Date:

ENDOCRINE SYSTEM

→ regulation of different functions inside our body through chemicals called hormones

→ hormones are produced inside the body (secreted) by endocrine glands (duct-less)

→ the hormones are directly poured into the blood for transport to their specific target-site

ENDOCRINE GLANDS:

1. Pituitary Gland
2. Thyroid Gland
3. Pancreas
4. Adrenal Gland
5. Gonads / Reproductive Glands (Ovary, Testis)

→ HORMONES
- substrate specific like enzymes
- protein nature / steroid nature
  - → recognized at level of c.m
  - → regulatory reactions must take place at level of cytoplasm
  - bc of its lipid nature it can pass through lipid layer of c.m
  - recognation takes place on nuclear membrane
  - reactions take place in nucleus

Protein : thyroxine, insulin, glucagon, glycogen, pituitary hormones

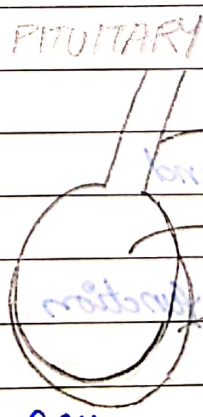
Steriod : estrogen (C-17), progestrone (C-20), testosterone (C-19)
- derivatives of cholestrol (C-20 chemical)

1. Pituitary Gland

→ major gland producing 9 hormones

→ present in fore brain

→ pea sized



i. Growth Hormone (GH)

→ general increase in size of the body

→ Disorders :
- Gigantism : over production of GH
- Dwarfism : less production of GH

DALMATIAN

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ii. Thyroid Stimulating Hormone (TSH)

→ target site is thyroid gland
→ regulates production of thyroid hormone
→ can increase or decrease production according to requirement

iii. Follicle Stimulating Hormone (FSH)

→ target site is Gonads
→ maturation of eggs in Ovaries
→ maturation of sperm cells in Testis

iv. Leutinizing Hormone (LH)

→ target site is Gonads
→ a process of release of eggs from the ovaries ⇒ Ovulation
→ regulates the production of (male sex hormone) testosterane/androgen in testis

v. Adrenal Cortex Stimulating Hormone (ACTH)

→ target site is Adrenal Gland
→ regulation of adrenal hormones

vi. Pro-lactin

→ female specific
→ works in pregnancy
→ target site is Mammary gland
→ production of milk
→ present in males but has no function

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vii. Oxytocin

→ target site is mammary gland + uterus

→ main function is muscle contraction

- in mammary gland : secretion of milk
- in uterus : labour (birth phase)

viii. Anti-Diuretic Hormone (ADH)

→ target site is kidneys (nephrone → loop of henley)

→ function is reabsorption of water towards blood

↑ ADH = ↑ reabsorption (concentrated urine)

↓ ADH = ↓ reabsorption (dilute urine)

Date:

2. Hypothelamus

→ only use the word secretion (nuero secretory cells) → can not be termed as endocrine
→ chemicals reach pituitary gland through ↑ b/c not poured directly into
→ regulates pituitary hormones blood

i. Growth Hormone Releasing Hormone (GHRH)

→ target site is anterior pituitary lobe
→ regulation of GH

ii. Thyroid Releasing Hormone (TRH)

→ target site is anterior pituitary lobe
→ regulates production of TSH

iii. Gonatotrophins Releasing Hormone (GRH)

→ target site is anterior lobe
→ regulates production of Gonads trophins + FSH/LH

iv. Pro-lactin Inhibiting Hormone (PIH)

→ Pro-lactin production is inhibited during normal lifespan
→ target site is posterior lobe
→ levels decrease during start of pregnancy and around 2 years after giving birth

3. Thyroid Gland

→ yellowish in colour
→ present along trachea tube
→ butterfly in shape
→ & produces thyroxine

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1. Thyroxine
→ has two derivatives → T_3, T_4
→ they require iodine (I_2) to form
→ target site is at tissue level all over the body
→ regulate metabolic rate
(rate of respiration that gives us energy)
(Cellular Respiration)

★ Disordered Conditions:

