

Endocrinology and Biological Science: A Comprehensive Overview of Hormonal Mechanisms

Dr. Santiago López*

Institute of Environmental Sciences, National University of La Plata, La Plata, Argentina

ABSTRACT

From the extracellular space endocrine of and secrete their products the hormones and enter into the circulatory system endocrine as ducts goonies differ from exocrine like solitary glands. Hormones act on specific organs and then secreted into the blood stream to act on specific target tissues

Keywords: hormones, release, blood.

I. INTRODUCTION

From the extracellular space endocrine of and secrete their products the hormones and enter into the circulatory system endocrine as ducts goonies differ from exocrine like solitary glands, whose products're release in to the ducts which leads to the digestive tract and then to exterior to the body endocrinology is the branch of science which deals the study of ductless glands or tissues and their hormonal products. There is no structural unity. It may be scattered all over the body. Elaborating several hormones as tissues, individual cells, or hormones.

These glands have association of embryological from different types of tissues including nervous tissue. Hormones act on specific organs and then secreted into the blood stream to act on specific target tissues it stabilises and give specific physiological response endocrine cells and targets cells avoid direct casual connections of hormones such as. Portal circulation between hypothalamus and hypophysis it carries the hypothalamic hormones to the pituitary cells or tissues may secrete specific substances act over on short distances of adjacent cells or tissues.

II. ENDOCRINE GLANDS AND HORMONES

Role of hormones:- In vitro hormones are regulated by endocrine glandular cells within the body or in cultures of endocrine cells. These are usually transported by the blood stream from endocrine cells to serve as chemical messenger may act as endocrine cells.

A hormone doesn't provide energy or building materials but it exerts profound regulatory effect on growth cells by effecting on membrane permeability, activation, deactivation of enzymes, formation of cycles A.M.P, etc. Now Hormones form a group of heterogeneous substances some are steroids, eg. Adrenocortical hormones, and sex hormones. Most of the hormones are proteins or peptides, released by exocytosis and released by granules for hours or days.

The anterior pituitary hormone hypothalamic hormones parathyroid, calcitonin, insulin. Glucagon. Gastrointestinal hormones (secretin, gastrin etc) and posterior pituitary hormones are all peptides.

They are the derivatives of amino acids. Thyroxine and iodo tyrosine. Similarly adrenaline and nor adrenaline are also derived from tyrosine the binding forms a reservoir from which hormones are released and diffuse to act on target cells are released and diffuse to act on target cells. Whereas catecholamines are not bound to plasma proteins and play short life in blood for a few minutes thyroxine bound to carrier proteins as long biological half life.

They are target on the liver spleen, bone marrow. Few hormones are not specific or target cells or organs and affected or almost cells of the body or parts of the body. They serve as binding effects on these tissues or growth hormone they specific receptor initiate their actions. Eg. Adrenocorticotrophic secreted by anterior pituitary stimulates the adrenal cortex to produce adrenocortical steroid hormones.

History of endocrinology:-

Endocrinology is study of science on the internal organs site and target tissues mainly experiment perform on hormones by Berthold in 1849. E. clinical relationships between tissue and organ abnormalities such as atrophy or enlargement and changes in particles physiological rates eg. Castration of cockerels led to no development of their combs and wattles and failure to exhibit male dominant behaviours, replacement of testes led to the development of the combined wattles, behaviour in moles agnostic.

Hypertrophy- increase in size of an organ to compensate functionally for the activity of the other best organ Testosterone was purified and crystallized in 1935. Bugloss and starling (1902) demonstrated that asbestos produced by the intestinal mucosa stimulated the secretion pancreatic juice. The active substance was named as secretin.

Now Cells are essentially chemical machines and respond to chemical signs, messages are carried by two well defined systems hormonal system in which the chemical messenger hormones are produced by specific glands released into the blood stream and slowly act upon the target cells in the body and the nervous system in which messages travel across the body in milliseconds. The chemical substances hormones produced endogenously by endocrine glands, and certain nerve cells serve as special receptors. 'The term "endocrine" refers to the system of glands or tissues that synthesize the hormones and secrete them directly into the circulatory system.

The endocrine system is more precisely a never endocrine system it not only include the glands, but also sites in the control nervous system with which the system interacts. The coordinated activity of these two major systems is responsible for the stability of the internal environment (homeostasis) in the body.

Homeostasis of calcium –

Blood clotting, contraction cellular secretion and number of cellular functions there is a need of requirement of calcium. It maintains the need to constant level and a narrow range Fluctuation may effects homeostatic mechanisms to bring it back to normal.

Parathyroid release parathormone it decrease in blood calcium level. Bone release store calcium. Absorb portion of calcium from the gut and reabsorption by urine tubeless in the kidney is favoured so that the blood calcium level is brought back to its original level.

After consumption food to release of another hormones above normal levels. Calcium from the thyroid gland calcitonin promotes. Deposition of calcium in the bone and reduces the absorption of calcium in the gut and kidney.

Inter-relationship of endocrine glands endocrine glands are independent in its action it may be inter related and inter dependent. It can be synergistic, complimentary, permissive and antagonistic resulting in hypo or hyperactivity of the endocrine glands. These action goes to be positive or negative hyperactivity leads to hyperactivity. there is the secretion of hypothalamic releasing or release inhibiting hormones also synthesized in the hyperactive hormones (median eminence and released blood into the portal blood system.

Three hyperactive hormones are also released i.e. production, somatotropic and melanin stimulating hormones.

Hyperactive hormone from the anterior pituitary TRH is a tripeptide promotes the secretion of TSH it is not oleic and release production. Neurons can be inter connected by other neurons of the central nervous system they show the differential release of GSH and LH dopamine is a stimulator , and serotonin is an inhibitory neurotransmitter e.g. prolactin (Lactogenic hormones) stimulates overdoes of some animals. It acts on the female breasts and not on sex glands. The growth hormones (somatotrophin) release is promoted by GRF. It is released from the hypothalamus under adrenergic control Dexamphetamine stimulates. GRF Release by alpha adrenergic stimulation where as it is inhibited by betaadrenergic stimulation.

The hypothalamic hormones are thought to be regulated as result of aminergic neuronal activity dopamine noradrenalin and serotonin.

Hormones and vitamins hormones and vitamins are inter-related to each other due to imbalance of hormones and vitamins deficiencies may be occur on restricted diets malabsorption syndromes or in states where the body need increases eg. During body growth pregnancy and lactation.

Endocrine glands and hormones

Endocrine glands are heterogeneous collection of glands distributed throughout the body in the head neck and abdomen.

Now the pituitary gland has been traditionally termed as the master of the endocrine systems these are regulated by the hypothalamic thus, the secretion of the tropic hormones from the anterior pituitary gland is controlled in two ways.

By the hypothalamic and by feedback of hormones from the endocrine target cells

Fig.

The negative feedback control of the anterior pituitary secretion environmental or endogenous stimuli act upon the hypothalamus. Which secretes specific releasing factors converged to the anterior pituitary.

Feedback control:- Over all connotations of hormones producing and secreting activity of the anterior pituitary is also influenced by the hormones of the endocrine glands. Thus plasma levels of hormones of the adrenal thyroid and gonads fall the hypothalamus is stimulated to secreting the appropriate releasing hormones.

Now production of corticotrophin thyrotrophic and gonadotrophy may be occurs. On other sides the blood levels of the target glands hormones are high, the release of the hypothalamic releasing hormone is inhibited thus, such a negative feedback mechanism is responsible for the maintenance of normal target gland hormones blood levels eg. Contraceptives, adverse effect like adrenal insufficiency and failure resetting from administration of androgens corticosteroids in high doses which depress the production of endogenous corticosteroids.

Homeostasis of glucose :- The concentration of glucose in blood is maintained at a constant level through many factors such as food intake rate of excretion exercise, reproductive state and psychological condition influence is level decreases in the level of blood glucose offer muscular exercise is recognized by alpha cells in the body of langerhans. Which release hormone glucose into glucose and these the blood glucose level brought to the normal level after meal the beta cell release insulin pancreas release a hormone. Induces uptake of glucose by liverless to convert into glucose. This reduces the blood glucose level and bring it back to the normal level. Vitamin D is ineffective cases or renal rickets and hypoparathyroidism rickets the vitamin D₃ analogue, alfacalcidol (1- α -hydroxycholecalciferol) is used for the treatment of renal osteoporosis osteomalacia – responds to favourably to vitamin D therapy. It is also used to raise and maintain serum calcium level in hypoparathyroidism the treatment of hypoparathyroidism consists of with withdrawal of the vitamins low calcium diet and administration of hydrocortisone. And vitamin E is isolated from wheat germ oil and name α -tocopherol. In muscle weakness increased oxidation of polyunsaturated fatty acids, vitamin E supplements the germinal epithelium treatment is done for infertility in women, habitual abortion progressive muscular dystrophy, peripheral vascular disease refractory anaemia's and haemolytic anaemia's they behave as catalytic surfers.

Functional classification of hormones

Three major classes of endocrine mentioned effects can be recognized.

- (I) Kinetic effects- includes muscle contraction, pigment migration and glandular secretions
- (II) Metabolic effects- Changes in rate and balance of reaction and tissue consists
- (III) Morphogenic effect- It concerned with growth and differentiation thyroids are morphogenic effects on certain tissues. Thus a single hormone can produce multiple effects hormones are specific to receptor or enzymes for different channels of action of different hormones.

Now chemistry of hormones are on the basis of polypeptides and proteins

Steroids

Derivatives of tyrosine's

These hormones show a great range of molecular weight from tripeptide like thyrotrophic releasing (TRH) to growth hormones (GH) with 190 amino acid residues and large glycoprotein hormones such as TSH.

They comprise single peptide chain. Peptides hormones are formed as prohormones or pre-hormones eg. Insulin. The C-peptide (connecting) called single chain peptide leaving insulin, which is a peptide, comprises of two chains A and B connected by two disulfide bonds. They are synthesized by cisternal space of ribosome carbohydrate resolves transform into vesicles. They release to the exterior exocytosis.

