Fertilisation and implantation.

In humans, fertilisation of the ovum by the sperm occurs in the mid portion of the fallopian tube, The penetration of the ovum by the sperm and the initiation of cell division, begins at the same time by the lysosomal enxyme in the sperm. After the coitus the sperms are transported through the uterus (in 5 minutes) to the mid portion of the fallopian tube by the ciliary activity of the lining epithelium of the tube and/or by the wriglint movemt of the sperm. Of the ½ billion sperm deposited in the vagina only 1000 to 3000 travels the fallopian tube to reach the ovum.

Sperm can remain viable in the female tract for 24 to 72 hours and remain healthy for 12 to 24 hours. The life span of ovum is 24 hours and is maximally fertilised for only 8 to 12 hours. Only 1 sperm is required for the fertilisation of ~~voum~~ ovum because once the ovum has been fertilised a barrier is formed around it and it normally prevents other sperm from entering. Immediately it starts dividing and forms Blastocyst. This blastocyst moves down the tube in the uterus. Once it comes in contact with endometrium it burrows into it. This process is called as implantation. ~~The syncytiotrophoblast erodes the endometrium and the blastocyst burrows into it. This is called implantation.~~

A placenta then developes and the trophoblast remains associated with it. The growing foctus gets its requirements of oxygen, respiration and nutrient from the mother through the placenta and excretes carbon dioxide through it. In addition, placenta secretes number of hormones. They are

1. Human chorionic gonadotrophins (HCG)
2. Oestrogen.
3. Progestrone.

The corpus luteum in the ovary at the time of fertilisation fails to reduce in size and instead enlarges in response to stimulation by the gonadotrophic hormones secreted by the placenta. This enlarged corpus luteum of pregnancy secretes oestrogen and progesterone.

The human chorionic gonadotrophins reaches the highest level during the 1st few weeks of pregnancy. It acts on ovary in such a way that the corpus luteum persists in the ovary. From 3rd month onwards sufficient amount of oestrogen and progesterone are formed by the placenta and they take up the functions of the corpus luteum. Human chorionic gonadotrophins decreases after an initial rise but oestrogen and progesterone secretion increases until just before paturition.

Other placental hormones.

1. Relaxin
2. Human placental lactogen (HPL)

COMH 34.3

Female Reproductive System, with special reference to menstrual cycle.

1. The primary reproductive organ in the female is the ovary. The two ovaries are located in the abdominal cavity.

2. In addition to the primary reproductive organ there are the accessory organs like, the fallopian tubes, uterus, vagina and the various glands.

3. The ovaries have 2 main functions, the production of female reproductive unit ie., the ovum and the production of female sex hormones ie., Estrogen and progesterone.

4. The ovary comprises of a large number of follicles which are in different stages of development. ~~Of~~ The follicles secrete estrogen.

5. One of the follicles enlarges, outgrows the size of the other follicles, ruptures and liberates the ovum. This process is called ovulation. The ruptured follicle finaly gets filled with lipid material and forms corpus luteum.

6. The corpus luteum secretes both estrogen and progesterone. The life of the corpus luteum is for about 12 days and dies later. If there is pregnancy the corpus luteum persists and remains secretory

7. The sexual life of the female is characterised by the presence of cyclic activity. It begins around the age of 13 to 14 years when the ovary becomes functionaly active. The ovary remains active upto 40-45 years and then regresses. This phase of regression is called menopause.

8. The first menstruation with occurs at puberty is called menarche.

9. The menstrual cycle in humans on an average lasts for 28-30 days. During this time there are changes, seen in the pituitary ovary, uterus, vagina. The first 4 to 5 days are characterised by vaginal bleeding. Ovulation occurs on or around the 14th day of the menstrual cycle.

10. A large number of methods are available to detect the approximate time of ovulation. These are based on the changes in the properties of the cervical mucus and recording of the basal body temperature (BBT).

11. The basal body temperature drops at ovulation and then raises to 0.5 to 1°c because of the thermogenic effect of progesterone. The temperature remains raised till the onset of next menstrual cycle.

12. The ovulatory mucus is thin, and can be drawn into long thread when stretched between two slides called "spinnbarkeit." When allowed to dry it exhibits "Ferning" pattern.

13. The mucus after ovulation and during pregnancy appears thick and does not reveal ferning pattern on drying.

14. These ovarian hormones are responsible for two methods form the basis for establishing the safe period and help in natural family planning programme.

15. Hormonal changes in the ovary and pituitary during menstrual cycle

upto the 14th day (ovulation) the follicles secrete large amount of estrogen under the influence of follicle stimulating hormone FSH from the anterior pituitary. Ovulation occurs under the 'surge' of lecutinizing hormone (LH) from the anterior pituitary. When once the corpus luteum is formed it starts secreting estrogen and progesterone. The amount of progesterone secreted is much more.

16. Thus the ovaries are under the influence of the two hormones secreted by the anterior pituitary gland. The two hormones are the follicle stimulating

hormone (FSH) and luteinizing hormone (LH). These are further under the influence of releasing hormones (FSH RH) (LH RH) from the hypothalamus.

(R. Kamaka.)

Pregnancy and Parturition or Labor

① In humans, Pregnancy lasts for 10 Complete lunar months or 284 days from the 1st day of last menstruation preceeding Conception.

② The whole duration of Pregnancy is divided into three trimesters.

(a) 1st month to 3rd months – 1st trimester.
(b) 3rd " to 6th " – 2nd "
(c) 6th " to 9th " – 3rd "

③ Throughout the duration of Pregnancy mild Contractions of the uterus are present which becomes strong, rhythmic towards the termination of Pregnancy. So that the baby is expelled out. This Process is Called Parturition or labour.

③ A large number of hormonal and mechanical changes occur during Parturition. Progesterone Causes relaxation of the uterine musculature and oestrogen brings about Contraction of the uterus. The ratio of oestrogen to Progesterone Varies during Pregnancy and Parturition. In addition to

these two hormones, another hormone called oxytocin which is from the post pituitary, helps in bringing about increased uterine contraction at the termination of pregnancy.

(4) The constant downward movement of the foetus helps in the mechanical stretching of the uterine musculature.

(5) The process of labor is divided into 3 stages. -

(a) 1st stage of labor or the stage of cervical dilatation begins with 1st true pain and ends with complete dilatation of the cervix. This stage lasts for 8-24 hrs in 1st pregnancy.

(b) The second stage or stage of expulsion begins with the complete dilatation of the cervix and ends with delivery of the baby.

(c) 3rd stage of labor or the placental stage begins with the delivery of the baby and ends with the birth of the placenta. This stage lasts for 5 mts.

(6) The onset of labor is characterised by the following sequence of events; which involves the feedback mechanism :-

Contraction of uterus → cervical dilatation → stimulation from cervix → oxytocin secretion

During labor oxytocin secretion leads to uterine Contraction → stimulation of the birth Canal → Reflex and voluntary abdominal Contraction.

(7) The normal presentation is called Vertex presentation.

(8) Stages of labor -
Descent, flexion, internal rotation, extension, external rotation, restitution

(9) False labor Pains - and True labor Pains — for a varying Period before the establishment of true labor pains, the gravidas often suffer from so Called false Pains which must be distinguished from effective uterine Contractions. false Pains usually begin as early as 3 or 4 weeks before the termination of Pregnancy.. occurs at irregular intervals, Confined towards the lower abdomen, duration is short. They donot increase progressively in

intensity, duration and frequency. Effect on cervix is minimal where as true Pains are considerably Painful mainly due to Hypoxia, occur at regular interval, confined mainly at the back and comes to the front. They increase progressively in intensity, duration and frequency which brings about cervical dilatation.

(10) The Signs and Symptoms of Pregnancy are usually classified into 3 groups:-

(a) positive Signs detected only after 4th month.

(b) Probable Signs which can be appreciated earlier.

(c) presumptive evidence experienced by the mother.

(a) <u>positive Signs</u>

(i) Foetal heart sounds.

(ii) Foetal movements (active movement can be felt after the 5th month)

(iii) X-rays - Foetal skeleton can be made out.

Probable Signs :-

I). Enlargement of the abdomen.

II) Changes in the Shape, Size, Consistency of the uterus.

III). Softening of the cervix.

IV) Braxton Hicks Contractions - Painless Contraction at irregular intervals.

V) Ballottment.

VI). outlining the foetal Parts.

VII) Endocrine Tests - which are based on the presence of human Chorionic gonadotrophins hormone excreted in the urine during the early months of pregnancy.

Presumptive Signs of Pregnancy -

① cessation of menses.

II) Changes in the breast.

III) Discolouration of mucous membrane of vagina.

IV). Hyperpigmentation.

V) Abdominal Striae.

VI) Morning Sickness - Hyperemesis gravidarum

VII) Quickening - 1st foetal movement.

VIII) Disturbances in urination. (Neela Pandit)

COM H 34.4

Male Reproductive System

1. The primary reproductive organ in the male is the testis. The testis are present in a specialised bag of skin called scrotum. The temperature of the scrotum is about 2° below the body temperature. The scrotum provides a cool environment for the testis.

2. In addition to the primary sex organ there are the accessory reproductive organs like, the epididymis, vas deferens, seminal vesicle, prostate gland, bulbo-urethral glands and the penis.

3. The testes have 2 main functions, the production of male reproductive unit i.e., the sperms and production of the male sex hormone ie., Testosterone.

4. The sperms develop inside the seminiferous tubules present within the testes. In between the seminiferous tubules are present the leydig cells or the interestitial cells which help in the production of testosterone.

5. The sperms formed within the tubules are stored in the epididymis, vas deferens and on acquiring maturity are transported out through the male genital opening by a process called ejaculation.

6. A mature sperm consists of head, neck, body and tail. The tail helps in the movement of the sperm.

7. The sperms are found in a fluid called semen.

8. The semen is the secretion from the various accessory reproductive organs like the seminal vesicle, prostate gland, mucus glands, bulbourethral glands. The main content of semen is fructose which provides nutrition for the sperms

9. About 100 million sperms are present in one ml of semen. The number of sperms ejaculated is used as a measure of fertility.

10. The life span of the sperm ranges from 24 to 72 hours

11. The hormone testosterone secreted by the leydig cells is responsible for maintaining the accessory reproductive organs and the secondary sexual characters.

12. The secondary sexual characters are the growth of hair, over the pubis, chest, umbilicus and face, cracking of voice, increased growth of skeletal muscle etc.

13. These secondary sex characters make their appearance at puberty at the age of 14 to 15 years when the testis becomes functionaly active.

14. The testis are under the influence of two hormones (gonadotrophins) secreted by the anterior pituitary gland. The two hormones are the follicle stimulating hormone (FSH) and leutinising hormone (LH) or Interestitial cell stimulating hormone (ICSH). These

are further under the influence of the releasing hormones FSHRH and LHRH from the hypothalamus.

R. Kanaka.

Nervous System

CHW BCS

COM H 34-5

Dealing with information

The Nervous System is made up of the brain + the Spinal cord, the nerves with their nerve endings and the Autonomic nervous system. It is a huge communication system which spreads right through the whole body. It deals in messages. Messages are brought to the brain. They are sorted out and dealt with in the brain. New messages are passed across the brain and sent out to the body. Very simple messages don't go to the brain. They can be dealt with by the spinal cord.

Nerve cells which carry the messages through the nervous system are called neurons. Their basic structure consists of (i) a large nucleus
(ii) the cellbody around the nucleus
(iii) the nerve fibres which are the little branches coming from the cellbody.

