cells in the inner surface absorb the digestive food.
(c) In the skin they remove wastes by excreating them in form of sweat.
(d) the epethelial tissue forms. inner lining of the nose, bronchi and lung secretes mucus which keep the organ moist and traps dust particle and harmful bactaria.

Connective tissue

Connective tissue binds together two or more other tissues or organs.
it also fills up the space B/w organs of the body it provides support and give shape to the body

All connective tissues consists of a jelly like ground substance called matrix
Different types of cells and fibres are fixed in the matrix
Various connective tissues have different types of cells and fibers in them.

eg-

(1) Bone is hard connective tissue its hardness is because of calcium and other mineral in the matrix it forms the skeleton which support the body.

(2) Cartilage is a soft tissue consisting of Cartilage cells. Its matrix consists of a clear material of like (glassy) which make the tissue tough but flexible External ear is made of it.

(3) Blood is a liquid Connective tissue it has three kinds of cells
(1) Red Blood cells
(2) White Blood cells
(3) platelets
the matrix is filled with a liquid called blood plasma
this tissue helps in the transport of digested food respiratory gases and wastes in the body.

(4) Areolar tissue is a loose jelly like connective tissue that binds the skin to the muscle underneath.

Muscular tissue

the muscular tissue forms the muscle in the body. the muscular tissues are found in every part of the body where movement is involved
it is the most prominent tissue of the body and makes up more than 1/3 weight of the body.

Muscular tissue is collection of a large number of muscle cells.
Muscle cells or muscle fibres are bound together by connective tissues Most of the muscles are attached to the bones of the skeleton they have the ability of contract and expand
Because of this they can be used to move the part of the body to which they are attached.

They are of three types of tissues

Voluntry or stripped muscle	Involuntry or smooth muscle	Cardiac or heart muscle
These muscles are attached to the bones and make them move they are called voluntry muscles as they are within our control we can move them when we want the muscles of our arm and legs e.g - we use these muscles when we run, lift a load, write	we do not have control over these muscles they move wether we want or not, so they called involuntry muscles. the cells of these muscles are spindle shaped in the pointed ends. they are present in the walls of internal body organs the walls of our Blood vessels internal organs have smooth muscles.	these muscle are found only in the heart. they have very strong contractions and work throughout our life without living they are also involuntry muscles as we have no control over them Cardiac muscle cells also have stripes on them

these muscle have Band like appearance the bands looks like dark and light strips that is why they called stripped muscles	the walls of digestive system also contain these muscles. they control Breathing move food through our body and helps move blood through body	and are branched.

Nervous tissue

Nervous tissue consists of nerve cells or neurons. a nerve cell is made up of the cell body which contains the nucleos and the long structure called the axon. the nerve cells are joint end to end to form long nerve fibre
A large number of nerve fibre held together form a nerve.
it is through these nerve that massage travel from one part of the body to another.

the brain and spinal cord are also made up of nervous tissue.

Date
DELTA Pg No.

UNIT - II

I - BLOOD

Blood

Blood is a life giving fluid that flows through the human body we cannot live without it. the heart pumps blood to all our body cells supply them oxygen and food at the same time blook carries Carbon di oxide and other wastes products from the cells. blood also fight infection keep our temperature steady. and carries chemicals that regulates many body functions

Blood even has substances that plug broken blood vessels and so prevent us from bleeding

the amount of blood depends on our size and the altitude at which we live

An adult who weight 80kgs has about 5 litres of blood.
A 40 kg child has about 1/2 the amount

people who live at high altitudes where the air contains less oxygen may have upto 2 litres more blood. than people who live in low region. the extra blood delivers additional oxygen to the cells

Date
DELTA Pg No.

Functions of blood

(1) Transport of oxygen and carbondi oxide-
Blood transport oxygen and Carbon di-oxide from the respiratory surfaces such as lungs to the tissue and from the tissue to the respiratory surfaces. and hence blood helps in respiration.

(2) transport of food.-
Blood carries soluble food like- fats, glucose, amino acids, polypeplides, vitamins minerals and water from the intestine first to the liver then to the whole body tissues where it is required.

(3) transport of waste products-
Waste products are produced by the cells of all over the Body. Which are harmful for our body and need to eliminate from our body. Immediately. blood transport there wastes to the kidney. lungs, skin and intestine so that they may be eliminated.

(4) Maintenence of water balance-
Blood maintain water balance to a Constant level by bringing about constant exchange of water B/w circulating Blood and tissue cytoplasm.

(5) Maintenance of PH –
The plasma protien acts as a buffer system and therefore prevent any change in PH (acid base balance) of blood.

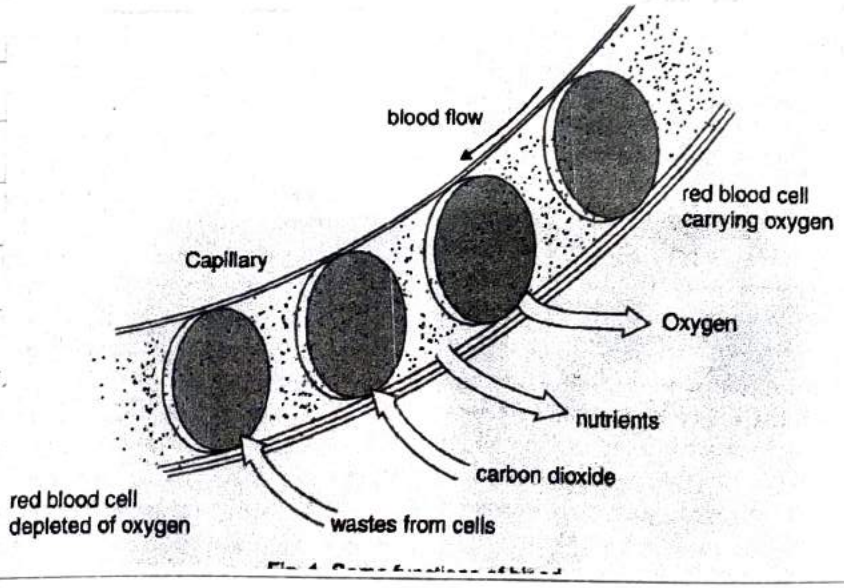
(6) Chemical co-ordination –
Organs called endocrine gland produce harmons and release them directly to the blood. the harmons enter the plasma and act as chemical messengers" when a harmone reaches a part of the body it regulates, it may effect growth, reproductive processes.

(7) Regulates body tempreature –
All cells actualy produce heat But some cells particularly those in muscle and glands create more heat than others
the heat enters our blood stream and travels throughout the body, Excess heat escapes through our skin if blood did not distribute heat some body areas would become extremely heat while other would become extremely cold. therefore
Blood circulation distribute body heat and maintain body tempreature.

(8) Defend against infection —
White blood cells (WBC) plays an important role in our immune system which helps our body resist disease-causing substances.
The (invasion) attack of harmful substance activiates the WBC. they then work to destroy it. Some protien in plasma also help to fight disease

(9) Clotting of blood —
Blood prevents loss of blood in case of any injury as it has power of coagulation.

(10) Support and formation of stable environment.
Blood provides support and a relatively stable environment for the active body cells.



Date
DELTA Pg No.

Composition of blood.

