Short notes on:

1. Paracrine Glands:
    1. Signals that act locally between cells thata are close together are called paracrine signals.
    2. The move by diffusion through the extracellular matrix.
    3. These type of signals usually emit quick responses that last only a short amount of time.
    4. In order to keep the response localized paracrine ligand molecules are normally quickly degraded by enzymes on removal by neighbouring cells.
    5. Removing the signals will re-establish the conc-gradient for the signal, allowing them to quickly diffuse through the intracellular space if release again.
    6. Eg. Paracrine signalling in the transfer of signals across between nerve cells.

2. Autocrine Glands:
    1. Autocrine signals are produced by signalling cells that can also bind to the ligand that is released.
    2. This means the signaling cells and the target cell can be the same or a similar cell. This type of signaling often occurs during the early development of an organism to ensure that cells develop into the correct tissues and take on the proper function.
    3. Autocrine signalling also regulates pain sensation and inflammatory responses.
    4. Further, if a cell is infected with a virus, the cell can signal itself to undergo programmed cell death, killing the virus in the process
    5. Eg. In some cases neighbouring cells of the same type are influenced by the released ligand. In enbyological development, this process of stimulating a group of neighbouring cells may keep to direct the differentiation of identical cells into the same cell type.

3. Endocrine Signalling:
    1. Signals from distant cells are called endocrine signals, they originate from endocrine cells.
    2. In the body, many endocrine cells are located in endocrine these types of signals ususally produce a slower response but have a longer-lasting effect.
    3. The ligands released in endocrine signalling are called hormones, signalling molecules that are produced in one part of the body but affect other body regions some distance away.
    4. Eg. Hormones travel the large distances between endocrine cells & their target cells via the bloodstream, which is a relatively slow way. It moves throughout the body because of the form of transport, hormones get diluted and are presend in low concentrationwhen they act on their target cells

4. Pitiutary gland:
    1. Pituitary is a pea-sized endocrine gland at the base of the brain, behind the bridge of nose and directly below the hypothalamus.
    2. It sits in a dent in the sphenoid bone called as sella turcica. The pituitary gland is one of the interrelated major endocrine glands:
        1. Pineal gland.
        2. Pituitary gland
        3. Thyroid gland
        4. Thymus
        5. Adrenal gland
        6. Pancreas, ovary and testis
    3. The pituitary is often referred to as the “master gland” because it not only secretes its own hormones pituitary is divided into two main sections:
        1. The front (anterior lobe)

    2. The back (Posterior lobe)
4. The hypothalamus communicates with the anterior lobe via hormones and the posterir through nerver impulses.
5. The hypothalamus, which is above the pituitary gland, is the control center of some of your body is basic operations. It sends message to the body's autnomic nervous system, which controld blood pressure heart rate, respiration, body temperature. Sleep-wake cycle and digestion.
6. The hypothalamus tells the pituitary gland to produce and release hormones

5. Adenohypophysis:
    1. The adenohypophysis or anterior lobe is a lobe of the gland that regulates several physiological processes (including stressm growth, reproduction and lactation)
    2. Anterior lobe : Anterior pituitary arises from an invagination of the oral ectoderm and forms Rathke;s pouch. This contrats with the posterior rituitary, which originates from neuroectoderm.
    3. Endocrine cells of the anterior pituitary are controlled by the hypothalamus. The later releases regulatory hormones into hypothalmic capillaries leading to the infundibular blood vessels, which in turn lead to a second capillary bed.
    4. The hypothalamic releasing hormones then bind to anterior pituitary endocrine cells, upregulating or downregulating their release of hormones.
    5. The anterior pituitary is divided into regions known as the pars tubularis, pars intermedia and pars distalis.
    6. Pars tuberalis:
        1. This a tubular sheath that extends from pars distalis and winds around the pituitary stalk.
    7. Pars intermedia:
        1. Is the boundary between the anterior and posterior lobes of the pituitary gland.
    8. Pituitary distalis:
        1. This is the portion where the majority of the hormone production occurs.
    9. It develops from a depression in the dorsal wall of the pharynx (stomal part) known as rathke's pouch. The pars intermediate is also considered as a separate intermediate lobe.