The nucleus + cellbody decide what is to be done with the message. The nerve fibres bring a message in, or pass a message to another neurone, or take a message away from the cellbody. So you can think of neurones as being one of 3 main types:
i) Sensory neurones for bringing messages in.
ii) connector neurones for sorting the message out in the brain or spinal cord, +
iii) motor neurones for sending messages out to the body.

eg pain.
stepping on a thorn → removal of thorn.
(stimulus)

The message is picked up by nerve ending of sensory neurones. It passes very quickly by chemical + electrical changes in the nerve fibre. These sensory nerve fibres can be long eg from the tip of your finger to the spinal cord or short from the eye to the brain.

The message then passes through connector neurones to the motor nerve fibres. Connector neurones are short fibres in the brain or spinal cord + form a link between the motor + sensory nerve fibres.

The message passes through the motor nerve fibre which can make muscles contract or relax or make glands produce more or less secretions

These fibres can be long or short depending on the distance from the brain or spinal cord.

Nerves look like white cables. Large nerves carry both sensory + motor nerve fibres. They branch into smaller + smaller nerves. Very small nerves carry either sensory nerve fibres or motor nerve fibres but not both

Reflex Actions - eg. sneezing, coughing, blinking of eyelids. They are called involuntary actions as they are not controlled by the mind. They are "inborn" or "instinctive" and are usually for our immediate protection. They are important because they happen very quickly and are very simple. The message is picked up + flashed into the nearest part of the nervous system. Or does not have to go to the brain. Or jumps across the connector neurones + motor messages are flashed out to the muscles. eg. you touch a hot plate + immediately snatch your hand away. This occurs 'reflexly' - you do not have to think about it.

Conditioned reflexes -

Imagine you hear the bell for lunch. Without thinking, you stop whatever you are doing, put away the things you are using and go to the lunch room. You are talking with your friend and are not aware of what you are doing. When you sit down in the lunch room you may think "Yes I am here. But I don't remember how I got here. I don't remember the details of each action I took after I heard the bell." A lot of our behavior is learned behavior. We have put by our things and gone to lunch so often that we don't need to think about what we are doing. Nervous pathways have been laid down in our nervous system + we follow them. This is very useful because it leaves our brain free to take in and deal with new experiences. Think how slow our lives would be if we had to concentrate on every little thing we do. A lot of our behavior is learned or conditioned behavior. A conditioned reflex is an action we have learned and repeated so often that each time we receive the stimulus we react in the same

way without thinking about what we are doing.

Most of our conditioned learning happens when we are very small. Watch a baby taking its first steps. You can almost "feel" the messages being sent from the brain to the muscles. Each new skill we learn has to be practised over & over again before it forms a nervous pathway and becomes a part of our behavior. Make a list of some of the skills a baby learns in its first three years. Habits are conditioned reflex actions and are also learned when we are young. We learn habits of thinking, feeling and behaving from our parents and the people in our home. Some of these habits will stay with us for the rest of our life. You can understand how very important parents are in helping a child develop habits for a healthy, active and happy life.

Remember —

A reflex action is inborn and is not controlled by our conscious mind.

A conditioned reflex is learned by our conscious mind.

After the learning period we do not need to use our conscious mind when we repeat the action. We can control a conditioned reflex action by using our conscious mind.

The Brain.

The brain is a soft greyish lump & looks like a large wrinkled walnut. It weighs about 1½ kg & is made up of about 15,000 million brain cells. It's difficult to think of 15,000 million of anything, though we have all these brain cells to think with!

Parts of the brain are bathed in fluid, cerebro-spinal fluid, which brings oxygen & nutrients to the cells. Three parts of the brain we will study are the cerebrum, the cerebellum & the medulla.

The cerebrum is large & covers most other parts of the brain. It is also very folded. There is a deep groove in the middle, which almost divides the cerebrum into two halves. The left side of the cerebrum controls the right side of our body, & the right side controls the left side of the body.

In a right handed person the left brain is called the dominant hemisphere.

i) The cerebrum controls our conscious acts
ii) It receives messages from the sensory organs
iii) It translates those messages.
iv) It sends out new messages to the muscles and glands.

v) It deals with things we don't completely understand such as memory, intelligence, thinking, judging, decision making, conscience, emotions & imagination.

The cerebellum or "little brain" is situated behind & below the cerebrum.

i) It deals with our balance & sense of position.
ii) It deals with muscle tone & the smooth contracting & relaxing of pairs of muscles.
iii) It deals with the coordination of our body & our movements. This means it puts together all the messages it receives & sends new ones to the muscles so our actions are correct and graceful.

The Medulla - This is cone-shaped and forms a swelling at the top of the spinal cord.
It controls the vital activities such as respiration, digestion, heart rate and temperature control. It works at an 'unconscious' level as it must continue to work while the conscious part of the brain is asleep.
It controls reflex actions which are also vital activities. For example, if the swallowing reflex stopped ~~(illegible)~~ saliva would go down into the lungs and we would drown.

There are many other parts of the brain with important functions also.
However, what is most important to understand is that the brain acts as a huge coordinating centre. Though we know there are special centres for special functions, the brain acts as a whole, protecting & controlling itself & the body.

Facts to remember.

1. The brain gets messages from all the sensory organs of the body.
2. It translates those messages and sorts them out
3. It passes the messages across connector neurones

to the parts of the brain which deal with them.
4) Some messages are stored as information to be used in the future
5) It sends out new messages to the muscles + glands along the motor nerves, or more of the same messages if they were the correct ones
6) Parts of the brain work at our conscious level + parts work at our unconscious level

The Spinal Cord

The spinal cord runs from the bottom of the brain to the second lumbar vertebra. It is a very simple part of the brain. In the centre is a small canal for the cerebro spinal fluid which brings oxygen and nutrients to the neurones. The grey matter surrounding the canal is made up of cell bodies and nuclei of the neurones. The white matter on the outside is made up of nerve fibres and nerves.

The function of the white matter is to pass messages between the brain and the body. The function of the grey matter is to deal with reflex actions.

Protection of the brain and spinal cord - The bones of the skull and the vertebral column protect the brain and the spinal cord respectively. Between the skull and the brain are the meninges and the cerebrospinal fluid. These also cover the spinal cord.

The meninges

These are linings of the brain + spinal cord. They are of membrane tissue + there are 3 layers. They have a rich supply of blood vessels. Brain cells need a great deal of oxygen as they have such a vast amount of work to do. In fact brain cells die within 3 to 5 minutes if they do not get oxygen. Once a brain cell dies, it cannot be replaced. A new one doesn't grow in its place. It is vital that there is a rich supply of blood vessels bringing fresh oxygen to the brain all the time.

The cerebro-spinal fluid

This is a clear fluid, between the middle and inner meninges. It acts like a water-cushion

for the delicate brain-cells, protecting them from any bumps or knocks and from the hard bony skull. It also brings oxygen and food to the brain and removes the waste products.

The Autonomic System.

This important part of the nervous system lies outside the brain & spinal cord, though it links up with them. It controls the rate of our heart-beat, respiration and so on and sends messages to all the vital organs and glands to speed up or slow down, when it is necessary. It works in two parts, one part controlling the action of the other, so that between them the internal workings of our body are kept at a proper steady state.

It is sometimes called the 'flight or fright' system as it also helps us when we are in danger. Remember the last time you were really frightened? How did you feel? Or imagine you are alone. It is dark. You hear sounds, scufflings, creakings or heavy footsteps. You are terrified. As your fear rises, you can almost 'feel' your body getting ready to run away & hide or to rouse up ready to fight.

The iris is pulled back so you can see more clearly
The salivary glands stop secreting saliva.
Your breathing rate gets faster & paler
You can hear your heart thumping as the heart beat speeds up.
Digestion in the stomach & small intestine slows down.
The liver sends out extra simple sugars to the muscles.

Peristalsis stops.
Control of the bladder & rectum is relaxed.
Blood is drawn away from the surface of the body & other places & sent to the lungs, heart and muscles.

These are some of the things which happen when you think you are in danger. Your body is now in a state of "Red Alert" ready & prepared to run or fight, whichever is best for you. The Autonomic System very cleverly stops the action or slows down those actions in your body which will not help you to get out of the immediate danger. Extra energy is used by the liver, lungs, heart & muscles.

Now imagine the danger is over. You can't

stay all keyed up for action when there is no need for it. The other part of the autonomic nervous system begins working, slowing down some things + speeding up others till the body returns to its normal steady state.

Remember-

i) The autonomic system is self-governing. We have no control over it.
ii) It is linked to the brain + spinal cord.
iii) It lies just outside the spinal cord + sends messages to the organs + glands.
iv) It works in two parts, by speeding up some actions + slowing down others
v) It's function is to keep the body working at a proper steady state
vi) In danger it gets the body ready to fight or run away.
vii) After danger it returns the body to its normal steady state.

—x—

Disease + Damage to the Nervous System.

Brain Damage

Sadly, about 4 in every 1000 babies are born with brain damage. There are many different reasons for this + not all of them are known.

There are different degrees of brain damage + some babies are only mildly affected. The commonest name for brain damage is cerebral palsy. If the nerves going to the arms or legs are damaged, the muscles are not able to make voluntary movements smoothly + may become twisted + drawn. If they can make no movements at all they are paralysed. Damage to the parts of the brain dealing with intelligence can cause a child to be backward. People with brain damage are not mentally ill. They are mentally handicapped.

Children with cerebral palsy can be helped by special treatment to train their muscles + to get some control in their brains. Severely backward + paralysed children are usually kept in special homes as they cannot do anything for themselves. The people who look after them need to be loving and have endless patience + understanding. Children with slight brain damage can live at home + go to schools for the educationally sub-normal. These schools also help children who need extra time + care to develop their learning.

Concussion.

This is a different type of brain damage resulting from a blow on the head or a fall. The person loses consciousness & is not aware of himself or the things around him. When he becomes conscious again he feels dizzy & sick, has a headache, & must lie down to rest & sleep. Concussion is always serious as there is a risk of brain damage, blood clots forming etc. Any person who loses consciousness after a blow on the head should be taken to hospital.

Epilepsy:

This is a disorder of the brain's function. For a short while the epileptic person may lose conscious control. He or she will fall down, parts of the body may jerk or stiffen, the tongue may be bitten. This is the most serious form of epilepsy. There are other much milder forms. Many people who have epilepsy have normal intelligence. There are now drugs which can control epilepsy.

Meningitis - is an infection of the meninges. It is very dangerous especially in children.

Encephalitis - is an infection of the brain. Many different viruses can cause this infection & it can be infectious. The symptoms are that the person has headaches, sickness, drowsiness, blindness & may become unconscious.

Paralysis

This is loss of movement in any part of the body. It is most usually caused by brain damage or brain infection. But it can be caused by a accident if a large nerve is cut or severed right through, no messages can be passed either way & when a large nerve in the upper arm is severed, the lower arm is paralysed.

stroke (Hemiplegia/paraplegia)
mental retardation.

polio
leprosy
rabies.

Sleep - Our minds are hungry for new facts, new information, new experiences. Each day we take in lots of new messages, some of which are quite difficult for us to understand. In the same way that our bodies need time to rest & recover, so our minds need time off to rest & sort out all the new information.

It is known that we can go for longer without food that we can without sleep. It is also

Known that sleep is vital for the health of our minds. But exactly why sleep is so important is not fully understood. Why do we spend one-third of our lives asleep? What do our dreams mean + why are some of them so frightening? Why do we all dream but usually forget what our dreams are about?

There are at least two kinds of sleep. In one, the growth hormone is released, new cells are built and worn out cells are removed. In the other kind of sleep we dream. Our eyes make rapid eye movements behind the closed lids. It seems likely that our brain is sorting out the information it got during the day. We need both those kinds of sleep, which happen in turn right through the night.