1. deficiency of iodine in diety
→ giving us less amount of throxyine
→ slightly inactive of thyroid gland
↳ Hypothyroidism
- less energy
- obesity
- lethargic condition
- physical inactivity

2. Hyperthyroidism
→ overactive thyroid gland
→ ↑ production of thyroxine than required
→ swelling and bulging out of thyroid gland : goiter
- more energy reserves are used up to meet the levels of metabolism
- lean condition
- hyper tensive

∴ can be tackled using more iodine in diet

Date:

Hypothelamus → Pituitary Gland → Thyroid Gland → Thyroxine

↓ TRH
↑ TRH
-ve

↓ TSH
↑ TRH

↓ Thyroxine
↑ Thyroxine
+ve

} According to our requirement

(negative feed back loop)

3. Pancreas

→ acessory organ present along the digestive track
→ whitish leaf like organ
→ has 2 parts : Exocrine : producing pancreatic juice
Endocrine → α cells = glucagon
→ β cells = insulin
(Islets of Langerhen)
} antagonistic pair

i. Glucagon

→ target site is liver
→ main function is to convert glycogen in liver to glycose and pour it into the blood → activated when fasting, starvation, glucose levels declining
→ inturn increases blood glucose levels

ii. Insulin

→ target site is ①. liver and ②. body cells/tissue level
→ picks the glucose from blood and convert it to glycogen and store it in the liver cells
→ allows glucose to move into the cells from blood at a faster rate (inhances the original process)
→ both these responses result in a decrease in level of blood glucose
→ is activated whenever there is extra glucose in blood, for eg: after meal when digestion is over

Date:

Glucose ↑ → Thyroxine can regulate metabolism rate → G·H works properly (cell division requires energy from m·r)

So G·H, Thyroxine & Glucagon + Insulin
Agonists

★ Disorders:

1. Diabetes Mellitus

→ ↑ blood glucose than normal
→ persistant high levels
→ this is a syndrome
  * ↑ blood glucose concentration + ↑ glucose in urine
  ↳ Type 1

Type 1 : IDDM (Insulin Dependant Diabetes Mellitus)
Type 2 : NIDDM (Non-Insulin Dependant Diabetes Mellitus)

→ IDDM is also known as Juvinell diabetes or early on-set diabetes
→ usually b/c of a genetic disorder
→ now, either the B cells are completely damaged
→ or, the insulin is present in a disordered copy (can't be utilised)
→ maximum glucose is converted to fats and is stored in form of adipose tissue
  • can result in obesity
→ it will increase the thickness of the blood and it will strike more to blood vessels giving us consistent hig B·P (will come at a later age)
  • rupturing of blood vessels is common and risk of thrombosis (formation of blood clots)
  • consistent risk of heart stroke and brain haemorrhage

* can be cured by taking Insulin in the form of injections or medicine, (normally used outside same)
* gene therapy will be a permanent cure, insert a normal part in place of the d/s part

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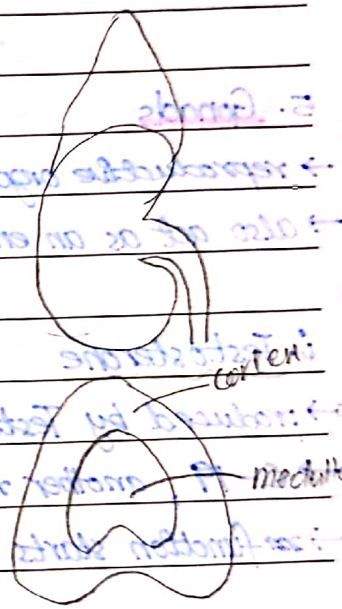
Type 2

→ individuals are producing insulin
→ but pancreas become weaker and can not meet up the requirement of insulin
• appears because of age or abnormal eating habits or less physical activity
→ consistent ↑ levels of glucose
→ also known as late or-set diabetes
→ usually above 40 years of age
→ not present in genes, not a genetic disorder
→ same risks, can be compatitively easily managed
* insulin uptake in form of medicine or injection, no genetherapy
* controlled diet & increased physical activity