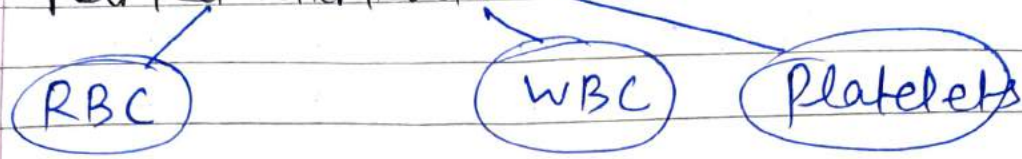
Blood is a connective tissue and Consists of cells that move about in a watery liquid called plasma.
the cells are known as formed elements because they have defenite shapes.

⟹ there are three type of cells that make blood.

(1) **Plasma**

plasma is a liquid straw coloured part of blood it make up about 50-60 % of the total volume of blood.
plasma contain 90% of water and 9 % suspended or dissolved substances.
these substances includes protien that enable blood to clot and to fight with infection, dissolve nutrients (food); and waste products
plasma also carries chemicals called hormons which control growth and certain other body function.

(2) Formed elements.



the formed elements are cells such as erythrocytes (RBC) and leukocytes (WBC) and cell fragments (Platelets

(a) Red blood cells

Red blood cells also called erythrocytes carry oxygen to the body tissue and remove Co^2 A red Blood cell has a flat disclike shape it is thinner in the middle than at the edges

RBC consists of Hemoglobin and an oxygen carrying protien that gives them a red Colour. the cell also contain chemicals perticularly enzymes., enzymes enable the cell to carry out necessary chemical processes more effectively. a flexible membrane surrounds each RBC. the membrane is so flexible so that the cell can squeze through the thinnest Blood vessel most kind of cells have a nucleous. a central structure that controls many cell activity But Mature RBC have no nuclei

White blood cells

WBC also called leucocytes, fight infections and harmful substances that attack the body.
Most of the cells are round and colourless they have several sizes and their nuclei differ in shape. Some kind of WBC kills bactaria by surrounding and digesting them other kind of WBC produces Antibodies, protien that destroy bactaria viruses and other invaders or make them harmless.

platelets

platelets are also known as thrombocytes are disclike structure that helps stop bleeding they are the smallest formed elements if the blood vessel is cut platelets stick to the edges of the cut and one another forming a plug. they then release chemicals that react with fibrinogen and certain other plasma protien leading to the formation of blood clot.

Date
DELTA Pg No.

Blood clotting (Coagulation)

One may bleed to death from a small cut. If blood didn't coagulate (clot) an injured blood vessel causes platelets to sticked to the damaged surface & to one another. forming a plug. the plasma contain protien called. clotting factors. they normally circulates in an inactive form in the blood. But if a blood vessel suffers damage the platelet. plug and the injured vessel give off chemicals that react with the clotting factor, eventually the plasma protien fibrinogen changes into sticky strands of fibrin the strands criss cross one another, creating a mess that holds RBC and the platelets plug tightly to the sight of bleeding the fluid is squeezed out and a solid plug - the clot forms. A clot on skin surface is a scab.

Date
DELTA Pg No.

II Skeletal system

(1) The skeletal system is consisting of all bones of our body.
(2) The hard and rigid structure of bone makes the skeletal system.
(3) to act as a frame work which support the body and give shape.
The skeletal system protects many imp internal organs.
e.g
Skull protects the brain
Rib cage protects heart and lungs

Function of skeletal system

(1) it serve as a supporting frame work
(2) it acts as ~~lever~~ lever and allows movement of the body
(3) it protects and support many internal organs
(4) it releases calcium when there is lack of calcium in the body fluid.
(5) it produces maintain and repair itself.
(6) it stores the marrow which produces the blood cells
(7) it provides surface for the attachment of skeletal muscle.

Date
DELTA Pg No.

Classification of bones

(1) long bones
(2) short bones
(3) flat bones
(4) Irregular bones
(5) Sesamoid bones.

(1) long bones

Each long bone is Composed as a central shaft and two knob ends. A fibre sheet covers the whole area of long bone, except where it joins with other bone, where as at the end of long bone where it joins with another bone a thin sheet of Cartilage covers its surface. Bones of upper and lower arm (humerus, ulna) thigh and leg (femur, tibia and fibula) and fingers and toes come under these types of bones.

(2) Short bones

these bones are cube shaped and are composed of central spongy bone covered with thin layer of compact bone
the bone of wrist and ankle are the short bones.

(3) flat bones

these bones are thin and flat they are composed of central layer of spongy bone fixed B/w two outer layers of Compact bone. Certain bones of the skull Rib and shoulder are flat bones.

(4) Irregular bones

These bones have complex shapes as compared to other bones. they are similar to short bones and flat bones but are identical

Bones of spinal column and some bones of skull are irregular bones.

(5) Sesamoid bones

these bones are seed like the development in the tendons like patella. pisiform etc.

Date
DELTA Pg No.

Joints and its classification

(1) Hinge joints
(2) Pivot- joints
(3) Ball and Socket joint
(4) Gliding joint
(5) Saddle and Condiloid joint.

(1) **Hinge joint.**
These joints are those joints which allow a forward and backward motion in one plane.
e.g motion of a door on its hinge.
⟹ the joints of the knee and the fingers

(2) **Pivot joints**
This joint gives a rotating motion such as the movement of the head from side to side

(3) **Ball and Socket joint**
These joints permit the maximum permit and freedom of movement. These joints are made up of large round end of a long bone which fits into the hollow of another bone the shoulder and hip have this joint the arm of the body can move more freely then the legs because, the way of the joint are arranged and because the shoulder blade is only loosely attached to the chest wall.

(4) Gliding joint
The articules surfaces glide over each other

joints B/w the carpel bones and B/w tarsal Bones are gliding joints

(5) Saddle and Condyloid joints
In these joints the movement takes place around two axes therefore allowing the different movement like flexion, extension, abduction, adduction and circumduction wrist joints and finger joints are example of these joints.

Date
DELTA Pg No.

✱ Structure and function of joint

✱ Basic movements of joints

(1) Flexion
(2) Extension
(3) Abduction
(4) Adduction
(5) Rotation
(6) Circumduction
(7) Supination
(8) pronation
(9) Inversion
(10) Eversion
(11) protoraction
(12) Retraction

(1) Flexion

Flexion decreases the joints ∠.
e.g. Bending the head forward, bending the arm at the elbow or curling the fingers.

(2) Extension

Extension is the return from the flexion it means extension increase the joint angle
e.g - Bending the head Backward.
lifting the arm Backward.

(3) Abduction

it is the outside movement away from the mid line of the body
e.g -
lifting the arms sideways.

(4) Adduction

Adduction is inside movement towards the mid line of body, oppo of abduction
e.g
Bringing the arm back forward mid line of the body.

(5) Rotation

Rotation is the movement towards body Centretine it is the pivoting of the bone on its own axis somewhat as a top turns on its axis

e.g.-

turning the head from side to side
moving the trunk from side to side

(6) Circumduction

it is 360° rotation like arm circle around or rolling the head forward sideways, Backward and then other side

e.g.-

it is Circular motion of body part.

(7) Supination

Supination is the turning of the palm forward and upward.

(8) Pronation

Pronation is turning the palm Backward or downward just opposite of supination

(9) Inversion

Inversion is turning the sole of the foot inward.