During sleep most of our body activities slow down. The body temperature drops, the heart rate + breathing are slower, our muscles relax and the whole body rests. We wake up feeling full of energy + ready to meet the new day. Each person needs a different amount of sleep. The average for an adult has been worked out at 7 hours + 20 minutes. Teenagers need more than that + babies sleep an average of 16-20 hours a day.

Mental Health

Until quite recently, people who suffered from any form of mental ill health were thought to be 'touched in the head', 'crazy', + 'insane'. Their families were ashamed of them + shut them away in mental homes or lunatic asylums

Nowadays we know that there are certain disorders of the mind which may cause a person to be mentally ill, just as there are disorders of any other part of the body. Sometimes people can be cured of their disorder.

Stress + mental health

We have heard people suffering from 'nervous breakdowns', 'nervous exhaustion', or 'anxiety states.' There are many different names for these sorts of mental illnesses. We will use the term mental ill health. People who suffer from this become so deeply unhappy or so anxious or disturbed that they are not able, for a while, to lead normal healthy lives. Mental ill-health is increasing, particularly in industrialised countries + one of the causes of this is the way in which we cope with stress.

Stress — Life is difficult for all of us at times. We

feel unloved, insecure, & are afraid of failing. We don't understand why other people seem to have a better life than we do. We get angry, jealous, spiteful & hateful, as well as pleased, happy & wild with excitement. We have to cope with all these feelings & this can be difficult. It is hard to learn not to 'hit out' when our feelings have been upset; to control ourselves so we don't damage other people. We have to become social; doing some things we don't want to do, & not doing other things we do want to do. All of us have to work out some sort of balance between our own feelings & those of the people in our world. Sometimes this causes us stress. Stress is different things to different people. Some people suffer stress from outside themselves - the world is too noisy, too full of machines, too polluted, too fast, too slow, too overcrowded, too lonely.

Some people are not able to find ways to cope with stress & become mentally ill. Other people enjoy stress, & because of it they work harder & longer & lead happy, healthy lives. Most of us just cope with it.

To try & understand why we differ in our reactions we must understand how a person develops mentally & emotionally (in his feelings).

The beginning - We can't think of a baby's mind as being a blank. From the moment he starts life in his mother's womb, he is a mixture of things he has got or inherited from his parents. These things will control quite a large part of the sort of person he is likely to develop into. But equally important are the things which happen to him after his birth as a result of his environment. A baby's environment is made up of his parents, the home he lives in & the family & friends around him. eg an intelligent child whose parents are not interested in education is not going to get the encouragement or the opportunities to reach his potential.

The environment

A baby has to be helped to develop his mind & his feelings. The people who do this are his parents or whoever is looking after him. Parents usually learn how to feed, clothe & keep baby warm, dry & clean so his body develops well. But

they are not taught how to look after his mind + his feelings. This is because we can't see a baby's mind + we can't see his feelings so we forget about them, or we think they are not important. "He's only a baby," we say, "he can't really feel or think".

Learning bad experiences

A baby is helpless. He has to lie + wait for the things he needs to be given to him. He is dependant on his parents for everything he needs. When he is hungry, cold, lonely or bored he feels 'bad'. He cries with anger till he is given what he needs. If his parents make him wait too long, his crying changes to fear + pain. He learns to be frightened of his mother + father + of the world he is in. He has no idea of time. He can only understand he is in some terrifying place where no one will come + help him. He is learning his first bad experiences; he is suffering from stress.

Learning 'good' experiences

A baby is dependant for a long while. If his parents go to him when he cries + give him what he needs, he feels 'good'. He begins to understand he is in some safe place where people come + help him + give him what he needs. He is learning his first good experiences; that he can cry, can feel stress, but that is quickly taken away.

While a baby is dependant, it is vital for the healthy development of his mind + feelings that he feels 'good'. A baby has as much stress in his life as we have in ours. We don't think of his stress as painful because it doesn't hurt us to wait, + we don't feel frightened by the same things. But it is painful for the baby, and part of the parents most important work is to protect their baby from stress whenever they can.

Conditioned learning:-

We know that once we have learned to walk we don't forget how to do it. We don't even have to think about it as our nervous pathways are set for walking. In something like the same way, a baby or small child develops nervous pathways about his mind + his feelings. 'Bad' feelings may make him think of himself

CARE OF THE NOSE

Nose is an important part of the human body. It needs constant care. Any neglect can lead to infection. The nose has the following main functions to perform:

Main functions of the nose

1. Respiration or breathing: Breathing through the nose helps in keeping one free from infections of the throat and chest.
2. Acts as the seat of special sence of Smell. It also helps in appreciation of flavour.
3. Acts as the resonating chamber for voice effecting it in tone and other qualities. If you have a cold or your nose is blocked-your voice is so different.
4. Regulates the temperature of the air that we breathe in, to body temperature.
5. Supplies moisture to the inspired air to enable gaseous exchange in lungs and to maintain protective action.
6. Acts like a watchmen at the gate and excludes substances of harmful nature like dust, soot, etc. by filteration.

Common Ailments of the Nose

Inflamed Adenoids

At the back of the nose there are small pads of tissue which when enlarged in size are called adenoids.

The adenoids act as filters and prevent germs finding their way into the air passages.

Cold in the Nose

During a severe cold the lining of the nose is swollen blocking the nasal passage

During a cold the output of mucous is also increased, giving rise to a 'head cold' i.e. running of the nose and typical thickening of the voice, etc.

The conditions are temporary but if they recur often and are neglected, chronic congestion called NASAL CATARRH may set in.

If the nasal catarrh is allowed to persist and becomes chronic, it inevitably spreads to the adenoids which become inflammed, swollen and block the air passages.

The inflammation may spread to the tiny tubes which run from the back of the nose of to the middle ear. This is a common cause of deafness and running of the ears in children.

...2

Chronic catarrh may also spread to the tiny cavities in the bones of the face on either side of the nose-known as sinuses.

The infection can spread from sinus to distant parts of the body through the blood stream.

The nose is an important part of the body and should receive careful attention.

Bleeding from one side of the nose

Every mother should consult the doctor if her child is having one-sided bleeding from nose or foul smelling discharge.

Foreign bodies in the nose

Children have an extraordinary habit of stuffing articles up through the nostrils like-stubs or pencils, pieces of paper etc.

These children have great difficulty in breathing through the nose.

In many cases they develop alarming symptoms like foul smelling discharge from the nose. If such a condition develops a doctor should be consulted.

R E M E M B E R

1. The nose should be kept clean at all times- If any obvious course of obstruction or infection is present and if any foreign body is present attention should be paid-consult a doctor.
2. If a child breathes through the mouth-consult the doctor-it may be due to blocking of nasal passages or enlarged adenoids.
3. The inner lining of the nose should be kept in a healthy condition.
4. Avoid using nose drops, ointments and inhalers continuously unless prescribed by a doctor.
5. Avoid using strong antiseptic lotions for nasal washing.
6. Safest method of nasal washing is by using warm saline solution. It is made by dissolving half a teaspoonful of salt in a glass of warm boiled water. Sniff into each nostril from the palm of your hand, draw it into your mouth and split it out. You can also prepare nasal lotion by dissolving 5 gms each of borax and soda-bicarb and 5 gms. of salt in 5 ounces of water.
7. When you blow your nose-blow each nostril separately. If both nostrils are blown together, infection of the nose is likely to be pushed into the ears.
8. Repeated head colds for special attention. Consult a doctor.

Source: Swasth hind - July 1978

CARE OF THE EAR

A large ear in man, they say, is lucky. To a woman, a small ear sets off her beauty. The ear can help to hear music, to hear lectures, talks, conversations, and to learn, to play, etc. If you cannot hear you cannot speak.

Some children are congenitally deaf and they don't know what to speak. They cannot pick up sppech, and thus become deaf and dumb.

Do you know that what you call the 'ear' is only the visible part of the entire mechanism of hearing.

An earache

Do not neglect an earache. It may result in life-long deafness.

How to take care of the ear?
The ear consists of outer ear, internal ear, middle ear and ear drum.

The outer ear has many folds and curves. It may collect much dirt and dangerous germs in course of the day. It folds and curves need careful cleaning every day with a towel after bath. The outer ear leads into a passage or canal. It is in this passage that greasy dirt, called wax, collects which prevents dust particles from going on to the drum and injuring it. So often the wax scales off and comes out with the tip of little fingers. Sometimes it develop into large hard plug causing deafness and earache.

Do not attempt to remove the wax by podding with any sharp pencil, hairpin and the like. Never get into the habit of fiddling with your ear as scratching the ear leads to earache, itching, boils and oti-tis externa and at times proforation of the drum of the ear.

The ear-drum-a delicate membrane-may be permanently injured by such methods. Not only that it gets ruptured by very loud noise and slapping on the ear. One should not hit on the ear.

Put a drop of warm oil kike coconut, seasame, olive oil or glycerine for a few days to remove wax. This will soften the hard wax and bring it to the surface and can be removed with cotton or soft muslin. If the wax is too hard, a doctor can remove by syringing.

...2

Do not let inexperienced people remove wax by unsterilized instruments or forcibly syringe the ear. They may injure the outer canal, induce infection or perforate the drum.

Boils in the passage of canal

Walls of the passage are dometimes inflamed by boils. The pain may be very intense, the lymph nodes in back, below or front of the ear and in the neck may get enlarged and become tender. The patient may feel ill and at times deaf.

Poking things inside the ear may spread inflammation along the whole length of the passage and cause abscess in the lymph nodes involved and also high fever. See a doctor first for a suitable remedy. Till then use hot water bottle for fomentation.

Foreigh bodies in the ear canal

Accidents to the ear are very common. Small children generally thrust things like beads, small peas and beans, pebbles, bits of rolled paper, etc., into the ear hole. Even lead of a pencil or a matchstick breaks into the ear while scratching. Sometimes, if the ear is dirty, a fly gets into it and remains there as a foreign body.

Cockroaches also manage to get into the ear and stick inside with their sharp legs.

Whenever, insect or cockroach enters the ear, put oil or spirit in the ear. It will kill the insect and the pain will be over.

It is unsafe to remove the article, in view of the peculiar position of the drum. In your attempt, you may only push the thing deeper and even pierce the drum. The moment you suspect any foreign body in the ear, go to the doctor, In the case of foreign bodies like small peas, and beans, water should not be used as they will swell.

The doctor will put in glycerine first to absorb the water and then syringe the ear. He will pick up the insects with forces and remove them. Often, people put cotton plugs to keep the cold out. Keep an eye on these bits of cotton wool because a piece of cotton wool pushed down the ear may give rise to offensive discharge.

<u>Beware of colds</u>

There are two passages leading out of the middle ear-one going backward and one in the front leading to the nose and throat (The Eustachian tube).

When you have a cold, germs can pass from the nose or throat up this tube and inflame its walls - which swell up and may cause deafness.

...3

When the walls of the middle ear become inflamed, earache is the result.

If it is not treated and the infection continues, an abscess may form. This results in severe pain and sleepless nights until the drum bursts and the ear starts running.

The hole in the drum may take weeks or months to heal or if may remain as a permanent opening.

If the discharge stops and child becomes healthy, perforation heals within few weeks. But if the discharge does not stop or child gets recurrent colds and recurrent onset of discharge, hole becomes permanent and so is the deafness.

Do not blow the nose with force. If you have a cold. Otherwise, it will push infection to the middle ear.

The lymphoid tissue at the back of the nose is in close proximity of the opening of the Eustachian tube and is called adenoids.

When it becomes inflamed, enlarged and septic, it may block the passage causing deafness and sometimes running ears. So often when a child has running ear it will not clear up until the infected tissue is removed.

If you have chronic inflammation, avoid entrance of water while bathing and plug the ear with cotton saturated in vaseline. Avoid swimming in such conditions.