They are not stored in cell like peptide hormones. They form when the time of requirement steroids comprises 3-b carbon rings and a five-carbon ring fused together.

All the steroids are synthesized from acetate cholesterol is converted into pregnenolone in the mitochondria catalyzed by enzyme cholesterol desmutase and then to progesterone or 17-hydroxy pregnenolone in the smooth endoplasmic reticulum. Cortisol is formed from

Pregnenolone by 17 hydroxylation and androstenedione, by successive hydroxylation and dehydrogenation. The side chain of 17 hydroxylation pregnenolone is cleaved to form Androstenedione. Tyrosine derivatives are the monoamines adrenaline, noradrenaline and dopamine and the thyroid hormones thyroxine and triiodothyronine. Dopamine is formed from tyrosine. Now noradrenaline and adrenaline formed by the action of phenylethanolamine N-Methyl transferase. Thyroid hormones are formed from two molecules of iodinated tyrosine linked together by an oxygen molecule.

Hormonal Effects :-

It exerts its influence on almost all types of cells in the body.

It influences cellular synthesis and secretion of endocrine glands and neurons.

Its effects on digestive tract, and its products such as enzyme hydrochloric acid by gastric glands and bile salts.

It affects the integument. Mucus production, Peeling, Plumage, pigmentation and larval change production and secretion of sweat, sebum and milk is also controlled by hormones.

Production of pheromones body controls the process of contraction relaxation and metabolism of muscles in the body. Hormones control animal behaviours, also controls the processes of excretion and osmoregulation.

Histology of endocrine glands:-

It's how was great variation in their histological architecture some endocrine glands are defined from a single germ layer during their development while others arise from more than one germ layer. Most of the endocrine organs are defined from the endodermis of the embryo. These include the thyroid, parathyroid and glands associated with the gastrointestinal tract such as pancreas. The pituitary gland is derived from the ectoderm. The adrenal medulla is derived from neural crest material which is also ectodermic in origin the adrenal cortex and the gonads testes and ovary are derived from the mesoderm of the embryo. The pineal gland is nervous in nature and is therefore derived from the neural ectoderm. The thyroid and testes are tubular structures with central space. All the endocrine cells have well developed endoplasmic reticulum and Golgi complex required for the synthesis and packaging of the hormones. The histological characters of the cytoplasm of the endocrine cells also reflect the function carried out by the endocrine cells. Cells of refractile granules in the cytoplasm in the adrenal cortex.

Thyroid gland :- It is a dumb bell shaped, bilobed gland located in the thoracic region at the root of the throat. The two lobes are almost symmetrical lie one on either side of the tracheal tube. Each lobe measures about 5 x 2 x 2 cm. The two lobes are connected to each other by a narrow strip of tissue called isthmus or middle lobe which crosses the 2-4th tracheal rings the right lobe is bigger than the left lobe. A pyramidal lobe arising in size extends from the isthmus opened in the neck. Accessory thyroid bodies are located beneath the main thyroid gland.

The weight of thyroid gland varies up to 20 to 25 gm is influenced by diet age, sex and reproductive state of the individual. Thyroid gland is highly vascular blood is supplied by the paired superior and inferior thyroid arteries and directly from the aorta venous blood collected by internal jugular and innominate veins. Blood vessels ensure adequate supply of inorganic iodine of the gland it is derived from the superior, middle and inferior cervical ganglia and parasympathetic fibers derived from the superior and inferior large vagal branches of the vagus nerve. These have control the blood supply to the gland.

Development:-

It is endodermis in origin from the primitive foregut.

During embryonic development the primitive thyroid gland arises out pushing from the middle of the neck in front of the thyroid cartilage. It is derived from the fourth pharyngeal pouch, which gives rise to the lateral folds of the gland. During intra uterine development thyroid gland before reaching the follicular structure of gland is evident by 12-14th week of the foetus.

Histology:-

The biosynthesis of thyroid hormones is carried out in the thyroid follicular cells of numerous small to large diameter large follicles are found near the periphery of the gland while smaller follicles are arranged at the center. Each follicle is made up of a cubical follicles epithelium. In the resting condition, the epithelium is low but the height is dependent upon the extent of stimulation of the gland. Thyroid stimulating hormone the low cubical epithelium becomes converted into tall columnar epithelium.

Thyroid follicles are measured about 20-150 μ m in diameter. A single layer of cubical follicular epithelial cells lines each follicular. It is surrounded by a basement membrane these are consisting of fine connective tissue fibers on which rest the bases of the follicular cells. These follicles are surrounded by a highly vascular stroma containing lymph channels and nerve endings. The follicular lumen is filled with a colloid material, the thyroglobulin. It consists of 75% of the colloid material is the main storage form of thyroid hormones thyroglobulin constitutes about 75% of the colloid material.

Granular cytoplasm containing large number of mitochondria and distinct Golgi apparatus follicular cells facing the colloid material is thrown into a number of microvilli. Nucleus is situated at the center of the follicular cells and the cytoplasm is filled with the well developed rough endoplasmic reticulum and Golgi complex cytoplasmic vesicles filled with the colloidal material are also found in the cytoplasm these on the basis of staining are of three types Eosinophilic, acidophilic and basophilic and mixed two types of follicular cells have been distinguished on the basis of electron microscopic and histological studies principal cells one contained small number of mitochondria and different proteases and oxidases required for the synthesis of thyroid hormones. Small numbers are scattered in large number of mitochondria and parafollicular cells or C-cells-which secrete calcitonin.

Functions- They show iodide trapping they leads to form moniodotyrosine (MIT) and diiodotyrosine (DIT)

The thyroglobulin with T_3 and T_4 attached to it by peptide linkage. On the proteolysis which is under the control of TSH. These are bound by plasma proteins. It is mainly bound to thyroxine binding globulin (TBG) and T_3 is mainly bound to thyroxine-binding prealbumin (TBPA) Thyroid secretions are increased in cold environment. Thyroid hormones have a variety of effects on the cardiovascular system it stimulates Na^+ , K^+ ATP are directly and these by increase ATP turnover and oxygen consumption these hormones are used in the treatment of myxedema in adults, cretinism and juvenile myxedema in children. It increases the degradation of adrenal corticosteroids, other disorders including obesity delayed union of fractures, hypogonadism infertility, menopausal arthralgia, infertility menstrual disorders, nephritic syndrome refractory, and chronic constipation and refractory eczema.

Toxicity- It resembles the manifestations of hyperthyroidism, like hyperirritability, insomnia nervousness, tachycardiac, palpitation, arrhythmic angina pectoris, polyphasia and emaciation. It leads to hypertension and gastrointestinal disturbances. Thyroidal preparations must be used with caution in patients with hypertension and coronary artery disease.

Source. Sea fish, used in goitre belts, Treatment.

- (i) Lugol's iodine
- (ii) Iodized table salt.

Hypersensitivity reaction like angioedema swelling of the larynx and multiple cutaneous haemorrhages may occur.

Radioactive iodine (I^{131}), Propranolol, Guanethidine, thiocyanates, Perchlorates.

Dosage- Propyl thiouracil (Propacil) 75-100 mg every 8 hourly
methylthiouracil (Methicil) 50 mg every 8 hourly.
Methimazole (tapazole) 5-10 mg every 8 hourly.

Therapeutic uses:-

To prepare hyperthyroid patients for surgery. It is administered potassium iodide 60 mg thrice daily is given for 14 days before operation. Gland becomes less vascular, reducing bleeding at the time of surgery. Combined therapy of carbimazole or propyl thiouracil to suppress hormone synthesis and avert thyrotoxic crisis prevents pump inhibition.

One example is a recently introduced gastric antisecretory agent that inhibits the final common pathway in the secretion of HCl i.e. proton pump or H^+K^+ ATPase pump.

It is also an effective anti-secretory drug. It produces an anti-secretory effect for a very long duration normal secretory upon the treatment therapy miscellaneous agents.

The normal healthy gastric mucosa has a variety of defence mechanism against digestion by acid and pepsin- these are (a) gastric mucus (b) epithelial tight junction (c) high epithelium cell turnover and (d) Bicarbonate secretion.

Constipation is a condition in which defecation is delayed and hard stool is formed for various reasons. It may be due to consciously ignoring or preventing defecation or ageing, emotions, a low bulk diet, atonic or spastic colon, chronic constipation or drug effects.

Irritant cathartics :-

These agents cause irritation of gastrointestinal tract mucosa and thereby increase reflex peristalsis i.e. the motility to produce cathartic action.

Osmotic purgatives:- These agents act by increasing the bulk of intestinal content by increasing the bulk of intestinal contents by administering the materials which are not digested e.g. Cellulose, giving the materials which absorb water and swell e.g. Agar

Giving the substances which prevent water absorption in the gastrointestinal tract e.g. Liquid paraffin employing the material also which by their osmotic properties. Draw fluid in the tract. Eg. Saline

Saline purgatives are poorly absorbed from solutions retain water to increase in the bulk in the gut they act quickly and do not injure the mucosa. Food evokes secretion in the mouth rich in mucus and enzyme ptyalin waxes lubricants of the food when secretion is reduced some common drugs are used for maintaining secretion in a normal manner. These drugs are called sialogogues and those inhibiting are known as anti sialogogues e.g. Benzodiazepine sedative, cyproheptadine (5HT antagonist) and hypoglycaemic agents also increase appetite.

Gastro intestinal protectants and adsorbents these agents adsorb noxious substances such as gases, bacteria and bacterial toxins they protect gastro-intestinal mucous membrane from the irritants by coating it mechanically. These agents might absorb either anti-infective or anticholinergic material.

Prostaglandins in (diarrhoea), lactobacillus acidophilus (chronic diarrhoea) antibiotic streptomycin locally chloramphenicol, neomycin etc.