(10) Eversion

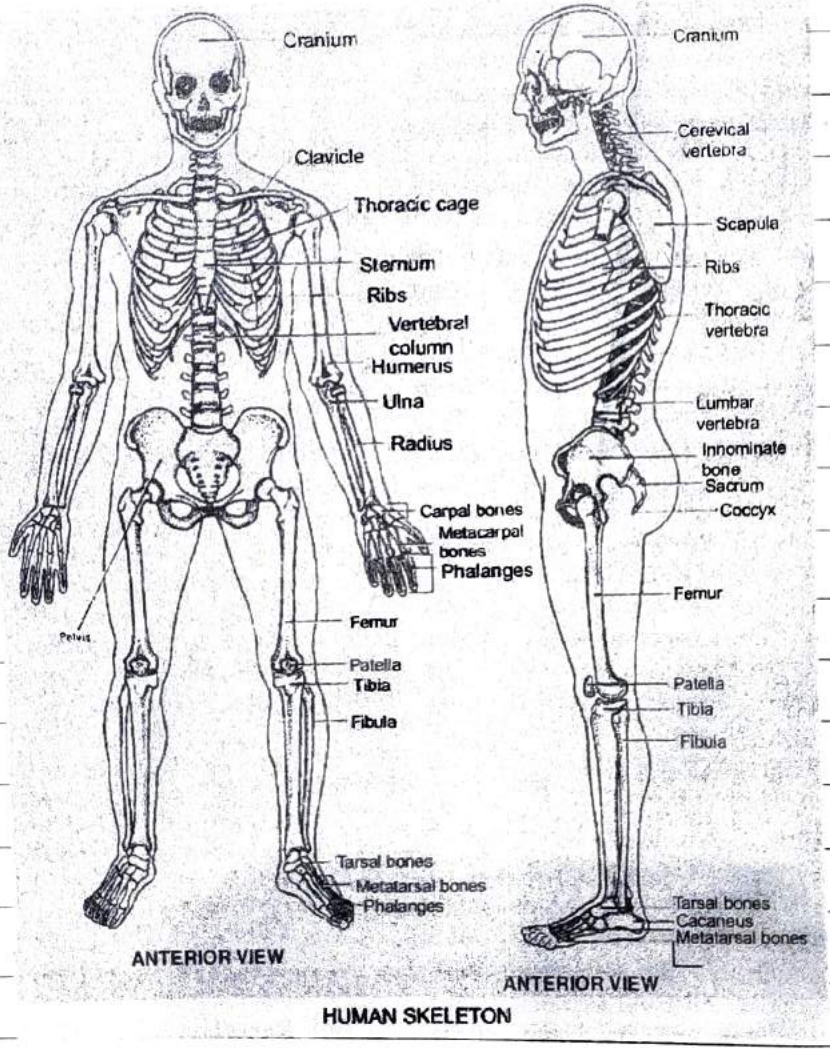
it is turning the sole of foot outward

(11) Protraction

it is lowering the jaw or sticking out the tounge.

(12) Retraction

it is raising the jaw or pulling the tounge.



HUMAN SKELETON

III Muscular system

⇒ The human body contain more than 650 individual muscles.
which provide pulling power so that you can more around.

⇒ These muscles are 40% of our total body weight.

⇒ The muscles are attached by tough fiberous structures called tendons

⇒ The body is moved primarily by group of muscles not by a single one.

⇒ Contractions that really move bones like those used in working, lifting an object chewing food are called
Isotonic contraction

⇒ Contraction that counter opposing forces but do not make movements are called
Isometric contractions

Date
DELTA Pg No.

Classification of muscles

(1) Skeletal muscle
(2) Smooth muscle
(3) Cardiac muscle

(1) Skeletal muscle

these muscles are attached to the bones, they move the bones of the arms, legs, fingers and other part of the skeleton they are also voluntry muscles the febre that make up the skeletal muscle have alternate light and dark crossbands called striations
the skeletal muscle is under voluntry control and is responsible for voluntry movement of body parts.
Skeletal muscle also called striated muscle

(2) smooth muscle

these muscles are found in most of the body's internal organs, smooth muscles do not have alternate light and dark cross bands called striations
they are in the wall of stomach. and intestine through the digestive system.
smooth muscle also control width of the blood vessel and the size of the breathing passage
In such case they contract and relax, we don't have control over them.

Smooth muscle provides movement of internal organ which are under control of involuntry or nervous system
Smooth muscle is responsible for movement of food through the digestive tract
flow of blood emptying the urine from urinary bladder.

(3) Cardiac muscle
This muscle is found only in heart
it has features of both skeletal and smooth muscle cardiac muscle has strations like skeletal muscles but like smooth muscle it contracts automatically and Rhythemically without tiring
Cardiac muscle helps heart to beat 72/Min without rest throughout our lifetime

the heart beat is controlled by the cell in heart called Purkinje fibers

Date
DELTA Pg No.

Functions of muscles

(1) **Mobility** = to allow movement
e.g walking, running, swimming.
fine movements. e.g - writing
speaking
facial expressions.

(2) **Stability**
Muscles tendons streach over joints and contribute the joints stability

(3) **Posture**
Skeletal muscles helps to keep the body in the correct position when someone is sitting or standing is called posture.

(4) **Circulation**
The heart is a muscle that pumps blood throughout our body the movement of the heart is outside of conscious control and it contracts automatically
Smooth muscles in the arteries and veins play role in circulation of blood.

(5) **Respiration**
Breathing involves the use of the diaphragm muscle.

(6) Digestion –
Smooth muscles in the gastro intestinal or GI tract control digestion the GI tracts streaches from the Mouth to the Anus.

the upper muscles in the stomach relaxes to allow food to enter while the lower muscle mix food particles.

(7) Urination
the urinary system comprises both smooth and skeletal muscles.

(8) Vision
6 skeletal muscles around the eye control its movement.

(9) Organ protection

(10) tempreature regulation

Structure of skeletal muscle

skeletal muscle are organs which are made up of skeletal muscle tissue plus important connective and nervous tissue components. Skeletal muscle differ in size. shape and arrangement of fibre. they range from very small strands such as muscle of middle ear. to large masses such as the muscle of thigh. some skeletal muscles are narrow in shape and some broad. Some are triangular and some are irregular some form flat sheets and other bulky masses

Arrangement of fibres differs in various muscles. In some muscles the fibers are parallel to the long axes of the muscle in some they have narrow attachment. the direction of the febers making a muscle is important Because of its relⁿ to. fⁿ.

Date
DELTA Pg No.

Mechanism of Muscular Contractions

All our movements such as walking, running etc are possible due to the presence of muscles inside the body.
as we know that Myofibril is the simplest unit of muscle contains contractile proteins that helps in the contract of muscles and involves in body movements.