Dental trouble

Dental trouble in children and the eruption of new teeth may cause earache. It is possible to distinguish this cause from acute inflammation unless the ear is examined.

Always consult a doctor when your baby has an earache. Infectious fevers like influenza or measles are often accompanied by earache due to inflammation in the ear. Symptoms should be reported to the doctor immediately.

Pus formation in the middle ear, if not checked, may spread to the bone at the back of the ear and may result in mastoid abscess.

As a result of negligence or mishandling, the abscess may even give rise to pus formation in the brain.

Inner ear-internal ear-besides being the receptive organ for hearing is also concerned with maintenance of balance and sence of position.

If you feel giddy, or if you get vertigo or both, it may be due to your ear, you should then go and see a doctor.

If your child does not start speaking at the right age or if you are doubtful about his hearing the sounds, you should consult the doctor.

Quite a few children with marginal hearing (not totally deaf) can with early care at good E.N.T. Centres, be prevented from becoming deaf and dumb.

SOURCE - Swasth Hind- Aug-1978

GETTING INFORMATION (Sense Organs) CHW BC-8

COM H 34-8

Introduction: Our brain 'looks after us'. It protects us from harm + makes sure everything is working well. To do all this it has to know what is going on
- inside the body
- on the surface of the body
- outside the body (our surroundings are called our environment)

But the brain is tucked away inside the cranium, the skull, at the top of the body. It is a long way from the stomach, the legs, the skin. It is even further from our environment. There has to be a special system to get the information the brain needs, to find out what is going on inside, on the surface + outside the body. This special system is the **sensory system** + it is made up of **sense organs** + **internal receptors**.

THE SENSE ORGANS:-

These are on the surface of the body. They are for sight, smell, sound, touch, balance + taste. They have nerve endings which receive information. The nerve endings are called **receptors**. The information or message picked up by the receptor is passed along a **nerve** to the **brain** we see, hear, feel + so on in the brain. The brain translates the message into sight, sound touch [eg if a sense organ like the eye is perfectly normal, but the nerve connecting it to the brain is damaged, we will not be able to see]

THE INTERNAL RECEPTORS:-

These are inside the body. They pick up information about what is happening inside us + pass it to the brain. The sort of information they get is that the bladder is full + needs emptying, or that a muscle is tired + needs rested. They also keep the brain informed about where the parts of the body are. This is very useful. We don't have to look to wash our ears, put food in our mouths, shrug our shoulders, or scratch an itchy place on our leg.

However in certain diseases of the nervous system this sense of position may be lost.

The sensory system is extremely important

for getting information + for protecting us from danger. Think of the ways we could be in danger if we were blind, deaf or had no feeling in our skin. Our sense organs also allow us to appreciate our environment- eg listen to music, look at beautiful things + art, taste food, etc. They are called the "gateways to the Brain"

SIGHT:

Protection of the eyes.

The eyebrows - stop sweat + rain from getting into the eyes. We use them to show our feelings - pulling them down or upwards to show surprise, or downwards to show anger or worry.

The eyelids - close over the eyes about once every 6 seconds. Blinking keeps the eyes damp + sweeps any dust away from the front of the eye.

The eyelashes stop dust from getting into the eye

Tiny sebaceous glands secrete oil along the lashes. A stye, which is a small boil on the eyelid, is caused by an infection of the hair follicle.

The tear glands produce small amounts of tears all the time. Tears are a watery, salty, sterile fluid with enzymes to destroy germs. Tears trickle down onto the eye keeping it damp + clean. The tear ducts are at the inner corner of your eye. Tears which have not evaporated drain down this canal into the back of your nose. When we cry we produce excess tears which spill over the eyelid + pour down our cheeks. Work out a) Why our eyes get puffy + b) Why our nose runs when we cry.

The conjunctiva - is a clear lining which covers the front of the eye + the inside of each eyelid. It protects the delicate front of the eye. If it gets infected, the eyelids swell + redden + the eye looks pink. This is known as 'sore-eyes' or conjunctivitis It must be treated at once so that no damage is done to the eye + we do not pass the infection to other people.

Movement of the eyes:-

We only see the front part of the eye. It is important to remember that the eye is nearly round + that most of the eyeball is deep in the skull, protected by the bony eye socket. Feel.

around your eye to find the rim of the bony socket. The eye is held in position by 3 pairs of muscles. Stare at the tip of your nose, then up to your eyebrows, out of the corner of your eyes, & all around you. You will feel the muscles pulling your eyes. Eye muscles work together, so both eyes are pulled in the same direction & we see an object with both eyes at the same time. What do you think happens if one of a pair of muscles loses its muscle tone?

If the eye muscles do not work together the person has a squint. It is quite usual for new-born babies to have a squint, however if this continues for more than 3 months it must be treated.

Structure and function of the eyes

Our eyes give a clear detailed and exact picture of our environment. We can also judge distance, colour, brightness & darkness. The function of the eye is to let in light rays to the back of the eye, where they stimulate the nerve endings — the sight receptors.

The pupil is the part of the eye where light enters. The function of the iris, the coloured part around the pupil is to control how much light gets into the eye. In dim light some muscles in the iris contract pulling the iris back so that the pupil becomes large. In bright light other muscles contract pulling the iris inwards so that there is only a small pupil. In this way we get more light coming in when it is dark & we get protection from too much light when it is very bright sunshine or artificial light. We have no control over the muscles of the iris. They are involuntary. Sit in a dark room with a mirror & a torch. Switch on the torch & stare at one of your eyes. You will be able to see the iris closing, protecting the eye from the glare of the torchlight.

Dark brown or black eyes have lots of pigment in the iris. Blue eyes & shades of green, grey & hazel have very little pigment.

There are 3 coats which make up the outside 'shell' of the eyeball - i) The sclera is the tough outer layer which protects the eyeball. We can see it as the 'whites' of our eyes. It doesn't cover the pupil as

Long sight + short sight:

In normal sight, the light rays are bent to focus directly on the retina. Long sight is usually caused by the eyeball being small or by the lens not being able to become thick enough to bend light rays from close objects, we only see distant things clearly. After the age of 40 many people become long sighted + need glasses for near sight. Short sight is usually caused by the eyeball being too long. We only see near things clearly.

Cataract

As we get older the lens may become cloudy or split vision is weak + as the cataract develops over the whole lens, the person loses his or her sight. The lens can be removed + the person is given 2 sets of glasses. one for close vision + one for distant vision.

The optic nerve.

This is a cable of more than a million bundles of nerve fibres from the eye to the brain. Any severe damage to the nerve may cause loss of sight, as messages received by the retina cannot be passed to the brain.

The image which lands on the retina is upside down. The brain turns it up the right way for us.

Vit A deficiency — Lack of adequate Vit A in our diet produces a number of changes in the eye. The earliest sign is night blindness, then dryness of the eye (xerophthalmia), Bitots spots, + finally softening of the cornea or Keratomalacia which can lead to blindness. In India this is a very common cause of blindness

Health + Hygiene of the eye

Foreign body in the eye — Anything which gets into the eye, such as dust or grit, is called a 'foreign body'. Extra tears are produced to try to wash it out. If it is a tiny speck, try to get it out with a clean tissue or handkerchief. Pull the lid away from the eye + look for the speck first. Then very gently lift it out with the corner of the tissue. It is very easy to damage the delicate conjunctiva + to infect it with germs. Never rub the eye, as you can push the speck into the membranes. Bits of steel, chips of glass + grains of sand must be removed by a doctor.

Eye care

Foods with Vit A eg green leafy vegetables, yellow fruit + vegetables help preserve ones eyesight.

2. Any eye infection must be treated at once & care taken not to spread the infection to other people.
3. All children should have regular checkups of their eyes.
4. Don't use eye-washes unless your doctor says so.
5. When doing close work, rest your eyes by looking into the distance every half an hour or so.
6. Make sure your work is well-lit, lighting should come from over the shoulder onto the work.
7. Avoid glare or dazzle in the eye.
8. Any change in vision or damage to the eye must be reported to the doctor.
9. Protective, shatter-proof goggles should be worn when doing dangerous work.

Blindness:

There are degrees of blindness from having no sight at all to having what is called partial sight. There are many more partially sighted people than totally blind people.

Blindness in babies may be caused by the mother having german measles, which is called rubella, in early pregnancy. Malnutrition in the pregnant mother & in the small child (Vit A deficiency) is a very common cause. Can you imagine the sadness of having a blind child because you cannot afford to buy enough food? Germs, carried by flies, are also the cause of millions of people losing their sight. Blindness also happens in very old age to some people.

Parents of blind babies need to know that lack of sight does not change the baby's intelligence. But blind children must have things explained to them so they can learn about what they can't see. If a blind child hears a dog barking, he cannot tell whether it is a big frightening dog or a small friendly one. Nor can he tell if it is tied up or if it can jump on him. This sort of problem can be got over by telling the child what is happening before it happens. Parents have to be the 'eyes' for their blind child, protecting him from fear by telling him what is going on around him. This helps the child not to be frightened of the world he cannot see, to try out new skills & to develop his mind & other senses to the full.

PTO

Smell:-

There are two small patches of tissue up in the back of the roof of the nose which are the sense receptors for smell. They are made up of tiny cilia, bathed in a mucus layer. They join up to form the olfactory nerve which sends messages of smell to the brain. It is not clearly known how this happens but all smells are first dissolved in the mucus before the nerve endings can get the stimulus.

As we breathe in, air passes underneath the olfactory nerve endings. When we want a really good smell, we sniff, so the air is forced right up to the mucus layer. New earth, fresh rain, flowers are pleasant smells.

Smell helps us to recognize dangers like escaping gas, burning food etc. It gives us more information about what is happening around us. But we only smell a new odour for a short while. This explains why we can be unaware that food is burning & yet someone who comes into the room can smell it immediately. Some people have a much better sense of smell than others. Smokers & people with heavy colds lose their sense of smell.

Hearing -

If you talk to the person next to you, or bang a book on the desk, the air vibrates with sound waves. These have to travel into the ear & stimulate the hearing receptors so that messages can be sent to the brain & we can hear.

The external ear that we can see is the least important part of the ear & we can hear perfectly well without it. The main parts of the ear are buried deep in the skull & protected by bone. The ear can be studied in 3 parts - the outer ear, middle ear & inner ear.

i) The outer or external ear is used for catching & directing sound waves into the ear.

The hearing canal is a short tube leading from the external ear to the ear drum. It is lined with tiny hairs & secretes a waxy substance. Both these things help to trap any dust & dirt. At the end of the canal is the ear drum which is a lightly stretched membrane completely closing off the outer ear. When sound waves travel down the hearing canal they bump against the drum & make it vibrate.

ii) The middle ear. - There are 3 odd-shaped little bones forming a chain across the middle ear. They are called the hammer, the anvil & stirrup.

because it was thought they looked like these things.
They touch one another like a chain. The hammer also touches the eardrum & the stirrup on the inner side touches the oval window, another tightly stretched membrane. The vibration of the ear drum starts the 3 little bones vibrating, which cause the oval window to vibrate

The middle ear is like an air pocket in the skull. It is sealed at each end by the ear drum & the oval window. The only way air can enter or leave is by the Eustachian tube. The air pressure in the middle ear is usually the same as it is outside. If we go up or down in a lift, or an aeroplane, we may hear curious squeaks or go deaf for a short while. Swallowing or yawning 'pops' the ears. It makes the pressure in the middle ear the same as that outside again by forcing air up or down the Eustachian Tube from the back of the nose.

The inner ear - is made up of strange looking objects, all bathed in a fluid, the perilymph. The cochlea which looks like a snail has sound receptors in it. The sound receptors called the auditory nerve endings are tiny hair cells bathed in another fluid, the endolymph. The vibrations of the oval window cause the perilymph & vibrate. This causes the endolymph to vibrate & the hair cells get the stimulus & send messages along the auditory nerve to the brain.