6. Neurohypophysis:
    1. The neurohypophysis or posterior gland comprises the posterior lobe of the pituitary gland and is part of the endcrine system.
    2. Despite the posterior pituitary gland is not a gland : rather it is largely a collection of axonal projection from the hypothalamus that terminate behind the anterior pituitary gland.
    3. The posterior pituitary consists mainly of neuronal projections (acons) extending from the suprotic and paraventricular nuclei of the hypothalamus.
    4. These axons release peptide hormones into the capillaries of the hypohyseal circulation.
    5. These are then stored in neurosecretory vesicles (herring bodies) before being secreted by the posterior pituitary into the system bloodstream
    6. The posterior pituitary are composed of two types:
        1. The pars nervosa, also called neural lobe or posterior libe, constitutes that majority posterior pituitory and is the storage site of oxytocin and vasopressin
        2. The infundibular stalk, also known as the infudibulum or pitutary stalk, bridges the hypothalmic and hypophyseal system.
    7. Hormones secreted by posterior gland are oxytocin and vasopressin. (Antidiuretic hormone ADH)

7. Hypothalamus:
    1. The hypothalamus is a small region of the rbain. It is located at base of the brain, near the pituitary gland. It play a important functions:
        1. releasing hormonse
        2. regulating body temperature
        3. maintaining daily physiological cycles
        4. controlling appetite
        5. managing of sexial behaviour
        6. regulating emotional responses
    2. Anatomy and functions:
        1. The hypothalamus has three main regions. Each one contains different nuclei. These are cluster of neurons that perform vital functinos, such as releasing hormones.
        2. Anterior regions:
            1. This area is also called the supraoptic region. Its major nuclei include the supraoptic and paraventricular nuclei.
            2. There are several other smaller nuclei in the anterior region as well. The nuclei in the anterior region are largely involved in the scretion of various hormones.
            3. Many of these hormones interact with the nearby pituitary gland to produce additional hormones
            4. Some of the important hormones produced in the anterior regions:
                1. Coritcotropin releasing hormone [CRH]: It involved in the body's response to both physical and emotional stress. It signal the pituitary gland to produce a hormone called adenocorticotropic hormone (ACTH). ACTH triggers the production of cortisol, an important stress hormone.
                2. Thyrotropin releasing hormone [TRH]: It production stimulates the pituitary gland to produce thyroid stimulating hormones (TSH). TSH plays important role in the function of many body parts such as the heart gastrointestinal tract and muscles
                3. Gonadotropin releasing hormone (GnRH): GnRH production causes the pituitary gland to produce important reproductive hormones such as follicles-stimulating hormone (FSH) and luteinizing hormone (LH)
                4. Oxytocin: Hormone that control many important emotions and behaviours.
                5. Vassopressing : Also called antidiuretic hormone [ADH], this hormone regulates water levels in the body. While vasopressin is released the vasopressin signals the kidneys to absorb water.
            5. The anterior regions of hypothalamus also helps regulate body temperature through sweat
            6. Middle region: This are is also called tuberal region. Its manjor nuclei are the ventromedial and arcuate nuclie the centromedial nucleus helps control appetite, while the arcuate nucleus is involved releasing growth-hormone (GHRH).
            7. It stimulates the pituitary gland for the growth & development of the body
            8. Posterior region: This area is also called mammillary region. The posterior hypo-thalamic nucleus and mammillary nuclei are its main nuclei.

8. Thyroid Gland:
    1. The thyroid is a butter fly-shaped gland that sits low on the front of the neck.
    2. Thyroid gland lies below the adams apple, along the front of the windpipe. The thyroid gland lies below the adam's apple, along the front of the windpipe.

3. The thyroid has two side lobe, connected by a bridge [isthmus] in the middle. It is brownish red in colour with rich blood vessels Nerves important for voice quality also pass through the thyroid.
4. The main hormone is thyroxine, also called T4 thyroid hormones act throughout the body. Influencing metabolism, growth and development and body temperature.
5. During infancy & childhood, adequate thyroid hormone is crucial for brain development
6. Thyroid conditions:
    1. Goitre
    2. Thyroiditis
    3. Hyperthyroidism
    4. Graves disease
    5. Thyroid Cancer
    6. Thyroid nodule
    7. Throid storm
7. Thyroid tests:
    1. Anti-TPO antibodies: In autoimmune thyroid disease, protein mistakenly attack the thyroid peroxidase enzymes, which is used by the thyroid to make throid hormones
    2. Thyroid ultrasound: A probe is placed on the skin of the neck, and reflected sound waves can detect abnormal areas of thyroid tissue
    3. Thyroid scan: A small amount of radioactive iodine is given by mouth to get images of the thyroid gland. Radioactive iodine is concentrated withing thyroid gland.
    4. Thyroid biopsy: A small amount of thyroid tissue is removed, usually to look for thyroid cancer. It is typically done with needle.
    5. Thyroid stimulating hormone (TSH): Secreted by the brain, TSH regulates thyroid hormone release. A blood test with high TSH indicates low levels of thyroid hormone (Hypothyroidism), and low TSH suggests hyperthyroidism.
    6. T3 and T4 (thyroixine): The primary forms of thyroid hormone, checked with a blood test.
    7. Thyroglobulins: A substance secreted by the thyroid that can be used as a marker of thyroid cancer. It is often measure during follow-up in patients with thyroid cancer.
    8. Other imagin cancer: If thyroid cancer has spread (metasized), tests such as CT scans MRI, PET scan can help identify the extent of spread.