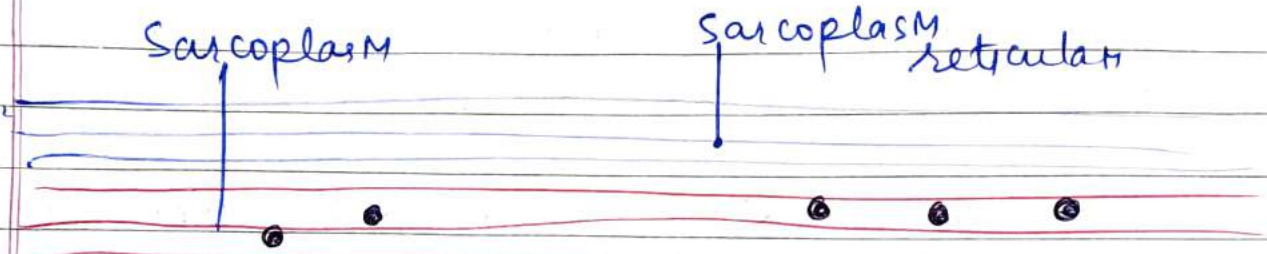
According to the sliding filament theory the contraction of muscles takes place by the sliding of the thin filaments over the thick filaments

The process of muscle contraction begins by a signal from the central nervous system (CNS) the signal is brought by motor neurons from the CNS. the motor neurons are connected by the neuron fibre
the motor neuron with which the muscle fibre connects is called a motor unit

the junction b/w the motor unit and the sarcolemma is known as neuromuscular junction or the motor end plate

the signals from the CNS are transported as electrical impulses also known as action potential

A neuro signal on reaching the neuro muscular junction releases a neurotransmitter. thus generating an action potential. thus action potential spread over muscle fibre and causes the release of calcium ion into the sarcoplasm by sarcoplasm reticulam



thus is turning ↑ in the calcium ions in sarcoplasm . the ↑ calcium ion leads to the binding of calcium ion with the sub unit of Troponin on the active filaments. and stuck on actin filaments
the active sites of Actin filament exposed the myocin heads starts a binding process actin thus forming a cross bridge
the energy needed for the cross bridge formation comes from the Hydraulated ATP attached to the myocin into ADP and inorganic phosphate the attached Actin filaments are then pull towards the centre then closer to each other Basically it is contraction of the muscle

Date
DELTA Pg No.

(Muscle Contraction machanism)

Muscle contraction is the activation of tension generating sites within muscle cells in physiology
Muscle contract doesn't neccessarily mean muscle shortning Because muscle tension can be produced without changing in muscle length.
e.g.
When we hold a heavy book, dumbell at the same position.

The termination of muscle contraction is followed by muscle relaxation which is a return of muscle fibre to their low tension generating state.

Muscle Contraction can be defined based on two variables length and tension

A muscle contraction can be described as isometric if the muscle tension changes but length remain same

and Isotonic is if muscle tension remains same throwout the contraction

* If the muscle Length shortens the contraction is concentric
* If the muscle Length lenthens the contraction is eccentric

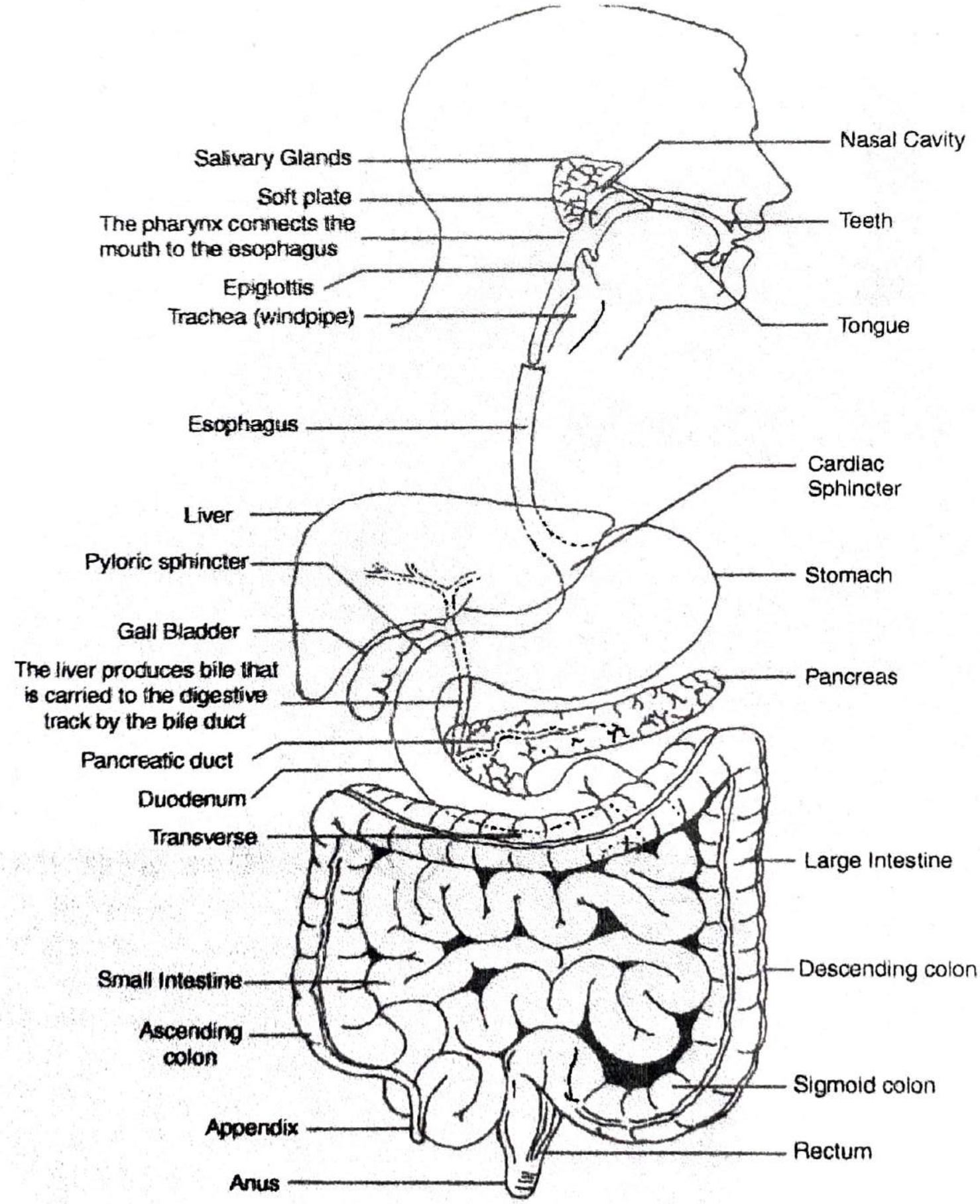
Date
DELTA Pg No.

UNIT - III

I Digestive System -

The digestive system is responsible for processing food. breaking it into usable Protein, food. carbohydrates, minerals, fats and other substances. and introducing these into the bloodstream so that the body can use them. the digestive, or elimentry - tract begins at the mouth. where the teeth and tounge begens the breakdown the food. aided by saliva secreted by the salivery glands, the chewed food, combined with saliva is swelled carrying it in the esophogus and to the stomach, In the stomach the food is combined with the HCl which further helps in breaking it down. when the food is thoroughly digested the remaining and thick ~~food~~ fluid or partially digested Food called chyme is passed through the small intestine and large intestine, ~~with~~ within Intensial canals. the nutrients are absorbed from the chyme into the bloodstream, leaving the unusable residue.

this residue passed through the colon and into the rectum where it is stored prior to excretion the solid waste called Faeces is compacted together and upon excretion passes through the anal Canal and Anus along the way through the digestive tract, the pancreas spleen, liver, and gall bladder secrets enzymes which helps in digestion.