Pancreas- cholecystokinin secreted by the mucosa of duodenum. When food material contains acid lipids, peptides and fatty acids comes in contact with the duodenal mucosa.

Serotonin, is also a polypeptide hormone it stimulates the secretion and release of the liquid non-enzyme component of pancreatic juices, and inhibits gastric secretion. Enteroglucagon is secreted by the wall of small intestine and colon in response to glucose intake. It has strong stimulatory effect on the contraction of gall bladder.

Gastrone It is a substance of gastric mucosa it inhibits the secretion of gastric acid stimulated by histamine and gastric rhythm. It stimulates the movement of intestinal rhythm. They are used in the treatment of severe diarrhoea only use of drugs like loperamide may be harmful if diarrhoea is due to bacterial or amoebic agents. e.g. kaolin pectin, Activated wood charcoal, Bismuth salts, coconut shells, zinc chloride etc.

III. REPRODUCTION

The ability of reproduce itself in all living matter is a cardinal characteristic the conception until it has produced its kind. The term in which process resulted the formation of new individuals of some kind it results genetic, structural, and physiological variations.

Reproduction is a source and a renewal source for the genetic material which appears to have an inborn process of ageing. It is a fast process of increasing efficiency in the reproduction processes of vertebrates. So, it is a general tendency towards a reduction of the number of young and increasing parental care, so they follow the stages of vertebrate evolution. They show the most urgent adaptation with birds and mammals.

Patterns of Reproduction:- Two processes of reproduction may occur these are asexual and sexual. By asexual mode two special cells are distinct called gametes, fusion to form cell-structure the zygote which then divides repeatedly to grow into a fully developed new individual. Sex organs in females have to perform the cyclic functions, like menstruation, and changes during pregnancy, parturition, lactation and menopause. The ovaries in women secrete one ovum every month, which may unite with the male sperm, to form a zygote, thus woman's unit of life, with its genetic contribution. In males, only one internal secretion is for the production of sex organs, secondary sex characters and anabolic stimulation this is controlled by gonadotropic hormones of the pituitary as in women.

External secretion is production of spermatozoa which contains the unit of life with its genetic contribution.

An organism that produces both types of gamete is called hermaphrodite. In most hermaphrodite the two gametes do not mature at the same time, so that self-fertilization does not usually occur, cross-fertilization is common. Sexual reproduction is of the biparental but may also be coparental depending up on the species.

Parthenogenesis:- The development of an egg cell- into a new individual without the participation of sperm cells from the opposite sex is called parthenogenesis. eg. Crustaceans, rotifers, insects. Not involve the fusion of gametes. Parthenogenesis is rare in the vertebrates. Eg. whitefish, honeybees.

Gamogenesis and androgenesis:- Development of new individual takes place from the egg which is activated by sperm. Sperm does not contribute any genetic material to the egg. Resulting zygote carries only maternal chromosomes. Eg. Fish, poecilia, planaria, a latro beetle.

Androgenesis:- Is a special condition of gynogenesis. Chromosome contribution in the developing egg comes exclusively from the male it is called androgenesis.

Sexual reproduction:- Mostly multicellular animals consist by the union of two dissimilar gametes, A egg nucleus with sperm nucleus to produce a single called diploid zygote which ultimately develops into a multicellular organism resembling two parents.

The production of gametes by organ is known as gonads. Also which produce sperm cells are called testes, while which produces egg. Cells are called the ovaries. Sexual reproduction involves two most fundamental events, meiosis and fertilization. Meiosis is the process by which gametes from the germinal epithelium of the gonads are formed and recombination of different genes takes place in the formation. Fertilization involves the fusion of two dissimilar gametes in the production of offspring of sexual reproduction.

External fertilization in external fertilization there is no union between opposite sexes. Sperm and eggs may unite in the aquatic water.

Internal fertilization :- Two opposite sexes of the same species undergo copulation, where fertilization takes place the fertilization is internal.

Embryonic development :- The animals which lay eggs are oviparous. Major part of embryonic development takes place outside the female body even though fertilization, has been internal but in viviparous reproduction.

Another type is ovoviviparous reproduction. Large egg which furnishes food for the developing embryo but due to internal fertilization egg remains in the females until it hatches. Eg. Viviparous development.

Reproduction in vertebrates:- All the reproduction phase are change due to environmental factor or change in adaptations thus internal fertilization foetal membranes and control of temperature the physiology of reproduction is dealt with special reference to vetch brutes.

Fishes:- Join like toolsets, place or trout produce a clergy Humber of yolky eggs. So- stimulus for ripening of gonads is supplied by pituitary hormones depend on the secretion rhythmical environmental changes. All fishes show anti mutant sparing (against the current) migrations.

So they actually release eggs up-current of the feeding grounds which allow larvae to drift down towards the latter. Some nest fines secure their eggs to present them from the drifting down stream eg. Cod, stick back. There the species of cat fish and species of sea-horse, which retain their yong in their mouths or in the brood pouches eg. Guppy fishes are or in elasmobranches.

It involves internal fertilization helped by claspers of the male. And the female lags a small number of eggs with a quantity of yolk to produced. In th dog fish, scyliorhinas conical internal fertilization is followed by the recreation of a protective case around the eggs and they are attached by its training threads to objects on the sea bed. Eg. Must lees vulgarise its developing embryos take muck the uterine secretions contain urea, forms an important part of embargo.

Eg. Mustiest lairs is true viviparous though true fish form placenta which secrete nutritive fluids. Loss of lines weight does not occur in mammals during gestation.

Amphibian :- They are stimulated by dog light and others factors. Frogs endocrine controls reproduction, Actins during hibernation mostly amphibians frogs return to water for reproduction and they migrate several mikes to find their original pawing ground. Crooking of the males frogs, enlarged belkeg of the females are two of the stimuli leads to mating accomplished by mole grasping the female which his nuptial pads. Fertilization takes place externally and sperms must penetrate the eggs before its coating of albumen swells. Sperms pass down to the testis ria the anterior part of the kidney and the wolking ducts both sexes name a cloaea where genital as well as excretory products are passed to the exterior once the just are passed that egg load have limited protection of their albumen coating and the fact that the black pigment contain bitter taste corral amphibians or tad poles are well adopted to life in water having respiratory and low matory systems as well as sensory adoptotias such as the lateral line. There are a good number of exceptions. It is adversely external facture of the reproductive system. Eg. Female moelfe toad clog eggs in their packets for fertilization.

Reptile Rapid colonic station of the land achieved by the reptiles we see many changes from the amphibian condition fishes and amphibian and re passed as an amniotes they the amnion character stics of the reproduction mechanism of reptiles birds and mammals which are passed as amiates.

Amnion is an extra- embryonic membrane evolved in junction with shelled egg and it facilities the embargo to develop within a stable fluide embroilment. In conjunction with the onion a further extra-embrgonic membrane the Atlantis develops. It has role in expiratory changes and excretion there is yolk enclosed in a sac. Prowling raw material for the developing embargo. Albumen of eggs contains water and porow shell allows gaseous exchange, so the level of reptiles a great deal of provison is made for both the nutrition and protection of the developing off spring.

Eg. Snakes guard their eggs and turtles and crocodiks, among others burg eggs to provide them with an uniform and protected environment lizards and snakes have developed vivipority but there is no exchange of materials between Mather and offspring.

Birds :- Eggs of birds are some in appearance shows wider range of colour and shape birds open nests usually have camouflaged eggs (eg. Planes) while some has concealed or domed nests have white eggs (eg.out) there is a generation tendency to reduce the number of eggs laid in the more advanced birds one but on the whale the number of eggs related to the number of eggs of offspring that the variation is due to species of nesting, late tube and immediate ecological conditions. During their reproduction phase of male and female parental care is well-developed they do the sub care of their young ones. Birds being homoeothermic. They maintain their at constant

temperature. Female is assist for construction of nest male develops the construction of increased supply the akin as well as losing feathers from her breasts. She also drine to in cubate which is xary strong and can be clearly seen in the behaviour of a 'broody hen after hatching the yongs are usually cared for both by parents the gap of the fledging s beak aeting as the releaser to the parents, fending responses. Hormel of feet is by the pituitary lactogen which causes the secretion of milk from the regain's crop.

Mammals :- The cerebral hemispheres and complex behaviour, Mammals owe their success to the efficacy of their reproduction system, now the closs of vertebrate of the offspring ,exceedingly highly developed.

Egg similar goes through a similar gastrulating to the reptile and bird egg. Is quite small in the placental mammals. so the shelled eggs of the primitive monodramas are quite large mammalian eggs have reduced yolk they the tissues oviducts are well prepared for specialized and muscular region uteri sis perforated in the developing embryos. Now the well of uterus establishes contact with the foetal membranes of the developing embargo placenta sernes as physiological function and forms by the extra-embrognic membrane allantoids grow out from the foetal endoderm and fusing with chorionic give rise to chorioallentoic placenta, inner wall of chorion and the enter lining of the allontois are lined with mesoderm and in this tld resells arise forming the umbilical artery and vein. Foetal or terg and between foetal and maternal circulations countess current exchange system may develop food, water and oxygen are passed from the maternal circulation and carbon-die-oxide metabolites are returned. Mammalian orders have a tendency to reduce the lagers involved in the placenta. Maternal epithelium, connective tissue and endothelium are absent in the placentas the uptake of ions and presumably other substances is greatly each onced they are more efficient than the placental with many lagers. The intervening layers are lost during development in various mammalian orders to increase the intimacy between maternal and foetal tissues and to increase the efficiency of functioning of placenta.

Maturity goes to be during age. This is called puberty the reproduction functions commence reproductive periods extend throughout the life. It ends when at Ropak changes accurse and gradual oppression of sexual activity 13 to 15 year puberty occurs earlier in gintl than boys. Secondary sexual characteristics may develop on the public region occur.

