Chemical Coordination Cheat Sheet

by Abdul Manan (Abdul Manan) via cheatography.com/204478/cs/43601/

Terms

Certain chemicals are involved in communications,which are neurotransmitters,Pheromones & hormones

Neurotransmitters: Chemical messanger between neurons

Pheromones: Chemicals secreted by an organism in minute amounts to stimulate particular reaction from another organism of the same species.

Hormone(Gr.Hormon:Excite): chemical messenger that is secreted by specialized tissues called glands,that is transported in the blood stream.

3 primary chemical categories of hormones are:

1.Peptide and Protein hormones (short chain amino acid hormones and long chain amino acid hormones

Peptide hormones example ADH and Protein hormones example Growth hormone & Insulin

2.Amino acid derivate hormones
3.Steroid hormones

Hormones may be categorized as hydrophilic (polar) or protein nature hormones & lipophilic (non-polar) steroid and thyroid hormones.

Hypothalamus

Part of brain that contains clusters of specialized cells called neurosecretory cells

Hypothalamus (cont)

A set of neurosecretory cells in the hypothalamus exerts control over the anterior pituitary lobe by secreting 2 kinds of hormones into the blood releasing hormones make the anterior pituitary lobe to secrete its hormones

Inhibiting hormones from the hypothalamus make the anterior pituitary lobe stop secreting hormone.

Another set of neurosecretory cells produce 2 hormones ADH & Oxytocin which are stored and secreted from posterior pituitary glands

Releasing and inhibiting hormones of hypothalamus, TRH,CRH,GnRH,GHRH,GHIH,PIH,MIH.

Pituitary Gland

Also known as hypophysis,is a pea sized gland.

Consists of 2 distinct lobes or parts

1.Adenohypophysis: appears glandular & also called anterior pituitary lobe

2.Neurohypophysis: appears fibrous & also called posterior pituitary lobe

Anterior pituitary: independent endocrine gland.Produces at least 7 essential hormones.Several hormones of anterior pituitary are collectively termed as tropic hormones or tropin

1.ACTH: Stimulates the adrenal cortex to produce corticosteroids

Pituitary Gland (cont)

2.Melanocyte stimulating hormone (MSH): Stimulate the synthesis and dispersion of melanin pigment in the skin.

3.Growth hormone (GH) OR Somatotropic hormone (STH): The growth of muscles, bone and other tissues.

4.Prolactin: Stimulate the mammary glands to produce milk.

5.Thyroid Stimulating hormone (TSH): Stimulates thyroid gland to produce thyroxin.

6.Luteinizing hormone (LH): Stimulate gonads (testes/ovaries) for production of steroid hormone estrogen and progesterone from ovaries and testosterone from testes.

7.Follicle stimulating hormone (FSH): Stimulate development of ovarian follicles in females. In males it is required for the development of sperm. FSH and LH are called gonadotropins (GnTH) because they stimulate the activities of the male and female gonads.

Posterior pituitary gland: the hormones released from here are actually stored secretion of hypothalamus,ADH & Oxytocin

ADH literally means hormone that prevents urination helps prevent dehydration.

Pituitary Gland (cont)

Oxytocin has 2 physiological effects;it stimulates uterine contractions during labour & stimulates breast tissue contractions to promote lactation after childbirth.

Thyroid galnd

Located at the base of neck in front of tracheae.

Comprised of 2 lobes & isthmus that binds them together.

Produce 3 major hormones: T3,T4 or thyroxin & Calcitonin.

Thyroxin contains 4 atoms of iodine, secreted in greater amount but is less potent than T3.

Thyroxin release is stimulated by TSH from anterior pituitary,which in turn is stimulated by releasing hormone from hypothalamus TRH.

Excessive secretion of thyroid hormone known as hypothyroidism

Children born with hypothyroidism are stunted in their growth and suffer severe intellectual disability,a condition called cretinism

Shortage of thyroid hormones is an enlargement of thyroid called goiter.

Parathyroid gland

4 small glands attached to the back of thyroid gland.

Hormone produced by parathyroid is a peptide hormone called parathormone or parathyroid hormone

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Pancreas

Located adjacent to the stomach

Performs both endocrine and exocrine functions

Endocrine cells make up only 2% of the weight of the pancreas,rest of the organ is exocrine tissues

In 1869,a German medical student student named Paul Langerhans described some unusual clusters of cells scattered throughout the pancreas,these clusters came to be called Islets of Langerhans.

Clusters of endocrine cells that secrete 2 hormones directly into the circulatory system.

Each islet has a population of alpha cells,which secrete the peptide hormone glucogon.

Population of beta cells which secrete the peptide hormone insulin.

Insulin & Glucogon are antagonistic hormones that regulate the concentration of glucose in the blood.

Defect in insulin production,release or reception by target cells result in diabetes mellitus

Diabetes mellitus: condition in which blood glucose levels are high and fluctuate wildly with sugar intake.

Diabetes type -1: autoimmune disorder i-e the immune system attacks and destroys its own beta cells.

Diabetes type 2: Associated with genetic history,obesity,stress,lack of exercise and old age

Adrenal gland

Located just above each kidney

Each adrenal gland is composed to an inner portion,the adrenal medulla & an outer portion the adrenal cortex

Adrenal medulla: produce 2 hormones epinephrine (adrenaline) & nor epinephrine (nor adrenaline) in response to stress.

Adrenal cortex : all hormones from it are steroids and referred collectively as corticosteroids.

Many corticosteroids have been isolated from the adrenal cortex,the 3 main types are glucocorticoids such as cortisol,and the mineralocorticoids such as aldosterone & Androgen

Over secretion of cortisol cause Cushing's syndrome (Hypercortisolism)

Low secretions of adrenal cortex hormone cause Addison's disease

Aldosterone: helps to regulate mineral balance.

Androgen: sex hormone,similar to testosterone present in both male & female bodies.

Gonads

Produce and secrete 3 major categories of steroid hormones,a testosterone,estrogen & progesterone.

All 3 types are found in both males and females but in different proportions

Gonads (cont)

Testes: male gonads produce both sperm & male sex hormone.FSH stimulates Sertoli cells of testes to facilitate sperm development and LH stimulates Leydig cells of testes to release testosterone

Ovaries: female gonads,lie in the abdominal cavity produce both egg & female sex hormones.Ovaries secrete 2 lipophilic hormones estrogen & progesterone.

Feedback Mechanism

Chemical coordination or most of bodily functions are regulated by a series of complex feedback mechanism

Postive feedback mechanism: rare in endocrine system,when release of a hormone initiates action that leads to an additional release of that hormone.Example Oxytocin

Negative feedback mechanism: one way that endocrine system tries to keep homeostasis (stability) in the body.Example control of blood sugar(glucose) by insulin

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