Salivary Glands
Soft plate
The pharynx connects the mouth to the esophagus
Epiglottis
Trachea (windpipe)
Nasal Cavity
Teeth
Tongue
Esophagus
Cardiac Sphincter
Liver
Pyloric sphincter
Stomach
Gall Bladder
The liver produces bile that is carried to the digestive track by the bile duct
Pancreas
Pancreatic duct
Duodenum
Transverse
Large Intestine
Small Intestine
Descending colon
Ascending colon
Sigmoid colon
Appendix
Rectum
Anus

The structure and function of the Digestive system

The food you eat takes an incredible journey through your body - from top (mouth) bottom (anus) along the way the benificial parts of your food absorbed, giving you energy and nutrients. Here's a step-by-step account of the digestive system's workings -

Mouth

the mouth is the begaining of the digestive tract In fact digestion starts before you even take a bite. your salivary glands get active as you see and smell that pasta dish or warm bread.

after you starts eating, you chew your food into pieces that are more easiely digested your saliva mixes with the food to begin it break down into a form that your body can use and absorb. when you swallow your tongue passes the food into your throat and into your esophagus.

Esophagus

loacated in your throat near your trachea (windpipe) that recieves food from your mouth when you swallow the epiglottis is a small flap that folds over your windpipe as you swallow to prevent you from choxking. a series of muscular contraction within the esophagus

called peristalsis delivers food to your stomach

Stomach

the stomach is a hollow organ or container that holds food while it is being mixed with stomach enzymes. these enzymes continue the process of breaking down the food into a usable form. cells in the lining of the stomach. secretes a strong acid and powerful enzymes that are responsible for breakdown process, when the contents of the stomach are processed enough, they're released into small intestine

Small Intestine

Made up of three segments—the duodenum, jejunum. and ileum

the small intestine is 22 feet long muscular tube that break down food using enzymes released by the pancreas and bile from the liver

the duodenum is the first segment of the small intestine it is largely responsible of the continuous breaking down process

the jejunum and ileum lower in the intestine are mainly responsible for absorption of nutrients into the bloodstream.

Contents of small intestine starts out semi-solid. and end it in liquid form after passing through the organ, water, bile

enzymes and mucus contributes to the change in consistency once the nutrients absorbed and leftover food residue passed away to large intestine.

Pancreas

the pancreas secrets digestive enzymes into the duodenum that break down protien, fats and carbohydrates
the pancreas also makes Insulin passing it directly to bloodstream. Insulin is the chief harmone in your body for metabolizing suger.

Liver

the liver has many functions but its main job within the digestive system is to process the nutrients absorbed from the small intestine
Bile from the liver secreted into small intestine also plays an imp role in digesting fats and some vitamins
the liver is the body's chemical factory
it takes the raw material absorbed by the intestine and makes all the various chemicals the body needs to function
the liver also detoxifies potentially harmful chemicals
it break-downs and secrets many drugs that can be toxic to the body

Date
DELTA Pg No.

Gall bladder

The gall bladder stores and concentrates bile from the liver and then releases it into the duodenum in the small intestine to help absorb and digest fats.

large intestine (colon)

The large intestine is responsible for processing waste so that emptying the bowls is easy and convinient, it's about 6 feet long muscules tube that connects the small intestine to the rectum.

(The large intestine is made up of. cecum the ascending (right) colon, the transverse (across) colon the descending (left) colon and the sigmoid colon which connects the rectum)

Stool or waste left over from the digestive process is passed through the colon by means of peristalsis first in the liquied state and ultimately in solid form.
As stool passes through the colon, water is removed stool is ~~removed~~ stored in the Sigmoid (s-shaped) colon. uptil a 'mess movement' empties it into the rectum once or twice a day
it normally takes 36 hours for stool to get through the colon. the stool is itself mostly food debris and bacteria. these 'good' bactaria perform several useful function

Such as synthesising various vitamins processing waste materials and food particles and protecting against harmful bacterias.

Rectum

the Rectum is a straight Eight Inches chamber that connects the colon to the Anus. the rectum's job is to receives stool from the colon let you know there is stool to be evacuated (popped out) and to hold the stool until evacuation happens when anything (gas/stool) comes into the rectum, sensors sends the message to the brain. the brain then decides if the rectal contents can be released or not if they can the sphincters relax and the rectum contracts, disposing its contents. If the contents cannot be disposed the sphincter contracts and the rectum ~~accod~~ accomodates so that the sensation temporarily goes away.

Anus

the anus is the last part of the digestive tract it is 2 inches long ~~of t~~ canal consisting of the pelvic floor muscles and the two anal sphincters (internal and external) the lining of the upper anus is able to detect rectal contents it lets you know wether the contents are liquid gas or solid.
the anus is surrounded by ~~spherical~~

sphincter muscle that are important in allowing control of stool.
the pelvic floor muscle creates an angle B/W rectum and anus. that stops stool from coming out when its not supposed to the internal sphincter is always tight except when stool enters the rectum. this keeps us continent (prevents us from pooping involuntry) when we are asleep or otherwise unaware of it.

Digestion

it is the process of breaking down the laeger complex and insoluble food molecules into small simple and soluble molecules which can be easily absorbed into the bloodstream.

Absorption

it is the process of absorbing the digested food molecules into the blood or lymph.
the absorption process occurs by active or passive or facilitated transport machanism.

Assimilation

it is the process of synthesizing simple macromolecules absorbed from the digested food molecules the assimilation process helps in the growth and development of cells tissues and also in the production of new cells and tissues

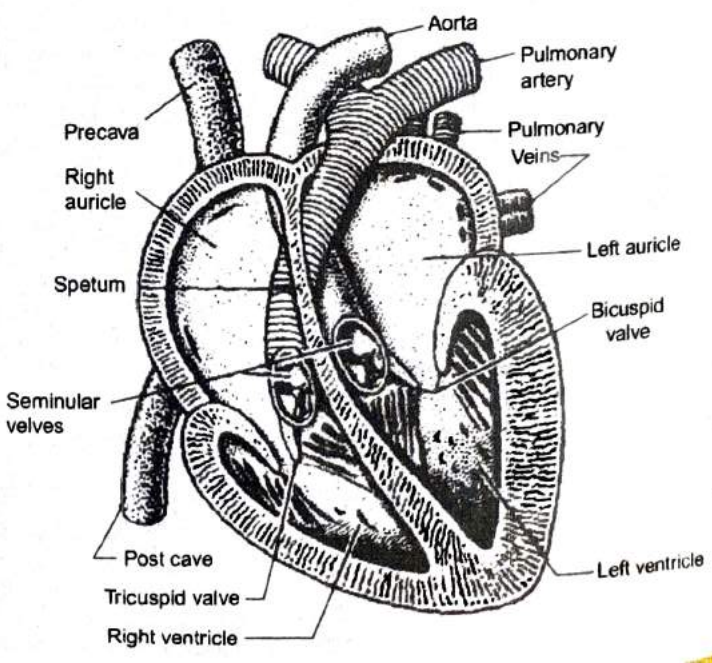
Date
DELTA Pg No.

II Circulatory system

the circulatory system means heart and blood vessels (vascular) system. which is the course taken by the blood through the arteries, capillaries and veins and back to the heart. In humans.
the heart is made up of four chambers the ① right auricles, left auricles, ② astria & the right ventricles, left ventricles

the right sides of the heart pumps oxygen-poor blood cells from the body back to the lungs for new oxygen.
the left side of the heart recieves blood rich in oxygen from the lungs that is pumped through the artries to the different parts of the body

it is estimated that a the given protein of the blood completes its course of circulation in approximately 30 seconds.