Summary of hearing.

Sound waves travel along the auditory canal
They start the ear drum vibrating
The vibrations are passed along the 3 little bones
They start the oval window vibrating
The fluid perilymph picks up the vibrations & passes them to the endolymph.
The auditory nerve endings are stimulated
Messages are passed to the brain by the auditory nerve
The brain translates the messages & we hear sound.

We can also hear through the bones of the skull.
Vibrate a tuning fork & press it to your forehead.
Vibrate it again & hold it between your teeth.

Health & Hygiene of the ears. -

You should never poke your ears or put anything in them. The ear flap should be washed daily to get

rid of dead cells, dirt + any wax which comes from the canal. Poking into the canal to clean is not necessary + is dangerous as the ear drum can be damaged. If the wax in your ears does become hard + you think it is making you a little deaf, it should be syringed out by a nurse or doctor. Do not try to remove it yourself.

Middle ear infections - These are quite common in childhood + are caused by infection travelling up the Eustachian Tube from the nose or throat. Any infection of the middle ear must be treated as there is a risk of long-term infection leading to deafness. The nose should always be blown gently, as any rough blowing may force mucus up the Eustachian tube into the middle ear. If you jump feet first into water for a swim, hold your nose. This stops water being forced up it + getting into the Eustachian Tube. Infections travel quickly between the ear, nose + throat + there is a special ENT department in hospitals for treating them.

Deafness - There are degrees of deafness; some people live in a completely silent world while others can hear with the help of a deaf aid. The most usual causes of deafness in the middle ear are (a) from an infection (b) overgrowth of the little bones which stops them vibrating + (c) excess noise. Damage to the cochlea + auditory nerve of the inner ear, which can be caused by noise, produce total deafness.

Noise - Noise intensity is measured in decibels. A whisper is 30 decibels + normal conversation is 60. The maximum noise level for safe hearing has been put at 87 decibels. Short bursts of very loud noise or long periods of noise below the painful level can cause permanent loss of hearing. Fireworks, riveting, road drills, big guns + the engines of jet aeroplanes can cause deafness. Noise is also painful + irritating + more accidents happen where people are working in noisy conditions. Noise has been called a pollutant, as it is made by us + damages our health. The level of noise increases each year as we build + use more + more machines. How loud do you turn up your radio or record player? Walk out when you were last in silence, when you could not hear one single sound.

A baby's hearing must be tested at intervals. It is important to find out as quickly as possible if a baby has any hearing problems. This is because our speech depends on our hearing words spoken to us. A deaf baby misses the long time of listening to words, while his brain is developing. He cannot learn what he doesn't hear, nor can he try to copy speech. We used to think many babies were born 'deaf and dumb'. They are not. They simply never learned to speak because they never heard speech. Babies with hearing difficulties should be fitted with deaf aids in their first year of life & spoken to as much as possible. They then have a chance of developing speech.

Deafness in new-born babies may be caused by the mother having rubella in early pregnancy. Small children may become deaf from diseases such as meningitis, mumps + middle ear infections. Deafness in old age is mainly caused by the auditory nerve not being able to pass the messages to the brain anymore.

Balance -

Did you spin around when you were a child? What happened when you stopped? Did you feel giddy or fall over? This could have happened because you upset your sense of balance.

Our sense of balance has been called our 'sixth sense' + the organs which control it are in the inner ear. There are 3 semi-circular canals attached to a large base with a smaller one underneath. All these organs control our sense of balance by passing messages to the brain about our position: whether we are spinning around or tilting our head, or lying down + so on. The organs are lined with nerve endings covered with fluid, the endolymph. When we move our head, the endolymph moves + presses on the nerve endings. So messages are passed to the brain. The brain works out the position of the body + sends messages to the muscles.

Our sense of balance is also helped by our sight + by the internal receptors in the muscles. It is much more difficult to balance on one foot with your eyes closed than with them open. It takes time for small children to develop the proper working,

coordination, between sight, internal receptors & organs of balance. They fail over quite often. Eg if we are reading in a bumpy moving vehicle our brain gets confused & conflicting sets of messages about changing positions, eye movements, muscle movements etc. We feel dizzy & sick. If we were standing we might fall over, as the brain cannot sort out which messages to send back to the body to keep it upright. Or now because easy to understand why we get travel sick & why it is not wise to read in a moving vehicle.

Taste —

Our sense of taste seems the least important of the senses. It doesn't protect us from danger, as food which is bad does not always taste bad. And it doesn't give us much information about our surroundings. But it does give us pleasure as we enjoy eating our favourite foods.

It is thought there are about 9000 taste buds on the tongue, & there are also some on the linings of the cheek & the pharynx. We have 4 main tastes. They are sweet, bitter, sour & salt. All other tastes are mixtures of these 4.

Taste buds are tiny hair cells in small pits on the tongue. These hair cells are the nerve endings, the taste receptors, which pick up the stimulus & pass it to the brain. It is not clearly understood how this happens. But it is known that the 'taste' in food must first be dissolved in saliva before the buds are stimulated.

Our sense of smell adds to our taste. We sniff a delicious cooking smell & we can almost taste the food before we put it in our mouth. When we have a heavy cold, we may think we have lost our sense of taste. Try holding your nose before & during eating!

Touch :-

The skin is the sense organ of touch. It is thought there are five different types of receptors in the skin — i) for light touch (ii) for heavy touch which is pressure (iii) for pain (iv) for heat (v) for cold.

Pain which we think of as an awful thing is very useful for reaching us to avoid danger & damage. If we had no pain receptors we wouldn't know when things were going wrong. Without headache,

we don't know a tooth is decaying. ~~Leprosy~~ patients who have lost this sensation damage their hands + feet because they cannot feel pain, heat etc. Pain is nearly always a warning that something is going wrong or that we are in danger of something going wrong.

Slight pain such as headache or indigestion, will usually go away once we have rested or slept or stopped eating the wrong foods. There is little need to take pain relievers such as aspirin or stomach powders, as the body can put things right by itself. Severe pain should be reported to a doctor if there is no clear reason for it, such as a cut or cramps etc. + if it doesn't go away quickly.

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Excretion and the Kidneys

Introduction

We know that food + oxygen, needed by the cells, are taken into the body and distributed to the cells by the blood. We must now consider how the body gets rid of the waste products which the cells produce while carrying out their various activities. When the body gets rid of something it is said to excrete it and the process of doing so is called excretion.

Excretion of carbon dioxide -

A very important waste product is carbon dioxide, which is produced when foods are burned for energy. The carbon dioxide so formed passes from the cells into the E.C. fluid and from the EC fluid into the blood stream through the capillary walls. It is taken in the blood to the lungs. While the blood is passing through the lung capillaries, the carbon dioxide passes out into the air in the alveoli + is blown out of the body in the air which is breathed out. In this way carbon dioxide is blown out of the lungs as fast as it is produced by the cells. The more energy you use up, the more oxygen you need for burning, and the more carbon dioxide you will have to blow away. It is easy therefore to understand why you have to breathe faster when you are running about + using a lot of energy than when you are resting quietly

The skin also helps to excrete small amounts of waste products through sweating etc

* [Whether we are awake or asleep, sitting quietly or rushing about, the systems of our body go on working, chemical changes keep happening, cells, tissues + fluids are always being mended or replaced as they wear out + we make new ones. Living protoplasm is changing day by day and many of these changes produce waste. Some of those waste products are poisonous or toxic + must be got rid of by the body. Getting rid of waste products is called excretion *]

When food is burned by the cells, the body contains a great deal of water. Most of it is in the cells themselves but there is a fair amount of water in the EC fluid, and the blood is, of course, liquid too. The water

in the body is all the time being changed + replaced by the water that is in the various liquids which we drink, and by the water which is produced, along with carbon dioxide, when food is burned. A certain amount of water is blown out of the lungs in the breath. This can be seen in cold weather as a cloud of 'steam' which comes out of your nose + mouth every time you breathe. Excess water is excreted out by the Ridneys or urinary system. ✱

Other waste products are also excreted by the urinary system. Nitrogenous waste from protein is one of the main things excreted. Protein is made up of different complicated chains of molecules which take a lot of breaking down. Nitrogenous waste from protein is changed in the liver into urea. Urea is then sent into the bloodstream + down to the Ridneys. The liver also works on toxic things such as alcohol + drugs before they are sent to the Ridneys. The Ridneys are able to remove all these things from the blood stream by filtering them out of the blood

✱ [The amount of water in the body stays the same all the time + it is ~~the~~ one of the tasks of the Ridneys to keep just the right amount of water in the body]

The urinary system.

The Ridneys are to be found, one on each side, high up in the abdomen behind all the organs of digestion. They are bean shaped. Each Ridney consists of millions of tiny units which can only be seen with a microscope. Each unit consists of a little tube, a tubule, which is very long. One end of the tubule opens into a big tube (about half as thick as a finger) called the ureter. The other end of the tubule is closed + is in contact with a special tuft of capillaries. The capillary tufts are in the usual way connected to branches of the artery which brings the blood to the Ridney, + to the veins which lead it back to the heart. They are called the renal artery + the renal vein.

The two ureters, one from each Ridney, lead down + open into a bag called the urinary bladder situated in the lower part of the abdomen. This which acts as a reservoir for urine. There is a short tube, the urethra, from the bladder to the outside. This ends at the tip of the penis in males

and in the vulva in females.

How the kidney works –

The blood enters the kidney through the renal artery. As it passes through the capillary tuft, nearly all the liquid part of it is squeezed out of the capillaries through the wall of the tubule & so into the tubule itself. About 100 litres of watery fluid are forced into the capsules each day. As it flows down the tubule towards the ureter most of the fluid is reabsorbed through the wall of the tubule into another set of capillaries attached to the outside of the tubule wall. It leaves the waste products and a small amount of water in the tubule. The amount of fluid which is taken back into the blood stream depends upon how much water the body needs to keep. If the body needs to save water eg in a hot climate when it sweats a lot, during attacks of diarrhoea & vomiting – it does so by taking most of the water back through the tubules, & if only a little water is needed by the body, only a little is taken back from the tubules. The network of blood capillaries having filtered out the waste & reabsorbed its fluid, joins up to form the renal vein. The filtered or 'cleansed' blood continues on its travels around the body.

What is left in the tubules is urine. It passes through the ureter & enters the bladder. This is a hollow muscular bag which can stretch to hold 300 cc or more of urine. It is a reservoir in which the urine slowly collects. There is an inner & outer sphincter to hold the urine in. When the bladder is nearly full we feel the urge to ~~urinate~~ go to the lavatory. The urine leaves the bladder through the urethra.

Incidentally, it is through the urethra that the sperms from the testicles leave the male body. A special tube leads them into the urethra from the testicles.

Water Balance in the body. – Urine is made up of about 96 per cent water, 2% urea & 2% other salts. Urea is the waste product from protein digestion. The other things include excess salts, harmful substances, waste product of the cells and anything which upsets the delicate balance of the fluids of the body. Sometimes the

urine will have more water in it + sometimes it will have less. This is because the kidneys help to control the water balance in the body - this is carefully controlled so that the amount of water in our body is kept fairly even. Each day we lose between 2 and 3 litres of water, from waste urine + food, from the skin in sweat + from the lungs in breathing out. Each day we must put back the 2 to 3 litres we have lost. Some people lose more water than others. A worker in the sun may lose upto 11 litres a day, and a miner can lose 7 litres during one shift underground. A person who has a fever needs lots of extra fluid because he sweats so much. When we exercise we sweat a great deal more. People doing heavy physical work or a lot of extra sport need to take in more water. People living in hot, tropical climates sweat very heavily to keep cool, and must be sure to replace the water they lose

[Any lack of water upsets the balance between how much we lose + how much we take in. A serious lack of water leads to dehydration: the body is dried out + cannot work properly. People with diarrhoea + vomiting often suffer from dehydration. People with fevers may also become dehydrated. Dehydration is extremely dangerous. Water must be given at once]

Under normal conditions we pass about 1 - 1½ litres of urine a day. But if we sweat a lot or lose fluid in diarrhoea, + if we don't drink more fluids to make up the water lost, then the kidneys will keep back more water the urine will be stronger. But if we drink too much liquid, especially tea, coffee + cocoa which cause an increase in urine, then the kidneys will pass a lot of water through. The urine will be paler in colour as it has so much more water. Certain diseases can cause a change in the amount of urine, as can nervousness + excitement.