4. Adrenal Glands

→ pair of whitish conical glands above each kidney
→ corten and medulla produce different types of hormones



i. Glucocorticoide

→ steroid hormone, from corten
→ function is to regulate the level of glucose in the blood

ii. Mineralocorticoide

→ steroid hormone, from corten
→ function is to regulate minerals like Na^+ and K^+

iii. Adrenaline

→ protein hormone, from medulla
→ functions take place in a sequence of events

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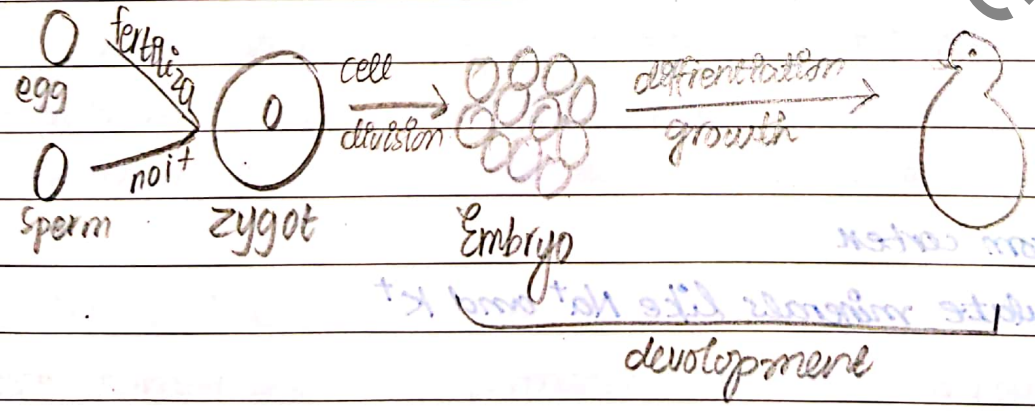
→ also known as emergency hormone
→ able to develop a fight or flight response (fear response)
→ ↑ Heart rate
↑ Breathing rate
↑ conversion of glycogen into glucose
↑ metabolic rate ⇒ ↑ production of energy
⊖ dilation of pupil to increase focus
⊖ Vasodilation to radiate metabolic heat out
⊖ hair erection and goose pimple

} FLIGHT RESPONSE CONSEQUENCES

5. Gonads
→ reproductive organs
→ Male – Testis → paired gland → lower abdominal region
→ Female – Ovary → paired gland
→ also act as an endocrine glands

i. Testosterone
→ produced by Testis
→ C-19, another name is ~~est~~ adrogens
→ ~~xx~~ function starts right after

growth + cell differentiation = development



→ If this zygote is destined to become a male
→ will give a signal to embryo to form a male reproductive system after 2 weeks of fertilisation

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→ male reproductive system's development is under the influence of testosterone in a very early embryonic life
→ 2nd week ↑
→ secondly, presence influences secondary sex characteristics at time of puberty
- deepening of voice / boardening of chest
- hair on face and body

13-14 years – end of life
Testosterone levels remain high

ii. Estrogen
→ also known as Estradiol or C-17
→ produced by ovaries
→ influences secondary sex charectaristics at time of puberty
11-12 years (average)
- boardening of pelvic bone
- more fat deposition in lower abdomen (thickening of layers)
- development of mammary gland

→ thickens the walls of uterus
↳ embryo completes its 9 months of development
- add on no. of cell layers

→ repair of walls of uterus
- when fertilization / pregnancy period is over the extra cells degrade
- to repair them menstrauation cydes

active progestrone & estrogen
estrogen
menstruation

iii. Progestrone
→ steroid hormone, produced by ovary
→ also called pregnancy hormone of C-20
→ progestrone supports the new cells, maintains them for about 2 weeks
→ just as levels of progestrone decline, menstruation begins

Date:

NERVOUS CO-ORDINATION	HORMONAL CO-ORDINATION
→ co-ordination through electrochemical change	→ only influenced by chemicals
→ specialized nervous cells are responsible for co-ordination	→ reaching target site through blood, transporting medium is blood
→ nervous response is much faster	→ slower response
→ not very long-lasting (shorter period of time)	→ hormonal level is always basal and there is gradual rise, constant for a span (requirement) of time and then there is a gradual decrease (effect is longer)(long-lasting)