Date
DELTA Pg No.

Structure of human heart (Internal)

The human heart is about the size of human fist and is divided into 4 chambers
2 ventricle, 2 artria
the ventricles are the chambers that pumps blood and artrium are the chambers that recieves blood among which both right artrium and ventricle make up the right heart and same as left formated.

the structure of the heart also houses the biggest artery in the body the aorta

the right and the left region of the heart are sepreted by a wall of muscle called septum
the right ventricle pumps the blood to the lungs for re-oxygenation through the pulmonary artries the right semilunar valves closed and prevent the blood from flowing back into the heart then the oxygeneted blood. is recieved by the left artrium from the lungs via the pulmonary veins

Date
DELTA Pg No.

External structure of heart

One of the very first structures which can be observed when the external structure of the heart viewed is the pericardium

Pericardium

the human heart is situated at the left of the chest and enclosed within a fluid filled cavity described as the pericardial cavity

the pericardium is a fibre membrane found as an external covering around the heart it protects the heart by produced by serous fluid. which serves to lubricate the heart and prevent friction B/w the surrounding organs.
apart from the lubrication the pericardium also helps the heart to keep it in its position by maintaining the hollow space for the heart.

its components are -
- Heart value
- chambers
- Blood vessels

Date
DELTA Pg No.

The function of heart

The function of heart in any organism is to maintain constant flow of ~~liquid~~ blood throughout the body. this replenishes oxygen and circulates nutrients among the cells and the tissues

⇒ one of the primary fn of the human heart is to pump blood throughout the body
⇒ Blood delivers oxygen, harmones, glucose and other components. to various parts of the body including the human heart.
⇒ the heart also ensures that adequate blood pressure is maintained in the body

(structure of heart) in Brief

the human heart is divided into 4 chambers namely two ventricles and 2 artria. the ventricles are the chambers that pump blood and atrium are the chambers that recieves the blood Among which the right atrium and ventricle make up the right portion of the heart and the left atrium and ventricle makes the left portion of heart.

Date
DELTA Pg No.

types of circulation

(I) pulmonary circulation is a portion of circulation responsible for carrying deoxygenated blood away from the heart to the lungs and then brings oxygenated blood back to the heart.

(II) systemic circulation is another portion of circulation where the oxygenated blood is pumped from the heart to every organ. and tissues in the body. and deoxygenated blood comes back again to the heart.

(III) Coronary circulation - is an essential portion of the circulation where oxygenated blood is supplied to the heart.
This is important as the heart is Responsible for supplying blood throughout the body.

Circulatory system plays vital role in supplying oxygen nutrients and removing Co^2 and others wastes from body

Date
DELTA Pg No.

(function of heart Brief)

* Pumping blood to the LUNGS
* pumping blood to whole body
* Regulating Blood pressure
* Regulating heart rate

Blood Pressure

Blood pressure is the pressure of circulating blood against the walls of blood vessels Most of this pressure results from the heart pumping blood through the circulatory system.

Normal	Below 120	and	Below 80
elevated	120-129	and	Below 80
high BP stage I	130-139	and	80 89
high BP stage II	140 or higher	or	90 or higher
hypertensive crisis	above 180	or	above 120

Date
DELTA Pg No.

Pulse rate

The normal pulse for healthy adults ranges from 60-100 beats/min
The pulse rate may fluctuate and increase with excercises, illness, injury and emotions

Females ages 12 and older in general tend to have faster heart rates than do males

pulse rate relevence in sports.

The strength or amplitude of the pulse reflects the amount of blood ejected with myocardial ~~cordi~~ contraction
A well trained athelete may have a resting heart rate of 40-60 Beats/min.

Date
DELTA Pg No.

III Respiratory system

The respiratory system is the network of organs and tissues that helps you breath it includes yous airways, lungs and blood vessels.
The muscles that power your lungs and also part of the respiratory system. these parts work together to move oxygen throughout the body and clean out wastes gases like Carbon di oxide CO^2.

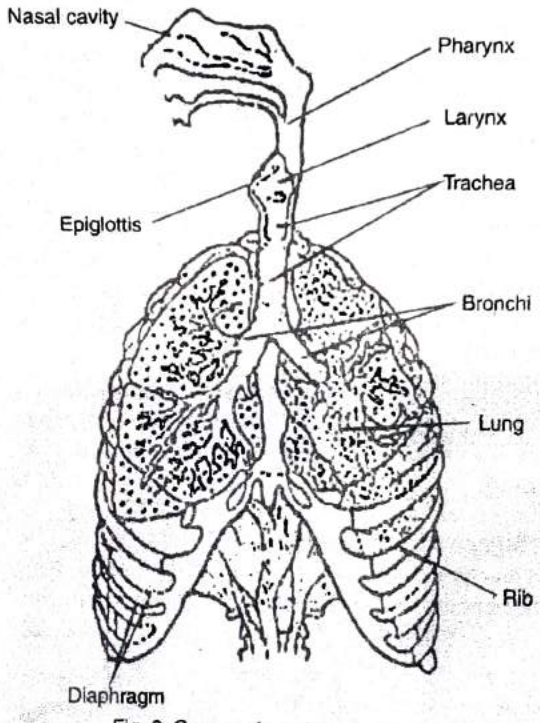


Fig. 2. Organs of respiratory system

Structure of respiratory system

the respiratory system has many different parts that work together to help you breath. Each group of parts has many separate components.
your airways deliver air to your lungs.
your airways are a complicated system that includes you

(1) Mouth and Nose
openings that pull air from outside your body into your respiratory system.

(2) Sinuses
Hollow areas between the bones in your head that help regulate the temperature and humidity of the air you inhale

(3) Pharynx (Throat)
tube that delivers air from your mouth and nose to the trachea (windpipe)

(4) trachea
passes connecting your throat and lungs

(5) Bronchial tubes
tubes at the bottom of your windpipe that connects into each lungs

(6) Lungs
two organs that remove oxygen from the air and pass it into your blood.

(7) Diaphragm -
Muscle that helps your lungs pull in air and push it out

(8) Ribs
Bones that surrounds and protect your lungs and heart

(9) Alveoli
Tiny air sacs in the lungs where the exchange of oxygen and CO^2 takes place

(10) Bronchioles
Small branches of the bronchioles tubes that lead to the Alveoli.

(11) Cappillaries
Blood vessels in the Alveoli walls that moves oxygen and CO^2

(12) Lungs lobes
Section of the lungs - 3 lobes in the right lungs and 2 lobes in left lung

(13) Pleura
thin sacs that surrounds each lung lobe and seprate your lungs from the chest wall.

(13) Cilia-
tiny hairs that move in a wave like motion to filter dust and other irritants out of your airways

(14) Epiglottis
tissue flap at the enterance to the trachea that closes when you swallow to keep food and liquid out of your airways

(15) Larynx (voice box)
Hollow organ that allows you to talk and make sounds when air moves in and out.

= function of respiratory system.

(1) Allow you to talk and smell.
(2) Brings air to body temperature and moisturizes it to the humidity level your body needs.
(3) Delivers oxygen to the cells in your body
(4) Revoves waste gases including CO^2 from the body when you exhale
(5) Protects your airways from harmful substances and irritants.