The placentas depends upon the type of sexual cycle fall into categories (i) oestrous and (II) Menstrual the first category include these which breed only in specific period of the year when ovulation takes place and the animals break the desire of sexual mating the breeding period is followed by resting phase. Mostly animals may bred once. Twice or many times. Breeding period continued by resting period oestrous animals may be mono, bi or polyestrous second category goes on annual breeding ovulation occurs every month periodically form the two ovaries breeding phase may followed by pregnancy, discharge of unfertilized ovum the endometrial tissue and blood in the form of menstrual fluid.

Pinnacle body Pineal is a small cone shaped pineal is situated beneath the corpus coliseum between the two superior calliculli originates from the third ventricle. The cavity of the diverticulum later on gate obliterated his to logically it consists of parenchyma cells. Which re large with easonophills cells and neuralgia cells. Atrophy at the age of seven years and is filed with calcium and magnesium phosphates and carbonates. Its function is still unknown and represents possibly dying gland.

Thymus:- Thymus is particularly a endocrine gland and partly lymphoid gland and is situated below the thyroid it gradually enlarges on until puberty and then atrophies. Now initially thymus consists of number of lobules. Each of consist of outer cortex and medulla.

Functions:- It controls the growth of the skeleton

It helpin the development of sex-glands control of secretion:- Thymus activity is accelerated by anterior pituitary and thyroid where gonads and adrenal cortex are known to inhibit its activity.

Placenta:- The fertilized ovum enters ther terms and gets its way into the hyper trophled endometrial and the ovum embelded in the walls of uterus. That portion of mucous membrane which intervenes between the ovum and the muscular lager of the uterus undergoes extensive proliferation. And forms placet. It is a developing connection of embargo and the maternal tissue. It develop because of two stimuli one from the corpus lithium progesterone and other developing entropy others placenta coasts of both maternal and foetal tissues.

Endocrine function of placenta:- Both estrogens and progesterone's have anti androgen activity it is only for target organs.

The secretion is on the late pregnancy. Phase and of its bilateral overactivity and it produced a third harmonic while is known as the chorionic gonadotropin some effect on luteinizing hormone. It maintains the function of corpus luteum and placenta is capable of producing estrogens and progesterone which are necessary for the maintenance of placenta. They are also contraindicated in patients with enlarged prostate eg. Testosterone therapy mifepristone has effects on ovulation it impairs development of secondary endometrium and produces menses.

Function :- Growth and development of vagina uterus and breasts.

Growth of axillary and pubic hair

Pigmentation of genital region

Growth of uterus during pregnancy. During proliferative stage uterus develop and menstrual cycle depends on the secretions of estrogens from the ovaries.

Growth of skeletal muscles is also stimulated by oestrogens.

Anti estrogens are compounds that inhibit estrogen action by competing for its receptors useful in the treatment of breast and uterine cancer. Eg. Clomifene, Tamoxifen.

During the metabolic processes progesterone gets reduced into an active derivative known as pregnandiol. Appears in the form of sodium-pregnanediol glucuronate. Period duration of progesterone is a week before menstruation and ceases before the period starts.

At the one set of pregnancy maximum secretion is eight or ninth month as it is produced by the placenta in large amount and concentration falls before the parturition or delivery the knowledge of biological actions of estrogens contraceptives and hormone replacement therapy (HRT). This affects on postmenopausal women, bone mineralisation, gonectomy.

Ovary:- The female sex-steroids secreted from ovaries. The oestrogens (estradiol from ovaries) have 18 carbon atoms and progesterone (from corpora lutea of the ovaries) having 21 carbon atoms. The ovaries lie in the abdominal cavity on either side hanging from the broad ligament by a fold of peritoneum called the mesovarium.

It shows vasculation on life most active at puberty and breeding period. The development stages of the ova may be seen at all the phases of life. The ovary consists of a layer of germinal epithelium stroma consisting of connective tissue developing the follicles and the bundles of interstitial cells. It secretes estrogens Hormone. Corpus luteum developed from the ruptured follicles after ovulation they produce progesterone.

Estrogens- are the hormones which produce oestrus in ovariectomized rats or mice. They are derived from supra-renal cortex, placenta and few Leydig cells of the testis.

Classification of estrogens:-

Natural estrogens- eg estradiol, estrone, estriol semi-synthetic estrogens eg. Ethinyl estradiol mestrol quinestrol.

Synthetic estrogens eg. Diethylstilbestrol. Chlorotrianisene, metallinoestrol.

Non steroidal agents with estrogenic activity eg. Dienestrol Benzoic helestrol methestrol . Metallinoestrol chlorotrianisene.

The FSH stimulates the metabolic activity of the Sertoli cells in the seminiferous tubules. And promotes spermatogenesis. The LH promotes the development of the interstitial cells of Leydig which synthesise and secrete testosterone. The mechanism leads hypothalamic- pituitary There is need of physiological levels. Development of accessory sex organs and the secondary sexual characters less potent is androstenedione and dehydroepiandrosterone. Are secreted by adrenal cortex and the ovary which are bio transformed as in the liver and kidney to testosterone. Sexual maturation concerned androgens in males. Eg. Facial hair, musculinity, boldness, texture of the skin. Lower pitched voice

Function:-

Indies, secondary sex character of males (body hair deep voice penile growth, and body hair in females. Support spermatogenesis

Influence sexual and aggressive behaviours in males and females.

Regulate secretion of gonadotrophins for muscle metabolism. Increased respiratory role and bronchodilation stimulate respiratory exchange of gases. Spleen contracts and release erythrocyte rich blood into circulation.

Piloerection increases as resins appearance.

Control of Adrenal medulla secretion

Adrenal medulla produces no hormones in resting condition whereas in stressful conditions stimulates the secretion.

These as myasthenia, hypertension, psychosis diabetes mellitus, osteoporosis, glaucoma, pregnancy, herpes simplex keratitis and infections, peptic ulcers and exanthematous diseases like chickenpox.

Testis:- The male sex hormones or androgens are mainly secreted by the testes, and adrenal cortex and the ovary. Each testis is consisted with large number of seminiferous tubules and many other is related groups of interstitial cell which secrete the male hormone the most potent natural androgen is testosterone, and is secreted by the testicular interstitial cell of Leydig.

Androgens:- At puberty there is an increased secretion of pituitary gonadotrophin follicle stimulating hormone (FSH) and luteinizing hormone (LH) in males. Collagen diseases is marked by defects in connective tissue protein (collagen) in the joints various organs and deeper layers of the skin.

Allergic disorders used in atopic and contact dermatitis, allergic rhinitis, allergic conjunctivitis, certain allergic skin conditions corticosteroids are effective in psoriasis, seborrhoea dermatitis paronychia or nail dermatitis herpetiformis and pemphigus.

Ophthalmic diseases It includes iritis, iridocyclitis, chorioretinitis, urethritis, corneal ulcers and secondary glaucoma.

Hematologic disorders used in the management of blood dyscrasias including acquired or autoimmune haemolytic anemia and idiopathic thrombocytopenia or drug-induced thrombocytopenia, aplastic anemia and a plastic anemia. Used in liver, disorders like chronic hepatitis cirrhosis of liver with ascites which is refractory to diuretic therapy alone. Acute infectious diseases massive doses of steroids used in the antitoxic and anti toxic effects used in cases of gram-negative septicemia and endotoxic shock and to control complications of tuberculous meningitis acute pneumococcal infections.

Sympathetic discharge:- Adrenal medulla discharge of adrenal or noradrenaline prepared actions of animals for fight. Blood pressure and cardiac output increases. Blood diverted to skeletal muscle and glycogenolysis and lipolysis provide fuel

Respiration and skeletal muscle :- Bronchioles are dilated secretion of mucus is reduced and mucosa undergoes shrinkage. Respiratory and death rate are reversed. Onset of fatigue delayed muscular excitability and contractility is reversed

Metabolism:- Adrenaline and noradrenaline prime glycogen lysis in liver muscle and lipolysis heat production are increased and tissues degrade to oxygen consumption. All these are B effects liberation of glucocorticoids, Now blood glucose level rise due to gluconeogenesis and glycogenesis and A.C.T.H production is increased.

Other Effects:- Sweating increased sweat glands are stimulated. Adrenocortical insufficiency is due to inadequate ACTH secretion. Acute adrenocortical insufficiency Addisonian crisis is characterized by extreme weakness dehydration, hypotension, and gastrointestinal symptoms.

ACTH is released from the pituitary causing and adrenal hyperplasia, and hyper secretion of steroids also occurs from an alternate path.

In conditions like Cushing's syndrome, adrenogenital syndrome and adrenal virilism the aim of therapy is to suppress pituitary ACTH production which may be excreted in urine or oxidised ultimately to vanillin mandelic acid and excreted in urine.

Actions of Adrenaline or non-adrenaline:- There poetically useful anti inflammatory activity has been intensified and the sodium retaining of mineral corticoid activity has been minimized. Therefore naturals cortices steroids can be obtained as such from of steroid animals synthesed from chalice acid, attained from cattle, or from steroid sapogenins like diosgenin.

Both adrenaline and noradrenalin are known as emergency hormones released under conditions of “fright, fight or flight.

These are associated with the sympathetic nerve-system

Adrenergic receptors:- The hormones are bind to specific receptors located inside the cells the adrenergic receptors. These receptors are of two types. A and B. Receptors respond to adrenaline and U-actions involve contraction of smooth muscles. B receptors responds to adrenaline and involve relaxation of smooth muscles or meta bolic effect U-actions are due to inhibition of adenyl-cyclase while B actions involve activation of enzyme U-receptors are excitory where as B receptors are inhibitory.

Heart and blood vascular system:- Adrenaline and nor-adrenaline increase heart rate by stimulation the sin-auriculars node myocardial contractility and excitability are increased as a result of which the force of contraction s increased contraction of bundle of his is also increased now the b-effects are increases cardiac-output. The action of nor-adrenaline increases the vasodilator on of the coronary blood vessels and vase constriction of the peripheral resells. Now the adrenalin modals B rasodiation of the skeletal blood vessels. The Blood pressure becomes increases and becomes quietly normal.