We can summarize by saying that the function of the kidneys is to regulate the amount of water which is in the body, + to wash out in the urine all the substances, including waste products which the body does not need, + to ensure that sufficient quantities of all the substances which are useful and necessary to the body are kept in the body.

This is a good moment to point out how the various substances of which the body is made are all the time being renewed + replaced. Even the protoplasm of the cells themselves is constantly being broken down + replaced by new protoplasm. This idea can best be understood by thinking of a cinema at which there is a continuous performance. The seats are always full, but they are not all the time occupied by the same people, so that if you watched, you would see a constant stream of people entering + leaving. + yet the cinema would always be full.

Diseases of the urinary system.

Infection — Kidney, bladder, urethra.
Tumor —
Stones —
Diabetes —
relationship ± hypertension.
B. prostatic hypertrophy.

We can live with only one kidney working, but if both kidneys failed we would die within 2 weeks. People with damaged kidneys can have their blood filtered, the fluids regulated + the water balance controlled by an artificial kidney, a dialysis machine by a healthy kidney from another person. This is not simple as blood groups + tissue types must be as similar as possible. (Kidney transplant)

Certain diseases can be found by testing a patient's urine. The kidneys filter our harmful substances + they are passed out in the urine. This can be tested + analysed in the urine. As the kidneys also regulate the balance of fluids + salts, an excess of anything will show up.

eg Sugar in the urine
albumin in the urine
bile salts + bile pigments in the urine
pus cells in the urine.

Cleanliness — Urine is usually free of germs but faeces are not. As the anus is so close to the external opening of the urinary system, the whole area should be washed carefully every day. Girls need to be especially clean to prevent any germs getting to the tiny opening of the urethra + travelling up to the bladder. Germs will breed in the bladder causing cystitis. This gives burning pain when passing urine + the feeling of wanting to pass urine all the time.

Com H 34.10

RESPIRATORY SYSTEM

1. Respiration is a process by which gaseous exchange takes place between an organism and its environment.

2. The respiration includes both inspiration and expiration. The pressure in the lungs (intra pulmonary pressure) is a negative pressure.

3. Oxygen is taken in during inspiration and carbondioxide which is the waste product of metabolism is given out during expiration.

4. The normal respiratory rate in man varies from 12 - 16/mt.

5. The organs of respiration consists of the respiratory passages and the lungs.

6. Exchange of gases occur in the alveoli of the lung.

7. In between the visceral pleura (serous membrane which covers the surface of the lungs) and the parietal pleura (serous membrane covers the inner aspect of the chest wall and upper aspect of the diaphragm, there is a potential space called pleural cavity.

8. The pleural cavity contains very little of serous fluid called pleural fluid.

9. The pleural fluid acts as a lubricant and it prevents the friction between the two surface layers during the ~~art~~ act of respiration.

10. In certain diseases this potential space is filled with air, or pus, fluid or blood. increased and is

11. Before birth (in the foetus) the lungs are solid, airless, and are not expanded and play no part in the respiratory function. During that time respiratory function is carried out by exchange of gases between the maternal and foetal blood, across the placenta.

12. The 1st respiration occurs after birth by a forceful respiratory movement.

13. The rate, depth and rythm of respiration are maintained by a group of nerve cells situated in the brain stem.

14. The group of nerve cells which control the respiratory activity is called as respiratory centre

15. Changes in the respiration can be brought about temporarily by a large number of factors like emotion, fear, voluntary arts like chewing, speaking, swallowing, excercise etc.

16. The respiration is regulated by fast acting neural and slow acting humoral reflex mechanism.

17. <u>Abnormalities of respiration</u>

    (a) Normally an individual is not conscious of his respiration. Sometimes in certain condition he feels the difficulty in breathing. This condition is called "Dyspnoea".

(b) Asphyxia - is lack of oxygen combined with carbon dioxide excess.

(c) Hyper capnia - increased in carbon dioxide ~~contact~~ Content of the ~~blood.~~ arterial blood

(d) Hypo Capnia - Decreased in carbon dioxide ~~contact~~ Content of the ~~blood~~. arterial blood.

(e) Hypoxia - Inadequate supply of oxygen to the tissues.

Com H 34.11

BLOOD

1. Blood is a liquid tissue

2. It consists of plasma and cells. The cells are red blood corpuscles, white blood corpuscles and platelets.

3. Plasma consists of water, proteins, inorganic constituents, organic constituents, internal secretions, antibodies and various enzymes.

4. The plasma proteins are albumin, Globulin and Fibrinogen.

5. Red blood corpuscles contain a red pigment called haemoglobin which in turn carries oxygen needed for metabolic activities.

6. White blood corpuscles take part in the defense reactions of the body.

7. Platelets are important in forming a plug and closing the ruptured vessel wall.

8. The fibrinogen which is present in the plasma takes part in the clotting process.

9. When the blood is shed outside it forms a solid mass called clot. This involves the conversion of the soluble fibrinogen to insoluble fibrin in the presence of calcium salts. There are a number of other clotting factors in the blood which help in the process of clotting.

10. The clotting retracts and gives out a straw coloured fluid called the serum.

Plasma - fibrinogen = serum.

11. The clotting formation can be prevented by addition of anticoagulants.

12. Heparin is a natural anticoagulant present in the circulating blood.

13. Decrease in the number of platelets leads to bleeding disorder called purpura haemorrhagica.

14. Absence of clotting factor VIII or antihaemophilic factor leads to clotting disorder called haemophilia.

15. Haemorrhage leads to loss of blood. If it is within moderate limits the blood gets regenerated otherwise if the haemorrhage is severe blood transfusion has to be given.

16. Before transfussion the blood group of the donar, (who donates blood) and receipient (who receives blood) has to be determined and matched.

17. The red cells contains antigen or agglutinogen and the plasma contains antibody or agglutinin.

18. The classification of blood groups is based on the presence or absence of antigen or agglutinogen.

(22) Refer 22

19. ~~The blood groups are mainly A, B, AB and O.~~ The blood has to be tested for both ABO as well as Rh grouping.

20. Cross matching of the blood is done before transfussion.

21. Direct cross matching is very important where the cells of the donar are matched with the serum of the recepient.

The blood groups are mainly A, B, AB and O.

after 18 ← 22. In addition to ABO grouping there is Rh blood grouping. Rh + and Rh - (negative). It can be either (positive).

Refer 19 ←

23. If mismatched blood is given there will be severe reaction.

ST. JOHN'S MEDICAL COLLEGE, BANGALORE-34.

DEPARTMENT OF PHYSIOLOGY — COMMUNITY HEALTH WORKERS

Introduction to physiology

1) The continuation of "life" is possible through mechanisms of preservation and propagation.

2) The study of these mechanisms constitutes "Physiology". These mechanisms are based on physical and chemical properties of matter.

3) The chemical and physical conditions necessary for the preservation of life have to be maintained within narrow limits, against ever changing environmental conditions. This maintainance of constancy of conditions, is called "homeostasis".

4) The "homeostasis" may be maintained either by a single cell (ex. unicellular organisms) or by the co-ordinated effort of multiple organs (ex. multi cellular organisms).

5) As "living" is an active process, it requires energy. The energy is released when the food combines with the oxygen.

6) The food is ingested into and digested by the digestive system.

7) The oxygen is obtained and the gaseous waste products formed during oxidation are removed, by the respiratory system.

.....2/-

8) The digested materials as well as oxygen are carried by the blood to different organs in the body. The proper distribution of blood is the function of cardio vascular system.

9) The unnecessary and harmful solid and liquid materials are removed by kidney.

10) After a particular age, the reproduction is initiated for propqgation of life. The reproductive mechanisms release certain chemicals, which make the body ready for reproduction.

11) Finally the functions of different systems in the body have to be coordinated so that the organisms gets maximum benefit from all the systems. This is achieved by slow acting chemical mechanisms which constitute the endocrines and fast acting neural mechanism which constitute nervous system.

24-1-79. (B.S. RAO)

NERVOUS SYSTEM

The function of the nervous system is to coordinate the working of different systems in the body it receives, coordinates and sends messages. The unit of the function is the neuron. The dendritic portion of the neuron is the receiving end. The cell body integrates. The axon sends the information. All the information is passed up or down by electrical impulses. However at the synapse (the junction between the neurons or the effectors) the electrical impulses are converted into chemical messages. The activity of chemicals may be blocked. If that is done the person becomes "unconscious" of external or internal environment. Before surgery certain chemicals known as "anaesthetics" are given to cause "unconscious" state.

The nervous sytem can be divided into ~~two divisions~~ (1) central nervous systems. (2) peripheral. The peripheral nervous system either takes messages to central nervous system from the different portions of the body, or brings messages from it. The central nervous system (CNS) integrates the information. In addition the CNS "stores" the information for future use. This is called "memory." The higher functions like "abstract thinking" are possible with the CNS.

31-1-79.

1/

Human Biology – Introduction. ComH 34.14

Most of the time we are fit & healthy so we don't feel curious about what goes on inside us. Then someone we know may get ill, or we may get ill ourselves & we worry because we don't understand what is wrong. There are many other things we may wonder about – why do our hearts beat more quickly when we do any fast exercise? Why do muscles ache after exercise & what is a bruise. We can't see what is going on inside our bodies under the skin – we know people have bones & muscles – but we can't see the 206 bones, nor can we see the 200 pairs of muscles being used for each movement. And just think how fantastic it is that every person has 100,000 kilometres of blood vessels in his body! Knowing about oneself helps one to keep fit, strong & healthy.

Biology is the study of living plants and animals. We are human animals. So human biology is the study of ourselves. It is finding out all the different things we are made up of & how all these different things work together; keeping us alive, keeping us active, keeping us healthy.

You are an individual which means there is no other person quite like you in the world. Because every single person is an individual, we are all different from one another in some ways. Therefore there are no absolutes in human biology, & health for example, if you read, 'The human hand has 4 fingers & one thumb' you will accept this as true, even though you may know that in rare cases a baby may be born with an extra thumb or finger. Another example: if you read "Smoking is bad for health" you will accept this as true, even though you may know an old man who has smoked for 30 years & still seems to be healthy

∴ what you will study will be true about most people, most of the time

Science is a living subject which changes as we discover more about ourselves.

Com H 3 4 13 CHw BC 8

Human Biology - What are we made of.

Protoplasm is the name given to the stuff we are all made of. Protoplasm is living matter. The word means 'the first thing formed'. Protoplasm looks like thin grey jelly which has all quite 'set'. Most of it, almost four fifths, is water. The other fifth is made up of many different things.

Protoplasm doesn't flow freely around inside us. We are not great lumps of loose jelly! It is neatly parcelled up into cells. A cell is known as a unit of life & we have between 30 million million & 100 million million cells in our bodies. It is hard to imagine such enormous numbers, so we can guess, quite correctly, that each cell must be very small indeed. In fact, a cell is so tiny that it can only be seen by using a microscope.