Mechanism of respiration

the process of breathing in is inspiration and breathing out is expiration
several of the gas laws of physics are high relevent to understanding respiration function

types of respiration

(1) Internal respiration
Exchange of gases B/w Blood and cells.

(2) External respiration
Exchange of gases B/w Blood and lungs

Date
DELTA Pg No.

Respiratory Volume and its Importance

Respiratory volumes are an important aspect of pulmonary function testing because they can provide information about the physical condition of the lungs

Respiratory capacity (pulmunary capacity) is the sum of two or more volumes.

Factors such as (1) age
(2) sex
(3) body built and
(4) Physical conditioning
have an influence on lungs volume and capacities
lungs usually reach their maximum capacity in early adulthood and decline with age after that.

UNIT - IV

I Excretory system

Many unwanted products are produced in the body during its various activities. Such wastes products must be flushed out otherwise they harm the body.
The function of flushing out the wastes are carried out the four widely seprated organs such as (1) kidney
(2) Sweat glands
(3) lungs
(4) liver

there should be no confusion to see the lungs and liver a part of excretery system instead of respiratory and digestive system.
it is true that these organs are part of their main system.

e.g.

respiratory and digestive but they also play an imp role in Excretery system as the lungs eliminate Co^2 which is a waste product same liver helps in the process of removing wastes through bloodstreams.
Water, salts and small amount of other wastes are eleminated by sweat glands

Date
DELTA Pg No.

Structure of kidney and skin and its function

① Kidney

the kidney is similar to beans in shape, are situated in the lower abdomen just above waist. an average sized kidney measures about 11.25 cm in length
5-7.5 cm wide
and 2.5 cm thick

Usually left kidney is little larger than right one. a heavy portion of fat holds them up in position. the concave sides of both kidneys face each other.
the inner and middle surface contains a V-shape called the helium. At the helium blood vessels, nerves, and lymphatics enter and leave the kidneys in additions the ureters that transport urine from the kidney to the bladder leave the kidney at the helium.

the out portion of the kidney is called cortex which is covered by the white feberous tissues the inner portion is called medulla. the kidneys consists of a large numbers of coiled tubes called nephrons
Each kidney contains about 1 million nephrons

Nephrons are the tiny filtering units of the kidney.
Nephrons filter out excess water salts and urea from the blood as it passes through it.
the clean blood leaves the kidneys and continues its circulation in the body.
the wastes collected in the kidneys form a liquid called urine
it passes from the kidneys through two tubes called ureters into an elastic sac called the urinary bladder

the bladder stores the urine until which is excreted from the body through the urethra
a human being passes out about
1.5 to 2.5 litres urine/day

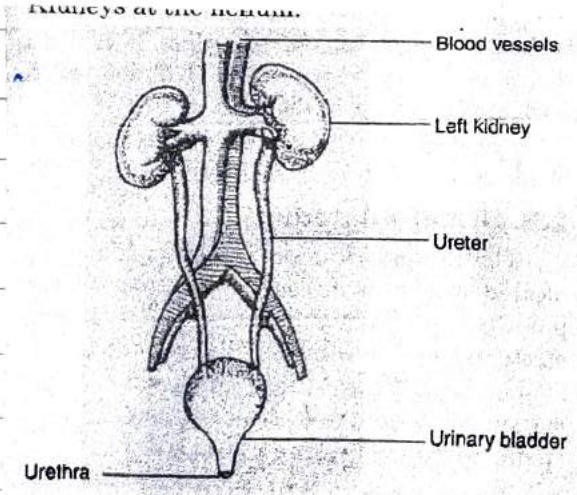


Figure : The human urinary system

(II) Skin

Skin contains sweat glands or sweat glands are found in skin all over the body but are numerous in the palm of the hands soles of the feet and forehead.

eg.

a single square inch of skin on the palm of the hand contains about 3000 sweat glands.

Sweat secration helps in maintaining the fluid Balance and regulating body tempreature.

fn

Sweat glands also function as excretory organs. as they eliminate nitrogenous waste from the body through sweat.

III Composition of urine

Urine is a liquid by product of the body secreted by the kidneys through a process called urination and excreted through the urethra.
it is an aqueous solⁿ of greater than 95% water. other constituents include

(1) urea
(2) chloride
(3) Sodium
(4) potassium
(5) Creatinine and
(6) other dissolving ions and
(7) organic & inorganic compounds

Urea is a non-toxic molecule made of toxic ammonia and CO^2.
any abnormal constituents found in urine are an indication of disease.

Date
DELTA Pg No.

II NERVOUS SYSTEM

The nervous system is one of the most complex body system.
Many of its functions are not yet fully understood.
The nervous system is the control centre of our body or it can be taught as the body's 'communication system'
it regularly recieves, records and passes on information from the environment and from the different parts of our body
⇒ it records the information and send messages to different parts of the body ordering them to perform certain fn.
⇒ This makes it possible for other systems of our body to work together and respond to a situation

Orders are issued in the nervous system which controls and regulates everything that our body does.
The nervous system controls all organs and other parts of our body it acts as an organ of the mind and regulates body's temperature (heat) secration of digestive juices and excretion of wastes.

We can say it controls each and every movement/ activity which we do or think of doing.

Date
DELTA Pg No

nervous system is classified as—
(1) the central nervous system (CNS)
(2) the peripheral nervous system (PNS) not in syallabus
(3) the autonomous nervous system (ANS)

(I) the central nervous system. (CNS)
⟹ the central nervous system consists of the centrally located nervous system organs that are (1) Brain (2) spinal cord and some nerve like (3) spinal nerves

~~these~~ the central nervous system houses more than 100 Billion of neurons.

(II) The autonomous nervous system (ANS)

Usually the autonomous nervous system is considered as part of motor division of the peripheral nerve system
But it regulates our body's involuntry internal functions such as Blood pressure, heart rate, blood distribution and respiration these fn's are very important to phy activities and sports. the autonomous nervous system have 2 parts sympathatic and parasympathatic nervous system

Date
DELTA Pg No.

Parts of brain (name and position only)

the main parts of the brain are

(1) the cerebrum
(2) the diencephalon (B/w mid brain)
(3) the cerebellum
(4) the medulla oblongata (Brainstem)

(1) Cerebrum

It is the major part of brain front the outer portion of cerebrum / cortex is site of the mind and intelligence

it is also called grey matter

it is our concious brain allow us to think, feel and dicides our movements. it governs the whole body.

(2) Diencephalon (B/w mid part of brain)

it is the composing of

thalamus	hypothalamus
(information receiving centre)	(it performs link B/w mind and the body)

(3) Cerebellum-

— [located under the back portion]
— it is second largest part of brain.
— regulates coordination movements.
— it helps us in controlling our muscle movements, balance and equilibrium.

(4) Medulla-

[it is mid brain]
controls heart and lungs
when medulla injured result death • the heart and lungs stop beating and breathing.