Adrenal Medulla

Morphology:- It is ectodermic in origin. It is desired from the precursor of theulls of sympathetic ganglion cells that separates from the neural crests. Cells these occurs in two directions some of them gene rise to sympathetic going loria cells are stained yellowish brown with phaeochrom cycles hatter are stained in yellows brown with chromic acid they are known as chromaffinells.

Metabolism of cate chalamines

Cate chomines are derimed form the amino-acid phenyl line. The amino acid in liner hydroxyloted to from amino acid tyrosine. At the time of blood circulation the adrenal medulla sceneaetes tyrosine. The adrenal medullaary cells. Tyrosine hydrogen lase converts dihydro xyphengloline and then to depomine by the action of aromatic h-amino acid decarlorg lase. From the adrenal medullar cells dopamine enters the dense care resides in which medullary cells cubs of cytop lass and concerted into noradrenalin by dopamine cells, noradrenalin passes into the cytoplasm under methylation catalyzed by the enzyme phenyloe than lone N-methyl transferees and noradrenalin undergo rapid degradation after the release. During course of circulation the two hormones are removed on the nor adrenergic normal endings or other tissues or the metabolred into blood tissues by on enzyme cate chalomines or methyl transferees. The products formed are metadrenaline or nor metadelrenalione.

Regulation of secretion :- Regulation and synthesis is done by glucocorticrds. Is regulated by the hypothermal - pituitary- adrenal axis circulated by A.C-TH and CRH.

Circadian Raytheon and plasma control.

The secretion of adrenal gland (cortical) and anterior pituitary (ACTH) hormone doesn't occur in steady rate It follows diurnal rhytham. Which is a 24 hour cycle human anterior pituitary in th usual sleep/week fullness cycle starte prodding larger amounts of ACTH after midnight. Peak 6.00AM to 9.00 AM. The blood steroid level is the lowest in the lote evenings.

Stress:- By the administration of riprap physiologic doses of gluco-corticoids.

Hens selye suggest the concept of stress is an agent which attempts to attars the internal environment. Eg. Physical injuring infection, high or low temperature, radiation injuring neurones clear fatigue, emotions, noses, environmental pollutants It generates two types of syndromes. Eg. Local adaptation syndrome. Or general adaptation syndrome. These diseases respond to gluco-cocticoid therapy. Under severe stress the cortical secretion may be raised up to tan-gold of the normal daily output.

The cells of the adrenal cortex are arranged in three zones: (I) the outer zone glomerulosa (II) The inner zone reticularis. They work as single functional unit and secrete cortisol, corticosterone and small quantities of male and female sex hormones. They are formed by dark brown chromaffin cells which secrete catecholamines. Adrenaline and noradrenaline.

Hormones released:-

There are main hormones secreted by the adrenal cortex.

- Glucocorticoids (cortisol), Corticosterone anti allergic effect
- mineral corticoids aldosterone, deoxy corticosterone,
- Sex hormones androgens are formed, trace of oestrogen eg. Homeostasis.

Biosynthesis:-

All steroids are derived from cholesterol derived from acetate or dietary source (animal fats) now cholesterol is converted into pregnenolone. Steroids derived from the pregnenolone are the oestrogens, the progestogens the androgens, and the corticosteroids. Three classes are regarded as steroids- C-21, C-19, C-18. (Progesterone) (androgens) (Oestrogens).

Synthesis is controlled by ACTH.

The enzyme 3- β -hydroxysteroid dehydrogenase is involved in the conversion of pregnenolone to progesterone and 17-hydroxy pregnenolone or 17-hydro progesterone.

Adrenal cortex:-

Morphology:- Adrenal glands are composed into two. These are triangular flattened cap like structure situated on the dorsal surface of the kidney. The supra-renal is derived from its position occupied size and 8-10 gm in weight. A connective tissue capsule is surrounded the gland underlying the kidney. Position occupied by the gland and shape from species to species. The right gland is on the right. This gland consists of two parts (i) cortex (ii) medulla. The two parts have different embryological origin structure and function.

These are highly vascularized receiving about 6-7 ml of blood gm. of tissue per minute. Now blood carried by the branches of the renal artery medially and inferiorly adrenal arteries right and left adrenal vein collect blood from the adrenal glands. Blood vessels enter from the surface to form a rich vascular plexus in the cortex from that side blood enters diluted to inner medulla.

Development it is mesoderm in origin it is derived from the ectoderm covering the anterior part of the mesonephros. At the time of development of embryo, an inner layer of provisional cortex is formed from groups of eosinophilic, large, granular, cells. Now the permanent cortex is well developed at the maturity cortex undergoes regression while the permanent cortex starts to develop and envelop the medulla.

Histology:- Polyhedral parenchyma cells forming two cell thick cords running radiolally from the cortex to the medulla. The blood capillaries form a close network around the cords ensuring blood supply to each other. They are characterized by well-defined nuclei, mitochondria and Golgi. All insulin preparations are usually given subcutaneously. Only insulin injection or regular insulin can be given intravenously eg. Atrophied (insulin), protamine Mentored,

Adverse reaction on hypoglycemia, insulin allergy, insulin neuropathy, insulin resistance, obesity.

Therapeutic use, diabetes mellitus schizophrenia, myasthenia, Anorexia nervosa bulimia.

Treatment:

Insulin was first discovered by Banting 1921 used in the treatment of diabetes mellitus in 1922. It was completely synthesized in 1966 It is a polypeptide with a molecular weight of about 6000 consist of a- and b- chain 21 and 30 amino acid linked by two disulphide bonds. Connecting Peptide (c-bond) forms eg. Pancreas of cattle (bovine). The pig (porcine) beef or pork insulins semisynthetic human insulin. (low antigenicity) is produced by E.coli by recombinant technique or by chemical technique of pork insulin, replacement of one amino acid is different from

human insulin. The normal pancreas contains about 200 units of insulin secretion to man so units daily metabolized in the lines.

Transport, metabolism and Excretion :-

Rapidly proteolysed in the gut, It has to be given parenterally, usually by subcutaneous injection. Insulin circulates in plasma in a free state and negligible fraction is bound to the plasma globulins in liver and kidneys. The disulphide bridges are split in the liver by the enzyme glutathione insulin transhydrogenase (insulinase). Which breaks insulin molecular into A and B chains. It is bound by muscle and fat tissue no- free insulin is excreted in the urine and faeces. The plasma half life of intravenously injected insulin is less than 1 minutes in man.

Pancreas/ islets of langerhans:-

Morphology:- endocrine function are performed by the islets of langerhans. It is leaf like situated between stomach and duodenum. They are small or highly vascularized masses of cells spread over the pancreas, on entire organ.

Histology:- It maybe grouped on epithelial cells among exocrine pancreatic acini. It is of four types of secretory cells.

- | | | |
|-------|-------|---|
| (i) | Alpha | (A) Cells |
| (ii) | Beta | (B) Cells |
| (iii) | Delta | (D) Cells somatostatin |
| (iv) | PP | (E) Cell, secretes pancreatic polypeptide |

The insulin-secreting beta cells are most numerous (upto 70 to 80% of islet cells). Alpha cells comprises 20 % of cells D and F cells of 4 percent and less than 2 percent. The physiological role of glucagon and insulin in the regulation of intermediary metabolism is well established the diabetes mellitus is a chronic disorder resulting from insulin deficiency, characterized by hyperglycemia, altered metabolism of carbohydrates, proteins and lipids. Metabolic abnormalities leads to polyuria, polydipsia, polyphagia and fatigue. Common complications include, proliferative retinopathy, myocardial infarction, polyneuropathy and uraemia include gangrene.

Hypersensitivity may occur and leads to demineralization of bone and metastatic calcification in the kidneys (hypercalcaemia of malignancy) the development of antibodies may cause intolerance and resistance.

Calcitonin or (Thyrocalcitonin) is a small polypeptide mol.wt 3600 with 32 amino acids synthesized by secretory cells. It produces hypocalcaemia by inhibiting bone resorption, and by promoting the urinary excretion of calcium and phosphate. It has no action on transport of intestines. Salmon calcitonin 40 to 160 units daily by subcutaneous, intramuscular or intravenous injection. Human calcitonin is usually given in a dose of 0.5 mg/day.

Dihydroxycholesterol is used to correct hypocalcaemia of hypoparathyroidism and to treat acute chronic and latent forms of parathyroid tetany. Etidronate (didronel) is a non hormonal substance (biphosphonate) that reduces the rate of bone turnover. It is related to pyrophosphate which has a role in bone mineralization. It is used in treatment of Paget's disease, malignancy, and reduction of heterotrophic bone growth. Due to spinal cord injury.

Hyperparathyroidism- hyperfunction may be due to a diffuse hyperplasia of the glands, adenomas, carcinoma and aberrant production of PTH. Symptoms include polyuria, polydipsia, disordered cardiac rhythm, renal calculi and subperiosteal bone resorption, with hypercalcaemia and hypercalciuria.

Structure of parathyroid gland:

Calcium metabolism in the body is mainly governed by two hormones parathyroid hormone from the parathyroids and calcitonin from the parafollicular cells of the thyroid gland. The chief physiological role of PTH is the maintenance of calcium homeostasis is required for normal body function. On removal of parathyroid gland results in a progressive hypocalcaemia, tetany, convulsions and death.

Action PTH increases the plasma calcium concentration and lowers the plasma phosphate level.

Its effects exerted on the Ca^{++} transport, in the bone, Kidneys, and the intestines. It stimulates adenyl cyclase activity in the bone and kidney cells.

Toxicity:- over dosage with PTH causes hypocalcaemia Overdosage with PTH causes hypocalcaemia manifested as weakness, vomiting, diarrhoea, lack of muscle tone.