The important parts of a cell are: -

The nucleus, which is the boss or headquarters of the cell. It controls what happens to the cell. The protoplasm in the nucleus is thick because it is closely packed together.

The nuclear membrane is a very fine covering around the nucleus.

The cytoplasm fills up the rest of the cell. Here the protoplasm is much looser and more watery.

The cell-membrane is the very fine outside covering of the cell. It helps to control the things which enter and leave the cell.

There are many other things in a cell which are too small to be seen under an ordinary microscope. Inside the nucleus are 23 pairs of, or 46 single, chromosomes. The work of the chromosomes is to carry the instructions about the things we have inherited from our parents. The function of the cell as a whole is to go on doing all the things which keep us alive. This is why a cell is called a unit of life.

We began life as one cell. This cell was made up of a sperm sex cell from the father and an egg sex cell from the mother.

The sperm and egg mix, or fuse, together to make the one cell which was us at the very start of our lives. This fusing together is called fertilization. The fertilized cell then divided into two, those cells divided into four, four into eight and so on & on.

NUTRITION FOR CHW BC-8

14th Sept — 2-4.30
15th " — 9-12.30
" — P Asmi - Nutridemonic

—x— Homit

1. Nutrients + Their sources.
2. Nutritional deficiency diseases.
3. Balanced diet
4. ~~Feeding~~ Feeding of vulnerable groups

How many divisions happened before we were made up of our first million cells? It is interesting to realize that the number of cells in our body multiplies because the cells in our body are dividing.

An unborn baby is called a foetus. A lot of growth + development occurs. Muscles, blood, skin, bone etc are formed. Scientists don't know exactly how but they do know cells carry special information about the work they have to do. As cells develop they change into the shape they need to be to carry out their special function. This is called cell specialization.

How cells are grouped together: A group of cells doing a special type of work is called a tissue. We have muscle tissue, bone tissue, lining tissue + so on.

Groups of different tissues with a special function are called organs. The stomach is an organ, the brain is an organ.

groups of different organs with a special function are called systems. The digestive system deals with food; the muscle system with movement. The systems of the body work closely together though they are studied as seperate themes.

Supplies to cells:

Each cell must be supplied with the things it needs eg oxygen + foods in order to carry out all its work. It must also be able to get rid of any waste it makes. Blood brings supplies + takes away waste. But blood doesn't flow in + out of cells. Somehow the cell has to get the things it needs from the blood + pass back its waste into the blood. It also has to be able to pass things

The first 5 years of life

[Source - Human Biology + Health - Dorothy Baldwin]

A newborn baby weighs about 3 Kg + is cm long + has a large head for his body size. He maybe wrinkled + thin, smooth + plump or somewhere inbetween. He may be calm + peaceful or restless + lively. He is helpless, he belongs to his parents + depends on them for all his needs.

Maturation: A baby's rate of growth + development will depend on the genes he inherits from his parents. New cells will grow, tissues, organs + systems will develop according to the instructions of his genetic makeup. This will decide how + when the baby first smiles at his mother, or first reaches out to touch a toy. This will decide at what stage he crawls, stands, laughs, runs, talks, plays, makes friends + so on. A baby's stages of development are inbuilt + they will happen at the right time for him. Each baby is an individual. Each baby has his own rate of maturation, his own 'time-clock' for growth + development.

However a baby's maturation can be slowed down or distorted by a bad environment. During the first 5 years of life, the baby's environment is made up of his mother + father, his family + his home. If this environment is bad, if the people looking after the baby are cruel or careless or neglectful or unloving, the baby will suffer in most areas of growth + development.

To understand a baby's needs, we will divide maturation into 4 kinds: physical, mental, social + emotional. But we must remember they are all linked together. And each stage of development will depend on the success of the last stage.

Physical needs:-

At first a baby's needs are nearly all physical. He needs food, warmth, comfort + sleep. He needs to be held gently but securely. He needs to hear soft, soothing sounds, not harsh sudden noises. He needs to be close to his mother, to feel her warmth and love and caring.

As he gets older, he will learn to use his muscles. He will need freedom + encouragement.

to try our new movements. He will need praise when he tries our new skills. A toddler gets many knocks + bumps while he is learning to control his muscles + to balance. He may need cheering up + lots of comfort. Parents have to protect their small children without making them timid or afraid to do more exciting things.

Mental needs.

A baby learns through his senses. He has a very sensitive mouth + during his first year he will put anything + everything in it. He seems able to learn about the feel of things through the mucus lining his lips + mouth. He likes to look at brightly coloured moving things + he especially likes to look at his mother's + father's face. When he is in his cradle make sure there is something interesting for him to look at. He likes to hear the voices of his parents + to copy the sounds they make. Parents should talk to their babies + if they can understand every word that is said. He needs to hear words, hundreds + hundreds of words, before he is able to talk himself. This will help him learn to speak. All children need to be talked to, played with, read to + given lots of interesting things to help their minds develop. A child's mind is open + eager to discover his world. He learns more in his first 5 years than at any other time in his life. If he is helped to learn through games + play, then learning will be exciting + full of adventure.

Emotional needs.

We all need to feel loved and secure, to have a close tie or bond with one other person, to belong to a family or group of people, to be an important person in the family or group, to be allowed to be individual (to be ourselves) with the person or persons we love. These are our most important + basic emotional needs. A baby + small child has exactly the same needs as the rest of us. At first, he is completely dependant on his mother or whoever is 'mothering' him. He needs to learn basic trust in his mother, to be certain she will come to him + look after him when he needs her.

around inside the cell itself. It does these things by "diffusion" & "osmosis"

Before a substance can get into a cell, it must dissolve in the liquid in our bodies. This applies to gases & other liquids as well as to solids such as food. Oxygen & carbon dioxide are dissolved in solution long before entering or leaving the cell. There is plenty of liquid in our bodies to allow solids & gases to be dissolved.

Diffusion

Put a lump of sugar into a beaker of water. Don't stir. After a long while the sugar molecules will have dissolved & spread, or diffused, throughout the water. If you put a drop of ink into some water you can actually watch this happening. gases are also able to dissolve & diffuse in liquids. The constant movement of molecules to spread evenly through a liquid is called diffusion. Liquids are taken to cells & spread, once inside them, by diffusion.

Osmosis

In diffusion, dissolved molecules from a strong solution, close to the sugar lump, spread into the weaker solution, the water, to even out the difference in strength. In osmosis, the solutions are balanced up by the movement of water molecules into the stronger solution.

Osmosis takes places when the weak and strong solutions are seperated by a semi-permeable membrane. This is a thin film which allows some molecules, like water, to pass through it, whilst stopping certain dissolved molecules.

Every cell is surrounded by a cell membrane which is semi-permeable. If a blood cell, muscle cell or lining cell was put into a strong solution; the weaker liquid of the cell would be drawn out by osmotic pressure into the salt solution. The cell would shrink & not be able to work properly. Cells are bathed in tissue fluid which helps to keep the correct balance of fluids inside & outside the cell.

The passing of fluids in & out of cells & tissue fluids takes place by diffusion & osmosis.

— x —

If she neglects him, if she leaves him alone when he is crying for her, he will learn a basic distrust of her. This makes him feel unloved, insecure anxious & afraid. It may affect his mental health as he gets older. Satisfying a baby's emotional needs is one of the most important function of parents.

Social needs.

We are social creatures. We need and want the company of other people. We don't like to be left out, to be on our own for long periods, or to be put with strangers who have no interest in us. A baby needs to be with his mother & family as often as possible. He does not like to be seperated from them. To be put in an empty room on his own, or to be looked after by strangers. Most toddlers go through a stage of being very shy & will cry with fear if they are seperated from their mother. By the age of 3, some children are ready & need to play with other children of their own age. But other children need only the company of their mother, father & family & are still quite shy when they first go to school. Small children are very different in their social needs. An understanding parent will learn from the child what his needs are.

Com H 31.15

ST. JOHN'S MEDICAL COLLEGE & HOSPITAL, BANGALORE-34

DIRECTORATE OF RURAL HEALTH SERVICES AND TRAINING

PROGRAMMES

TRAINING COURSE FOR COMMUNITY HEALTH WORKERS (CHW BC 3)

ANATOMY

Heart: Heart is a muscular organ situated in the chest cavity between the lungs and behind the breast bone.

It has a base and an apex. The apex is pointed towards the left 4th inter costal space.

Heart is divided into 4 chambers - 2 atria and 2 ventricles, The atria and ventricles are communicated through A.V. openings - the right & left. The atria ventricular openings are gaurded by valves - the tricuspid & bicuspid valves.

Normally there is no communication between right and left sides of the heart.

The heart is composed of specialized musculature called myocardium Outer to myocardium there is a fibrous membrane called pericardium. This has two layers - outer parietal & inner viceral. Between the two there is thin film of fluid called pericardial fluid. This is meant for lubricating the heart during its movements.

The inner thin lining of myocardium is otherwise called as endocardium.

Hence heart has :

Outer	-	pericadium
middle	-	Myocardium
Inner	-	endocardium

Circulation: Blood is the nutrition for various organs & tissues in the body. The heart is the main organ of circulation of the blood.

Circulation is of two types: 1. Systemic circulation
2. Pulmonary circulation

1. The course of blood from left ventricle through arteries, arterioles and capillaries returning it to the right atrium is called greater or systemic circulation.

2. The course from right ventricle through lungs to the left atrian is known as lesser or pulmonary circulation.

Systemic circulation: The pure blood from left ventricles is discharged through the aorta which breaks up into different sets of arteries, arterides and finally capillaries are formed. Here the walls of capillaries being very thin, exchange takes place between plasma and interstitial fluid - venules start by the fusion of capillaries - big veins are formed and finally the blood is poured into the right atrium.

Pulmonary circulation: The blood from the right ventricle is pumped through the pulmonary artery into the lungs. This breaks up into fine arterioles and capillaries exchange of gases takes place pulmonary venules are formed. Then pulmonary veins are formed which open into left atrium.

Portal circulation: Blood from stomach intestines, pancreas & splean, is collected by the portal vein. This breaks down into fine capillaries [illegible] collected by [illegible] which unite to

What is blood pressure?

The pressure of the blood in the arteries is called the blood pressure and is maintained by the force required to push the blood through the capillary section of the circulation.

What is arterial pulse?

Arterial Pulse is a wave of increased pressure which is felt at the arteries, when blood is pumped out of the hearts conveniently felt at any point where artery crosses the bone eg. Radial pulse.

Clinical notes:

a) Pericarditis: This is due to the inflammation of the outer covering of the heart. The membranes may produce fluid which embarrases the hearts action. This may lead to heart failure.

Surgical resection of the pericardium may held in the patients condition.

b) Endocarditis: This results due to rhematic fever etc. This may lead to the inflammation of mitral valve.

c) Coronary artery disease: Coronary vessels as elsewhere in the body may become narrowed as in atherosclerosis and hence the blood supply of the heart is hampered - myocardial ischaemia.

4. Congestive heart failure: Characterised by Dyspnoea - Oedema in soft tissues.

Blood supply to the heart:

Coronary arteries - branches of aorta supply the heart tissue. The return blood from the heart is collected mainly by coronary sinus.

Nerve Supply: Vagus (Para Sympathetic)

Sympathesic

Both to S.A. Node.

Sympathetic - accelerates the rate of heart beat.

Para Sympathetic - slows down the heart beat.

—— / ——

Bones & Health.

We think of bones as dead things. But they are not dead. They are alive. That is why we are able to grow taller. And that is why a broken arm or leg can mend. Bones are living parts of our bodies.

Bone tissue consists of tiny live cells surrounded by hard solid stuff which gives bone its strength. The solid part is made of mineral substances — calcium, phosphate & carbonate. Blood vessels & nerves in the bone keep it alive & healthy. This is adult bone.