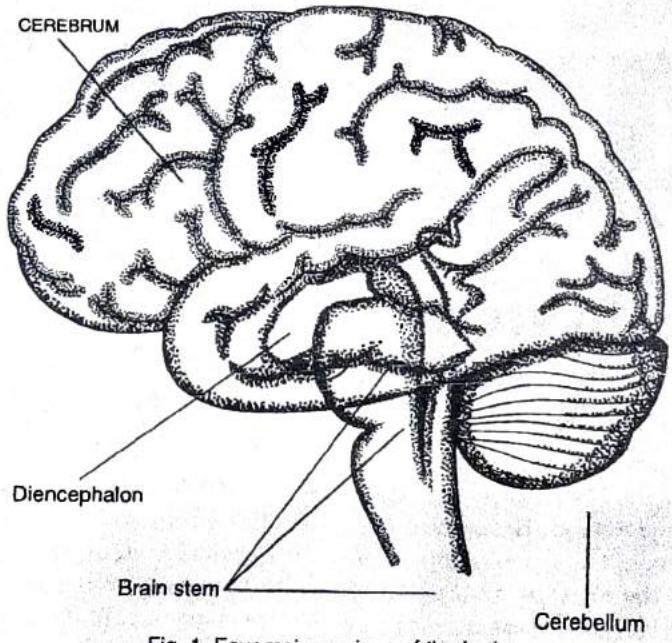


Fig. 1. Four major regions of the brain

Date
DELTA Pg No.

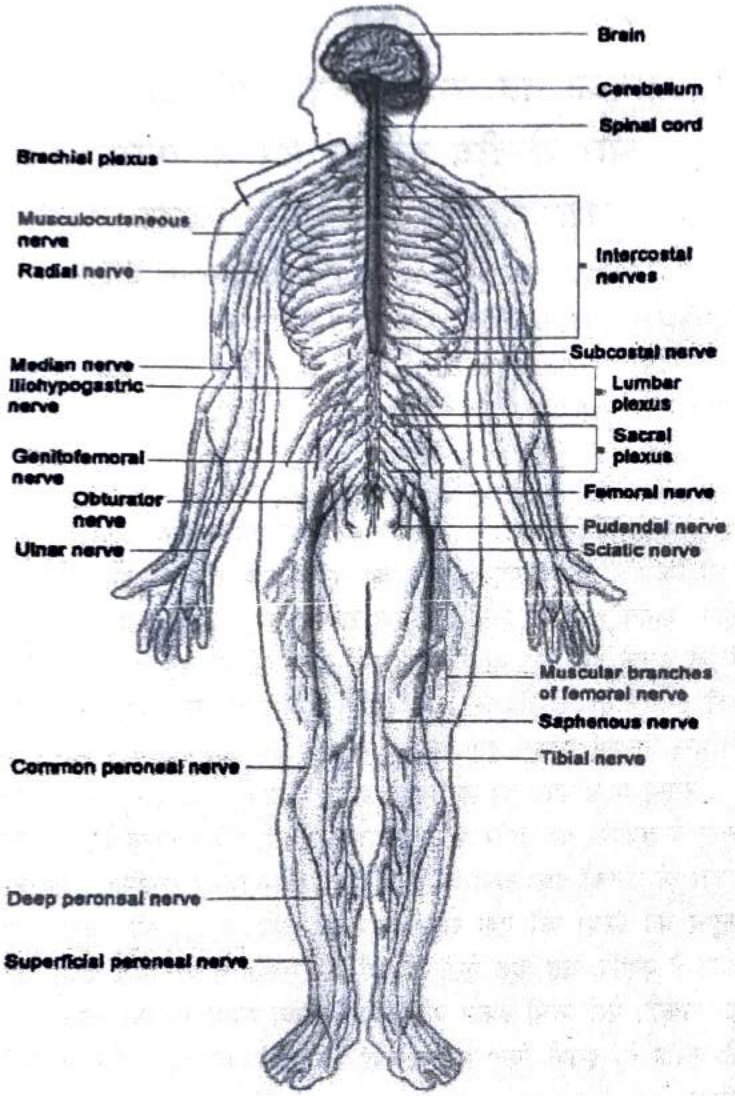
Spinal cord

The spinal cord forms the main link B/w the brain and the rest of the body.
it is attached to the medulla and runs down the middle of the back
the spinal cord carries both sensory and motor fibres B/w the brain and other parts of the body it is protected by the vertebrea of the backbone.
Nerve branch out from the spinal cord to all parts of the body they branched many times for forming smaller and smaller nerves so that every corner of the body is supplied with neurons.

Messeges travel from the brain, down the spinal cord through the nerves to all parts of the body.
Incoming messages of all parts of the body enters the spinal cord through the nerves. and then travel upto brain.

The spinal cord also controls certain action one of these is quick withdrawl of hand that touches a Hot object this is an Involuntry reaction called

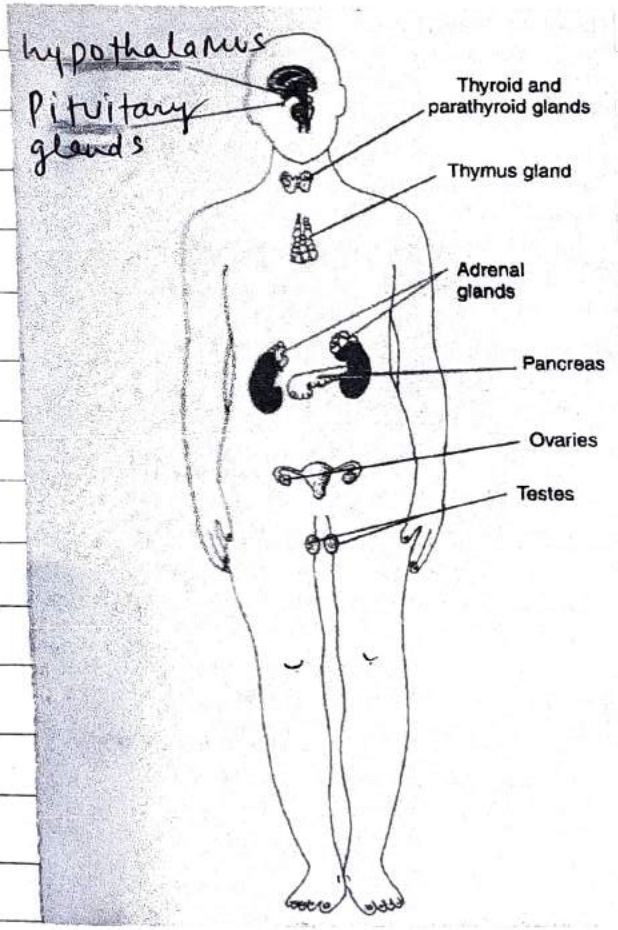
a reflex action



III Endocrine system

the endocrine system consists of a number of glands which release substances called hormones. into the blood Hormons acts as chemical signals throughout the body which regulates many functions in the body.
each hormone is required in very small quantity and has its own specific function.

Hormons produce slower and generally longer lasting responses. Hormons control Growth, development, behaviour, reproduction



Name of gland	location
the pituitary gland	Base of Brain (cranial cavity)
the thyroid gland	Neck
the parathyroid gland	Neck (Back of thyroid gland)
the adrenal gland	top of the each kidney
the pancreas	Behind the stomach
the sex gland	pelvic cavity.

Pancreas gland

located behind and slightly below the stomach. the two major harmones of pancreas are Insulin and Glucagon

fn -

(1) pancreas harmones control blood glucose (suger) level by lowering glucose levels.

(2) it increases use of glucose and synthesis of fat

(3) it stimulates the breakdown of fat and protiens

(4) it increases gastric secretions

(5) it also functions of distributing of nutrients to the tissue and cells or metabolism.