Parathyroid gland :-

Morphology:- In the posterior surface of the thyroid gland it consists of two pairs of small bodies, oval in shape and ring embedded in the posterior surface it assume 6x6x3 mm. in size total weight is 23 to 500 mg. gland associated with connective tissue it consists of columns of epithelial cells which intersperse with blood capillaries and nerve endings.

Development:- Two upper parathyroid glands are formed from the fourth branched pouches while the lower pair is formed from the third branched pouch.

Histology:- There is the presence of masses or columns of epithelial cells with blood sinuses in between them. These epithelial cells comprise two types chief or principal cells. It is small in size no granules, cytoplasm is clear but contains glycogen nucleus is large and vascular majority of the cells populate and sustain throughout life. These cells become enlarged cytoplasm becomes vacuolated chief cells commonly known as water clear cells cytoplasm studies shows they are of two types light chief cells or dark chief cells. Few and rich in secretory granules containing glycogen in cells in contrast to chief cells, oxyphil cells are larger in size and few in number. Granules can be stained in acidic dyes. It contains fatty granules and globules. Adipose tissues intersperse and sometimes colloid vessels.

Regulation of digestive secretions and motility of gastrointestinal tracts are controlled by nervous bio-chemical and mechanical factors nervous bio-chemical and mechanical factors increase in hydrochloric acid disturbances and needs symptomatic treatment.

Drugs used in peptic ulcers

- (i) Gastric antacids
- (ii) Anti-secretory drugs
- (iii) Miscellaneous agents including mucosal protective agents.

Anti secretory agent:- These are the drugs that suppress HCL secretion by blocking receptors (histamine receptor blockers) H_2 - receptor blocking or postreceptor mechanisms like H^+ , K^+ ATPase or proton pump. These enzyme is located on the cell membrane gastrin is released from antral mucosa of stomach by food alkaline P^H in the stomach and digested protein are powerful stimuli for gastrin release gastrin provides a feedback control on HCL secretion. When P^H of stomach is elevated by food gastrin is released and conversely release of gastrin is inhibited when stomach attains low P^H and cholinergic action e.g. Dryness of mouth, urine retention etc. further anticholinergic agents delay because the food remains for longer time, in stomach.

Gastro-intestinal hormones:-

The mucosal lining of stomach and intestine is the largest and most diverse gland of the body number of endocrine cells not in a compact group in endocrine tissue but scattered over mucosal cells. These cells secrete specific cells by diffusion and not through circulation. Mostly gastro-intestinal hormones are also secreted by other areas. These hormones control the motility and secretory activity of the digestive system and produced in response to specific chemical substance in gut content mostly they are polypeptides.

Gastrin:- gastrin occurs in two forms gastric 17 secreted by pyloric antrum and gastrin 34 produced by upper small-intestine gastrin 17 contains seventeen amino acids. While gastrin 34 contains in addition to the seventeen amino acids where as gastrin 34 contains in addition to the 17 amino acids at c terminal end of gastrin 17 another 17-amino acids thus making a total of 34 its half life is six times more than gastrin 17 but its action is six times less effective.

From the pyloric antrum two gastrins have been isolated gastrin without sulphate and gastrin II with ethered sulphate. These two gastrins contain seventeen amino acids their biological activity of first five amino acids and any synthetic product with all the physiological action of gastrin pentagastrin.

The gastric ulcers may be produced due to

- (i) Abnormality in gastric acid secretion
- (ii) Abnormal mucosal defence.

Estrous cycle:-

At the certain periods of the year female will receive the male now the mating seasons are the characters ties of animal breeders as heat and by physiological as oestrous. The sexual phases immediately preceding estrus are called postures. The changes of swelling and increases vascularity of the vulva and vagina. Uterus become enlarged glands hypertrophy. At this time bleeding occurs from the uterus and appears externally. These changes of postures are preparatory in nature female organs being into a condition suitable for reception of the male and the fertilization of ovum.

The growth of follicles in the ovary under go maturation estrus is the period during which ovulation occurs and the female mate with male the changes during postestrus are anticipatory to the implantation of the fertilized ovum in the uterus the uterine mucosa hypertrophies and its glands show an increase in secretory activity. During postestrus the corpus luteum develops the uterine changes in postestrus resemble those taking place during pregnancy which, indeed are an extension or continuation of the form thus the changes at the different phases of estrus are as:- pro-estrus-A sanguineous fluid is secreted in uterus and vagina become congested. It is a tendency of estrogens secreted by maturing follicles vaginal smear shows large number of cornified cells broken off from the proliferating vaginal epithelium.

Estrus-(heatperiod)- During the period of heat, only female receives male. Congestion of the uterus becomes maximum. The vaginal epithelium thickens further and the superficial layers are fully keratinized in pregnancy is possible. If fertilization takes place, placenta forms and pregnancy begins. If not, it passes on to the next phase vaginal smear shows large number of keratinized cells.

Postestrus changes:- changes in estrus in the previous stage proceed still further due to the action of progesterone secreted by the newly formed corpora lutea in the absence of pregnancy corpora lutea degenerate and the subsequent generation is forgone arise. Eg. Monoestrous animals (bitch). The hypertrophied mucosa breaks down and is discharged, vaginal smears show large number of neutrophils.

Anoestrus:- The resting asexual period in monoestrous animals last up to the next mating season and is known as anoestrus in polyestrous animals the resting interval is short up to the next cycle which is called diestrus. In rats last for 4-5 days vaginal smears shows degenerating leucocytes and denuded epithelium.

Sexual reproduction in moles:-

The structure which are involved in (sex characters) in reproduction include mainly as genitalia i.e. testes in the male and ovaries in the female. Gametes or sex cells all so secrete hormones that are the functional sex accessories induce structures which are involved in the transmission of gametes or the developing zygote from the site of its origin to exterior. In male the sex-accessories epididymis away from the testes and epididymis which provide essential nutrients, a single prostate gland that serves to lubricate the passage way to the outside of the body through penile, A pair of Cowper's glands which are also lubricating the passage in function. And penile may be erected by the circulation to facilitate placement in to the vagina of the female for the ejaculation of sperm.

In female, the sex accessories include a pair of fallopian tubes from the ovary at the proximal ends enter the uterus, A single Uterus a vagina that seems to receive sperms. One pair of mammary glands which produce milk, for the new born and but Bartholin's glands secrete a fluid similar to that of the gland, connected to the urethra of the female.

Secondary sex characteristics:-

These include more or less external specialization which are physical difference between the opposite sexes. They serve sexes to gether for mating to provide for the protection or nutrition of the young the important secondary sex characters are the following.

- (i) Males have muscular body in accordance to female.
- (ii) Mammary glands are well developed in females and rudimentary in males
- (iii) (the pitch of voice is high in males than females.
- (iv) Males have well defined organs as, hairs chest face, on their body. In females the hairs are present sparsely.

Female reproduction organs:-

Sperms are produced in the testes. Testes are two oval oldies and are suspend in a sac hanging from the lower wall of the abdomen, the scrota. Each testis is composed of coiled annatto massing somniferous tubs lined with epithelia cells and produce sperms cells. The interstitial cells of leg dig around the tables produce the mole sex hormones, testosterone, which promotes the development of accessory gland and contort. Mole secondary sex-characteristics. As, sperms are released into the interior of the tubules they are carried by ciliary action to the epididymis which lies on the outsides of and partially encircling the testis and epididymis together constitute testicle the sperms stored, so become motile in nature, epidydims connects the as deferens. It is a muscular tube that leaves the scrotum by the inguinal canal and empts into the urethra. The duct leads from the bladder the terminal portion of each was deferens enlarges to form an ejaculatory duct capable of contraction and expulsion of the sperms which are stored there adulatory duct before connects to urethra a glandular seminal vesicle empties three. It also secretes a viscid fluid which is expelled along with the sperms. The mixture of the fluid and the sperms is known as semen.

Another pair of glands, cowpeas glands attached to the urethra below the pro-state gland. Their secretions are also al kaline and are we as lubricant for the same. The secretions of the prostate and coopers glands suspend the sperms motile and newish than and neutralize the normally acid environment of the urethra and of the female reproductive tract to a P^H more suitable for sperm survival. from the musculature urethra communicates with the extortion of the body, the penis. It consist of columns of spongy tissue, the corpora cavernous, surrounding the urethra, along a skin layer. Tip of the penis enlarges slightly to form glands which is covered by a fold of skin, the prepuce, function of penis is to deposit the semen in the genital tract of the female.

Erection of penis:- Associated with sexual stimulation. It is caused by dilution of the blood resells carrying blood to the spongy tissues resulting in the called of blood with in these spaces .as the tissues the testis close to the body epoxy dymis urethra faunally the muscles surrounding the bulb are stimulated. They contract and propel the semen out through the urethra and produce some of the sensations associated with organism.

Ejaculation:- Stimulation leads to can traction of muscle present in the scrotum, railing the testes. Close to the body epididymis and vas deferens. These contraction more the semen in urethra finally muscles surrounded the bulls are stimulated. It contract and propel the semen out through the urethra and produce some of the sanction associated with organism.

Semen:- At the time of insemination. It contains sperms cells and secretion of seminal rest cells prostate gland and cowpers gland and also discharged per ejaculation raris from 2.5 to 3.5 ml.

Spermatozoon:- The spermatozoon consts of two marl parts, head and tail. Tail divided into neck mid piece. It is about 0.05 mm is lefth .it is motile in nature and enzymes are responsible forints motility are located in the mid piece. Head of spermatozoon is a sperm –shaped Stratton bovnved by plasma- membrane at the other for end it has a cup-like structure called acrosome made up of geology apparatus. It contains hydro zing enzymes and plugs on important role in the penetration of sperm in the ovum. Head contains a well condensed nucleus. And a very little cytoplasm. Head is followed by short neck. Neck consists of controlees a proximal contras. The two controlees lie at right angles to one another. The proximal controlled has no active function. But is a potential activist within the egg during the first deavage division of the fertilized. The distal contrail serves as basal body for tait neck followed by mid-piece composed exclusively of mitochondria. Aggregate at the based and forming a continuous spiral mitochondrial (A-Tapes) provides energy to the sperm tail for its motility mid-piece is followed the principal place (which ultimately ends in the and piece. Now principal place the end-place of the fibres system is reduced to the axial complex of the control fitters. Surrounded by the ring of nine peripheral fibres.