Before we were born & during our long childhood our bones were much softer than they are now. This was because there was a lot of cartilage in them. Cartilage is very rough and rubbery. But though it is rough, it is not hard & solid like bone. As we grew older the cartilage was changed into bone. This happened quite slowly & over the years. Your bones will not be fully hard till you are about 25 years old and the ends will always be covered with cartilage. ~~The cartilage of~~ After ossification, bone is made up of 70% hard, non-living matter & 30% living matter. As we get old, our bones may get dry & brittle & lose more of the living matter. old people must be careful not to fall as their bones snap very easily.

Some cartilage never changes into bone. A few examples are the rings in your neck which hold your breathing tube open, & your nose & your ears. Feel them.

If you look at a skeleton you will see that bones come in all different shapes & sizes. This is because, like cells, bones have special functions & so they develop in a special way for the work they have to do.

Parts of a typical bone are :-

i) Cartilage — This is a smooth covering at the ends of bones to stop them rubbing together.

ii) Outer covering — This brings the nerves & blood vessels to the bone

iii) Hard bone — This is ossified bone & gives strength

iv) Spongy bone — Here the bone cells are loosely packed so that the bone will not be too heavy.

v) Yellow marrow — This has fat cells & is an important store for minerals.

vi) Red marrow — Blood cells are made here.

The functions of the skeleton –

To support our bodies & give them shape & Strength (can you imagine what we would look like without a skeleton!)
To protect the most important organs of our bodies (work out which organs the skull, the backbone & the ribs cage protect)
To allow movement by being made up of lots of bones which are used as levers. (could we move if we were one solid bone? Imagine it!)
To give muscle attachment. Muscles must pull on bone to make us move, so they have to be firmly attached to bone.
To make blood cells in the bone marrow which are then sent into the blood vessels.
To store important minerals the body needs such as calcium salts.

The basic plan of the skeleton –

The skull – The bones of the skull are flat with tiny jagged edges. These edges fit smoothly together to make joints called sutures. When a baby is born the skull bones press closer, to make the birth easier for mother & baby. New babies have spaces on their skulls which are not yet joined. These are called fontanelles, there is a large one at the top of the head & a small one at the back. They close completely by the time the baby is about 18 months old. As the child grows, the skull becomes hard, making a very good protection for the delicate brain inside. Notice also the deeper eye sockets & the hinged lower jaw.

The vertebral column –

This is the name for the backbone or spine. The vertebral column is made up of rings of small bones called vertebrae. Each vertebra is piled on top of another to make a column. The biggest vertebrae are at the lower end of the column & to give extra strength & support are fused together.
The brain continues as a long bundle of nerves right down the back. This is called the spinal cord. It is very well protected by the vertebral column. The vertebrae are seperated from one another by discs of cartilage. They act as "shock absorbers" or "cushions". Have you ever landed with your full weight on your heels? It is a very painful thing to do! Why?

The rib cage -

We have 12 pairs of ribs. (One in 20 people have 13 pairs). Each pair is joined by cartilage to a vertebra at the back. The breast bone in front is called the sternum. The ribs curve round to the sternum. The lower ribs are not joined to the sternum. They are shorter and are joined to each other by cartilage. The eleventh & twelfth pairs of ribs are called floating ribs as they are not joined to anything at the front. Feel all around your rib cage. (Why do you think it is called the rib cage)

The ribs protect two main organs - the heart and the lungs. The ribs are also used in breathing.

The girdles

The shoulder girdle is called the pectoral girdle. There are two pairs of bones, in front the clavicle which is the collar bone and at the back the S. pula which is the shoulder blade. They join the arms up to the rest of the skeleton. They jut out from the rib cage so the arms have plenty of room to swing around.

The hip girdle is called the pelvic girdle. It is made up of heavy bones fused together to give strong support to the body & to provide attachment for the huge muscles of the bottom & legs. Notice the sockets for the leg bones & the fused bones of the vertebral column. The pelvic girdle is wider in women than it is in men. The pectoral girdle is wider in man than it is in women. Can you think of any reasons for these differences.

The Limbs -

The Upper Limbs - In the upper arm there is a single bone called the humerus. In the forearm there are 2 bones ~~called~~ the radius & ulna - which enable the forearm & palm to move freely. The palm & fingers are made of a number of small bones which allow great freedom of movement. This type of movement is called five movement.

Lower limbs - The general plan is the same as that of the upper limb. Between the hip joint and the knee there is a single bone - the femur. In the lower leg there are two bones the tibia & the fibula. The ankle, foot & toes are made up of numerous small bones. Covering the knee joint is a small bone

the knee cap or patella. to which some muscles are attached. The bones of the leg are much heavier & stronger than the arm because they carry the weight of the body when standing & walking.

Joints - A joint is the place where two or more bones meet. Apart from the sutures of the skull & the fused bones of the pelvic girdle, most joints have some sort of movement.

Moveable joints are held together by ligaments, which are rough strong bands of tissue.

The ends of the bones are covered with smooth, slippery cartilage which acts as a 'cushion' & a 'shock-absorber'.

The ligaments are lined with synovial membrane which produces a fluid.

The fluid is called synovial fluid. It oils the joint keeping it moist & working smoothly.

So moveable joints are called synovial joints.

Types of synovial joints -

Different joints allow us to make different kinds of movements.

The ball & socket joints at the shoulder & hip allows us the most movement. The top of the humerus is rounded & fits neatly into the rounded socket at the end of the scapula. This allows our arm to move in a huge circling movement.

The hinge joints at the elbow & knee allows less movement. We can only move our lower arm in one direction. We cannot move it backwards or sideways, as the bones of the joint act as a brake. The finger joints are very good examples of hinge joints. Try moving the top joint of your little finger sideways or backwards.

The gliding joints allow us a twisting movement. Rest your lower arm on the desk, palm upwards. Hold your elbow joint with the other hand. Slowly turn your lower arm so the palm is facing downwards. You can see the radius gliding slowly over the ulna.

The pivot joint is a special joint between the first two vertebrae of the spinal column. It is the joint which allows us to move our head around the top of our spine. Move your head & notice how it 'pivots' in various directions. Notice also how the joint acts as a brake to stop your head moving too far sideways or backwards.

The other bones of the vertebral column are

not included in the synovial joints. They have only a very slight movement, but, as there are so many of them, our backbone is flexible.

Health + Hygiene of the Skeleton

Bone is made from calcium + phosphate. But it cannot be made unless we have enough Vit D in our bodies to help the calcium + phosphate become bone. There are certain foods rich in Vit D eg milk + milk products, fish liver oils. Our skin can also make Vit D in sunlight, so people in hot countries can get enough of it. People in hot countries have dark skins to protect them from the ~~fierce~~ strong sunlight

Lack of calcium salts and/or Vit D causes Rickets in children + bone softening in adults. Vit. C. is also necessary for healthy bones + teeth.

We know that babies + small children have a great deal of cartilage in their bones. This is helpful because they have to learn to crawl, to walk + then to run + while they are learning they fall down — many, many times. They do not break their bones, as adults would if they kept falling over, because of the amount of cartilage in them. Older children can + do break bones. But, quite often they have a greenstick fracture. This means the bone bends or cracks a little rather like a young twig does; it does not snap or break as a twig from an older tree would.

All our growing is done before we are born + during our childhood. This is why it is so important that pregnant women, babies, children + teenagers get enough of the right foods to help bones grow straight and firm, + to harden or ossify them. Bone growth switches off in the late teens roughly at the age of 18 in boys + 16 in girls. Those are average ages so growth can continue beyond or stop before that. Bones finally ossify before our 25th birthday. We get our height + the weight of our bones from inherited from our parents — if we have the right diets.

A broken bone is called a fracture. This must be 'set' by a doctor. It is then firmly wrapped in plaster so that the two ends of the bone can grow together or 'knit' again. It takes a long while for this to happen but

the fact that bones do mend will help you to remember that they are living things.

A sprain is damage done to one or more of the ligaments which hold our bones at the joint. This happens when we twist a joint or fall suddenly onto it. The ligament is torn from the bone & this is very painful. Sprains should always be treated by a doctor. A suspected sprain, or when the ligament is only slightly damaged, can be treated by wrapping the joint in damp clothes (cold, if possible) to keep down the swelling & by supporting the joint in a sling or, if it is an ankle joint, resting the leg on a stool.

As we grow old, our bones break more easily & take much longer to heal. For this reason elderly people should never be hurried. They should be allowed to take their time when walking or moving about. Special care should be taken to see there are no slippery floors or mats, especially in the bathroom & kitchen.

The Teeth.

Two sets of teeth - we have two sets of teeth during our lives, our milk teeth & our permanent teeth. Milk teeth begin to develop in the jaws of the unborn baby. They usually come through or erupt between the ages of 6 & 24 months. There are only 20 of them & they have short roots. They begin to fall out, & the permanent teeth come through, from about 6 years old. By the age of 18, all 32 permanent teeth are usually through. Have you got your 'wisdom' teeth as yet?

A 'typical' tooth.

Like bones, our teeth are different shapes & sizes according to the work they have to do.

Enamel is a very hard wearing, non-living covering over the crown of the tooth. It protects the tooth & makes a strong surface for biting.

Dentine is like bone & is made up of calcium salts. It makes the tooth heavy & solid to help grind the food.

Pulp is soft. It has blood vessels to keep the tooth alive & healthy. It has nerve endings which feel heat & cold. And pain!

Roots hold the teeth firmly in the jaws. The back teeth have two or three roots as they do the heaviest work.

cement is a thin layer which covers the dentine of the roots. It fixes the roots, as you would expect cement to, firmly to the jaw bone.

Special teeth

Like cells + bones, teeth develop into different shapes + sizes for the different work they do. Look at your teeth in the mirror + feel the differences between them.

The main functions of teeth are to bite off food + then to chew it, grind it + crush it but it is pulpy + ready to be swallowed.

1. our front teeth or incisors cut or bite off the food. on each side there are two on the upper + two on the lower jaw
2. The canines, which are slightly pointed like a dogs teeth, grip the food + help tear it off. on each side there is one on the upper + one on the lower jaw.
3. The premolars have flattened tops. These help to grind the food. on each side there are 2 on the upper + 2 on the lower jaw.
4. The molars are the heavy back teeth which have larger flattened tops. They grind, chop + crush the food. on each side there are 3 on the upper + 3 on the lower jaw.

Rules for Healthy Teeth

1. A pregnant woman must have a balanced diet so that her unborn baby's teeth develop properly.
2. Parents must train small children to look after their teeth
3. Eat raw vegetables + fruit + not just soft cooked food.
4. Always brush teeth after food + last thing at night.
5. or rinse teeth with water, forcing it between the teeth.
6. The toothbrush you use must be soft bristle
7. Use toothpaste with fluride added - it does help some people
8. Brush teeth upwards + downwards not sideways, to get at the sticky foods trapped in the cracks.
9. Brush from the gum downwards for top teeth + upwards for bottom teeth. If you brush up + down

you push back the gum which lets in germs.
When you are older makes you look "long in the tooth!"
10. No chewing gum unless you have perfect teeth. It is so sticky it loosens the fillings & they fall out
11. Don't use your teeth to open things
12. Lots of chewing forces the teeth to work, bringing fresh blood to the teeth & keeping the gums healthy
13. Cut down on eating sweet things.

— x —

People who lose their teeth are fitted with dentures or false teeth. This is to help them to chew their food, to be able to speak clearly, & to look all right. When we lose our teeth, the gums where the roots have been shrink & the whole of the lower part of the face looks drawn in. Never lose a tooth if you can possibly get it filled. Protect your teeth care for them. get them in shining health & nice to look at now.