9. Adrenal Glands:
    1. Adrenal glands also known as suprarenal glands are small, triangular-shaped glands located on trop of both kidneys. Adrenal glands produce hormones that help regulate the metabolism immune system, blood pressure, response to stress and other essential functions.
    2. Adrenal gland are composed of two parts:
        1. The cortex : Outer region and the largest part of the adrenal gland.
        2. It is divided into three zones:
            1. Zona glomerulose.
            2. Zona fasciculata.
            3. Zona reticularis.
        3. It is responsible for producing hormone

10. Medulla:
    1. It is located in the adrenal cortex in the center of an adrenal gland. It produces”stress-hormone” including adrenaline.
    2. When adrenal gland don’t produce enough hormones this can lead to adrenal insufficiency [Addison’s disease], Adrenal glands may develop nodules that can be benign or malignant which can potentially produces excessive amounts of certain hormones leading to various health issues

11. Hormones:
    1. The role of the adrenal glands in your body is to release certain hormones directly into the bloodstream.
    2. Both the cortex & medulla perform distinct and separate functions
    3. The key hormones produced by the adrenal cortex include:
        1. Cortisol: It is glucocorticoid hormone produced by the zona fasciculata that plays important roles in the body.
        2. Adrenal Insufficiency: Congenital adrenal hyperplasia, overactive adrenal glands, cushing syndrone, hyper aldosteronism, pheochromocytoma [Tumor], adrenal cancer.

12. Difestive glands:
    1. Digestive glands are those having ducts that pour secretions into the digestive system. An alimentary canal and digestive glands are parts of the human respiratory system. The verious parts of the alimentary canal include slaivary glands, The liver pancreas, gastric glands, the liver, pancrease, gastric gands and the intestinal gands.
    2. Out of these major glands are salivary glands, pancreas and liver

13. Functions of the digestive system:
    1. Salivary gland : It secretes salivary amylase enzyme which breaks starch into sugar molecules.
    2. Gastric Gland : It secretes hydrocholric acid [Hcl], pepsin enzymes, and musuc pepsin helps in the digestion of proteins while musuc helps in the protection of the inner lining of the stomach acid.
    3. Intestinal Gland : They secrete intestinal juice to break fat molecules and bile salt into simpler substances.
    4. Liver : It is an organ that secretes bile juice to break fat molecules
    5. Pancreas : An organ that secretes insulin hormone along with pancreatic huice that break proteins, fats molecules in the small intestine.

14. Liver gland: The liver is the largest solid organ and the largest gland in the human body.
    1. Structure : Weighing between 3.17 and 3.66 pounds, the liver is reddish brown wih a rutery texture. It is situated above and to the left of the stomach and below the lungs. The skin is the only organ heavier and larger than liver.
    2. The liver is roughly triangular and consists of two lobes: a larger right lobe and smaller left lobe. The lobes are separated by the falciform ligament, a band of tissue that keeps its anchored to the diaphragm.
    3. A layer of fibrous tissues called glisson’s capsule covers is further covered by the peritoneum, a membrane that forms the lining of the abdominal cavity. This helps liver to hold on place and protects it which physical damage.

15. Hormonal deficiency:
    1. Adrenal insufficiency:
        1. The adrenal gland releases little of hormones cortisol and sometimes, aldosterone.
        2. Symptoms include fatigue, stomach, upset skin, changes ad dehydration. Addison's disease is a type of adrenal insufficient
    2. Cushing's disease:
        1. Overproduction of a pituitary gland hormone leads to an overactive adrenal gland. A similar condition called cushings syndrome may occur in people, particularly children who take high doses of corticosteroid medications
    3. Gigantism (acromegaly)
        1. If the pituitary gland procedures too much growth hormone, a child's bone and body parts may grow abnormally fast.
        2. If growth hormone levels are too low, a child can stop growing in height
    4. Hyperthyroidism:
        1. The thyroid gland produces too much thyroid hormone, leading to wright loss, fast heart rate, sweating and nervousness.
        2. The most common couse for an overactive thyroid is an autimmune disorder called grave's disease.
    5. Hypopituitarism:
        1. The pituitary gland release little or no hormones.
        2. It may be caused by a number of different diseases. Women with this condition may stop getting their periods.
    6. Multiple endocrine neoplasia I and II:
        1. These rare, genetic conditions are passed down through families they cause tumors of the parathyroid, adrenal and thyroid glands, leading to overproduction of hormones:
    7. Polycystic ovary syndrome [PCOS]:
        1. Over production of androgens interfere with the development of eggs and their release from their release from the female ovaries.
        2. PCOS is a leading cause of infertility.