Numbers:- nearly 300 to 400 millions of sperms cells are present in the semen of each ejaculate of a normal young adult male. Only of these can fertilize the egg cell. In moles 35 millions sperms/ml. of semen are generally sterile.

Female Reproductive organs:- Female reproductive organs include a pair of ovaries, air of avidest (fallow ion tubes) and the uterus or the vagina.

The ovaries are paired small almond live flattened belies lying the sides of vertebra of Colum behind the kidneys in the phonic cavity. Each ovary is attached to the and over ion ligament, it composed of stream of fibre connection tissue and is lined by a germinal epitheliums which proliferate the us ands of primordial follicles during the embvgonic life of individual.

Each ovary is roughly differentiated into an outer cortex and an inner medulla.

In mature ovary contains follicles corpora lutea in the various stages. It consists only large blood vessels of the organ one cell of the mass of epithelium cells give rise to an immature ovum oocyte.

The remaining cells surround the ovum oocyte as sac or follicle called follicular epithelium or granulosa consist of primordial cells.

Now they become organized in a connective tissue layers, the theca externa and the theca interna.

Puberty:- Graafian follicles reached on matting at the time of puberty in young girls. It is the beginning of youth, when onset of sexual maturity may functionally organize. At this time the various morphological, psychological and endocrine no logical changes take place in the individual. Secondary sexual characteristics marked during the growth as well as accessory sex organs maybe. These changes going on with gonadotropins which stimulate the ovaries. Ovaries on stimuli provides the development and maintenance of primary as well as accessory sex characters of the female individuals.

Sex-hormones:-

Male sex Hormones:- Testosterone is a male sex hormone. It is secreted by the seminiferous tubules in the testes associated by chemicals called androgens and realer masculine characters traits.

Effects of androgens:- They are produced in the male human foetus and play important role in the genitalia. It may causes the enlargement of the penis, testes and also the prostate and the seminal vesicles and other accessory organs. They also affect the growth of larynx muscle development of size and distribution of body hairs. They stimulate the biosynthesis of proteins of muscle tissue and also the formation of red-blood cells they stimulate by the apocrine sweat gland whose secretion attracts bacteria. And so produces body odours, associated after puberty.

Regulation of androgen production:-

Production of androgen is regulated by a gonadotropic hormone (LH) secreted by the anterior pituitary. LH acts on the interstitial cells of Leydig to release androgens. It effects on the male reproduction organs, androgen inhibits in turn the release of LH. During negative feedback when it reaches at a certain level profound effects on male reproduction organs. It inhibits. In turn the release of LH. Sperm formation stopped when it discarded pituitary development of sperm cells proliferate the pituitary hormone the follicle stimulating hormone.

Female sex hormones:-

Oestrogens and progesterone are mainly two female sex-hormones. They produced the ovarian follicles under the influence of follicle stimulating hormone (FSH) of pituitary gland. Oestrogens established steroidal stimulate the development of the breasts to external genitalia pubic and auxiliary hairs and distribution of body fat. Both oestrogen and progesterone are regarded as endometrium for the implantation of embryo. These hormones are produced in the ovary and regulated by gonadotropic hormone.

Menstrual cycle:- The rhythmic changes occur during the 28 days, during this time reproductive life of woman from puberty to the menopause (L.mens monthly). In the phase of the menstrual cycle bleeding occurs, this is called menses or menstruation phase. The duration is 3-5 days. Ovulation occurs between midway period. i.e. somewhere occurring between 13th and 15th day. Thus the average intervals of repeated 28 days earlier or the cyclic discharge of blood mucus and certain other substances from the females. The menstrual blood contains shedded endometrial, mucus leucocytes and unfertilized ovum uterine induces a gradually hypertrophies. It prepares suitable bed for reception and suitable bed for reception and implantation of the fertilized ovum.

If pregnancy occurs the proliferated mucosa is converted into placenta. During the block of pregnancy hypertrophied mucosa breaks down and is discharged as menstruation. It is described as the shedding of the unfertilized ovum. The disappointed uterus weeps and the weeping is swept out as the menstrual flow.

The endometrial changes occur during the menstrual cycle into the four stages (i) the resting phase (ii) proliferation phase, (iii) the premenstrual phase (iv) menstrual phase. The first and second phase are called follicular phase. They

are due to gradual action of estrogens, secreted by the maturing follicles. On the 14th day ovulation takes place and corpus luteum formation begins in the follicular space of ovary.

Ovulation:- burst of egg follicle liberating the egg and ovulation it starts about 14 days before the beginning of the next menstruation. Ovulation involves the development of primordial or primary follicle. The follicle stimulating (FSH) hormone from the anterior pituitary initiates and with LH regulates ovulation an egg produced from a primary follicle first become partly detached from surrounding epithelial cells beneath tunica albuginea. It begins to enlarge and surrounding cells grow to form many layers. A zona containing of muco-protein zone pellucida appears at the developing oocyte and follicle cells. These follicular cells surround the pellucida appears between the developing oocyte and follicle cells and developing egg. Under the influence of primary pituitary gonadotrophin a follicular fluid is secreted by the surrounding follicular cells and cells immediately surrounding the egg become separated from the more remote cells (zona pellucida) and a large cavity, the antrum is formed full developed follicle, granulosa, and the is called a mature follicle.

The mature follicles during final stages of development moves to the surface which bursts releasing ovum into the abdominal cavity. Now the ovum is swept into one oviduct with the help of cilia present at the finger like-projections of the oviduct opening. The oviduct the ovum is transplanted into uterus. In case the ovum is fertilized it liquefies and discarded through the vagina. The follicles, which enlarge but not go in ovulation finally degenerate to form atretic follicles which ovulates is converted into blood filled cavity corpus hemorrhagicum. After release of egg blood comes from the injured vessels. Soon after this dotted blood is replaced by yellow bodies of lipids or luteal cells produced from granulosa and the cells and thus corpus luteum is formed under the influence of luteinizing hormone formation and maintenance of corpus luteum starts with the influence of anterior pituitary. If the ovum is not fertilized the corpus luteum degenerates to become corpus albicans which appears as disorganized scattered globules.

Oocyte:- Size of human oocyte is about 0.1 mm/100 micrometer in diameter. It has ribosomes, enzymes, amino acids and other cellular organelles for rapid synthesis of embryonic cells. The eggs are shed in the body cavity form where the ostia of oviducts pick them up. Uterus wall is thick it leads through uterus and is the site of fertilization takes place uterus is connected to vagina through cervix near the opening of vagina through cervix the Bartholin's glands secrete a fluid. Vagina serves to lubricate and neutralize any acid present.

Vagina leads to exterior through vaginal orifice which is flanked by on either side of moist folds. The labia minora, enclosed with the fleshy hair covered outer labia majora. These structures enclose the clitoris which is a small mass of tissue just anterior to the urethral opening. Clitoris is a small mass of tissue just anterior to the urethral opening the clitoris is homologous to the penis of the male. It has glans, prepuce and capable of engorgement, it serves reproductive function. The urethra of the female opens just anterior to vaginal orifice.

Fertilization:- The spermatozoa which are stored in epididymis in males are actively mobile as coitus near completion and the climax organism of the male occurs, contraction of the epididymis and vas deferens propel the spermatozoon. Through the ejaculatory ducts into the urethra. At the same time, the seminal vesicles contract and expel viscous secretion, the semen with its suspension of spermatozoa. Is ejected from the urethra with considerable force by the contraction of the bulbospongiosus and of the striated muscles in perineum. The act of ejaculate on ejected the semen and the movements which bring to constitute it is a reflex act of which sensory nerves in the penis are its afferent limb the sympathetic nerves its efferent limb. A thin secretion from the prostate gland are added to the semen in the urethra. The secretion of the seminal vesicles appears to be essential for maintaining life and motility of the spermatozoon. But the prostatic secretion and the secretions of the urethral glands are not of the importance in this respect. They probably serve as a lubricant.

Spermatozoa deposited in the upper part of the vagina during coitus propel themselves upward by the peristaltic movements of the tube. Now fertilization takes place probably contractions of uterus during coitus draw the semen into the uterine cavity.

Adapting Teaching Practices for 21st Century Educational Needs

Dr. Santiago López*

Institute of Environmental Sciences,
National University of La Plata, La Plata, Argentina

Abstract

Teaching and learning are two sides of the same coin. There have been dynamic changes in the interrelationships and interactions of the teachers and the taught. Hi-tech, innovative technologies have unwarrantedly entered the realms of learning across the globe. The developed world has looked at the technological inputs deluging the corridors of academic institutions especially those of higher learning. The teacher presenting this paper examines the influx of technical inputs like the cell phone making inroads into the classrooms and how they are impacting upon the teaching learning continuum in an undergraduate and graduate situation.

The paper examines how the ordinary everyday lectures are securing the attention and comprehension of the students. The video recording of class room lectures provided the platform for long term learning among the students. It was also a reflection of the teacher's self-assessment of the classroom lecture delivered.

Key words: Technology, Student-teacher continuum, innovative, attention, comprehension, self-assessment, classroom, lectures.

Adapting Teaching Practices for 21st Century Educational Needs

Dr. Santiago López*

Institute of Environmental Sciences,
National University of La Plata, La Plata, Argentina

Introduction

The minds of learners in the 21st Century are no longer dependent on books or a straitjacketed closeted classroom environment. A truly dedicated teacher can help stimulate minds of students and motivate them to think and learn better.

Whenever the teacher is enabled to provide a creative and simulating environment, the response is rich and expressive. The students are encouraged to explore and are motivated to forage into areas unexplored on the subject.

An environment that impacts upon the inherent mind set, psyche and thinking processes enables the students to reach out and explore what is really beneficial for them in the long run.

As a teacher the biggest challenge one faces is capturing the undivided attention of the students and conveying to them the ideas and knowledge to create a lasting impression. To be able to tackle this challenge effectively, the teacher must constantly come up with innovative ideas that end up making the classroom experience of the students a most invigorating and stimulating one. Having experienced classroom teaching for about two decades, I have become aware of a number of ways of the student teacher interaction that make for long term sustainable bonding.

As the world is witnessing technological changes in all aspect of the field of technology, Peter, Abiodun and Jonathan (2010) felt, “students must adapt to changes in line with their levels of thinking on handling machineries and equipment so as to commensurate with the industrial needs.”

Creativity can be stimulated in a number of ways including playful games and even forms of visual exercises that can excite young minds and spark their interest to reach their own unique conclusions.

Use of Creative Initiatives in Classroom Learning

Creativity has no barriers and can be seen to make its mark in almost all the subjects, be it mathematics, science or history. Some of the best teachers are the ones with an unending flow of developing their own creative ideas.

The entire purpose of these teaching mechanisms is to encourage the students to bring up and experiment with different ideas and always give to them the total freedom to explore.

Teaching has come a long way from the days of black boards and chalk. The students today are raised on smart boards and all types of technological inputs. A large variety of audio-visual materials supplement the traditional textbook learning from school onwards. These are in the form of models, filmstrips, movies, pictures, info graphics, besides the other psychological gimmicks like mind mapping and brain mapping tools.

Such tools go a long way towards building imageries for the learners their imagination thrives and grows beyond all limitations. These methods go a long way in not only developing the students' ability to listen but also help them improve their understanding of concepts.

The most significant aspect of teaching is to utilize all forms of teaching aids for an exciting introduction to the lesson. If it is taken up in a story like manner and it can keep the students engaged for long duration of time. Learning sessions become all the more interesting when the teacher can introduce the subject as a story.

Rudyard Kipling had said that "if history were taught in the form of stories, it would never be forgotten." It is true, therefore, that the best historical records are those that have been recounted as stories. In fact most of the legends are recounted by word of mouth. These days' storyboarding is among the best approaches to teach any subject that requires step-by-step memorization. A higher level would be the visualization of the teachers' highly-conceptual ideas.

All teachers can use a storyboard to create famous events. This form of visually stimulating approach to learning ensures that even the most complex ideas can easily put across to the students. The social media is a helpful medium to make the story boards available to the students at all time. On personal level my inputs are followed by regular visuals and videos of the related content on Pinterest app and Facebook page.

In fact these kinds of storyboards tend to become a bridge and are a vital form of communication which lets the students tells a story in pictures all the while using their own imagination.

Vital Attributes of the 21st Century Teacher

It is essential that the teacher should really love teaching. Only then can the equation be well balanced. The students are all the more tuned in when the thoughts of the teacher are synchronized with the thinking processes of the students. There is a palpable feeling of achievement when the teacher feels that they are giving their best.

Bill Gates is of the view that “even the greatest of teachers can get better with smart feedback”.

The students too would then be more creative and inspired to reach out to newer dimensions of thought and exploration. Every teacher will find that loving their work keeps them relaxed and gives them ample room to experiment with new ideas. The creative teacher is always keen on doing extensive and intensive research on all kinds of creative ideas and a wide range of techniques.

These experiences are becoming popular all over the world. In India, as a developing country the access to facilities including hardware and software is still a scarce resource in many of the far flung government run academic institutions like schools and colleges. However, the reach of the communications network is such that cell phones, or colloquially, the mobiles are a bye word in even some of the remotest areas of the country. These mobiles are a great provider of connectivity in the government and private educational institutions. Towards this end I would like to present my first-hand experience of technology transfer in the classroom situation since the past year. Some of the views of the students will show the kind of impact that has been made. When I asked the students to enumerate how useful my lessons taught in class had been. I was pleasantly surprised to see a hundred percent positive feedback.

“We always ensure that your entire lecture and question answer sessions are recorded on our cell phones and we play and reply the lecture among ourselves for making our notes and preparing for assignments. We click the picture of the white board. Your recorded lectures are a tremendous source of information and we are encouraged to seek further information than just the course curriculum”.

Undergraduate Student of B. A Fashion Designing

“As everybody knows that the recording of the lecture is going on we have two advantages. Firstly, we can wholeheartedly be present during the classroom session and do not have to worry about taking notes. Our concentration is undisturbed and total. Secondly, while the lecture is being recorded everybody ensures silence in the class. All forms of mischievous activities are forgotten. There is full sharing and discipline in the class room. We also click picture of the demonstrations.”

Undergraduate Student of B. A Fashion Designing

“Most of the students sitting in the front benches concentrate totally on the audio-visual recording on their mobile phones. They forward the lecture to the entire class which forms a group on the whatsApp . Completing practical work has become so much easier because once the lecture has been recorded we can hear it again and again. In fact, many of the details of the lecture can be understood very well. Many of us hear the lecture together and perform practical in a group. In case there are still any doubts then the best recourse is to the approach the teacher and ask for further details.”

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“This is the best approach ever. We can hear or rather see the lecture in the classroom situation over and over. By seeing reviews of the lecture at our pace, that is, by going backwards and forwards on the video recording we can pick up every little detail of the module. Many a times we can see related videos shared for our enrichment of knowledge. The video recording is a boon. All the students are benefitted by it. One can even view the audio - visual recording over and over again any number of times. Many of us even get to memorize most of the lecture!”

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“This is so good! Earlier we used to take notes in class. Because of the pace of the lecture and the inevitable question answer sessions going on simultaneously we tended to lose some parts of the lecture. Later, when we compared notes with each other there would be major lacunae left and we would have to supplement with the help of books or going back to the lecture. Now that is not required. We simply record the lecture and then replay it at our leisure. It is the best way of learning. There are many more audio clips which visual are available on the subject but the real fun is having your own class lecture which you can replay at your own room or home. It is much easier for us students to understand the lecture in our own time. It is a great boon to be able to get such detailed lectures”.

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Thus, it can be seen that innovative ideas are essential to make teaching methods more effective. Seeing the fact teachers of the current century have paced their technological inputs during the past few decades it is essential that teaching and learning too benefit from the large volumes of technical aids available.

Technological Breakthrough and the Common Student

The onslaught of technology in the form of computers and mobile phones has ushered in multiple cross-sectional yet fundamental structural changes. The advent of the mobile phones and their large scale accessibility as well as use by large sections of the students' community is unprecedented. While almost all technologies support both teaching and learning, the mobility infuses classroom learning with digital learning tools like computers and hand held devices like cell phones. This greatly impacts upon the scholarly offerings, experiences, and by all means a greater variety of learning materials that supports learning. These learning aids have been observed to increase student's engagement and their motivational levels for imbibing what is being taught. Accelerated learning is the major output.

Technology gives the teacher the power to transform teaching by promoting new models of connected teaching that works 24 x 7. This model links teachers to their students as well as adds

professional content, resources and a variety of systems to help the learners improve their instruction inputs and personalize learning.

These days the access to online learning opportunities through the use of unfathomable educational resources generated through technologies has enabled them to increase vastly their educational productivity. This is largely through:

- (i) Accelerating the rate of learning;
- (ii) Drastically reducing costs of a large variety of instructional materials;
- (iii) Methodology of program delivery as well as;
- (iv) Much improved teacher time utilization.

Technology: Wings for prolonged Learning

It is evident that in today's teaching-learning environment the use of teaching aids is an integral component. The consistent use of teaching aids has exhibited the following impacts:

- (i) Helping learners improve reading and comprehension skills
- (ii) On a sustainable basis, illustrating or reinforcing skills and concepts
- (iii) Differentiating instruction and relieving anxiety or boredom by presenting information in a new and exciting way.

It is a well-documented fact that teaching aids involve the total attention potential of the students because these versatile aids can be utilized exponentially when supplementing the days' lesson.

On obtaining this form of feedback from my students I asked them to share their videos of my lecture with me also. It was a great learning experience indeed. I could easily understand the language, concepts and exchange of ideas given through the lecture. I was surprised at the ingenuity of the students to use this form of technological inputs. I came to the following deductions:

- (i) I could review my lectures in the videos and assess immediately the drawbacks, lacunae and points I had missed out on if any.

- (ii) The video showed me my pace and also the level of understanding the students were showing.
- (iii) Such videos would help me prepare better and give the students areas for further elucidation.
- (iv) The students' feedback on the videos especially pertaining to how well they had understood the concepts could be highly motivational.
- (v) The video gave glimpses of the type of fine tuning that was required to make the lecture cover the module holistically.
- (vi) The video provided the students with greater opportunity for interaction and interface. This is not possible in the classroom sessions.
- (vii) The best of both worlds is achieved when there is the benefit of direct interaction with the students in the classroom situation and there is also the achievement of the obtaining the required feedback after the students have thoroughly acquainted themselves with the teacher's lecture.
- (viii) The feedback obtained by the teacher is often two fold because it is firstly when the students interact in the class and secondly it is also afterwards when they have watched the video a few times.

Thus, the help of technology has made classroom teaching sustainable and the learning process very scintillating, highly absorbent and sustainable.

It is a persistent phenomenon of the times that the students of today are reading less and less on their own. In fact the reading habit has been totally eradicated in the younger millennial. The teachers are also finding reading and comprehension skills are very low among today's students. Modern teaching aids are helping teachers to close the gap and hone the reading and comprehension skills of the millennial students.

The millennial generation finds itself absolutely comfortable with online technology. Technology should therefore be embraced fully in consonance with the needs and accessibility of the learners.

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