ENDOCRINOLOGY

Enlist All Hormones Produced by Hypothalamus to control Anterior Pituatary Secretions?

(i) Growth Hormone releasing Hormone

(ii) Growth Hormone inhibiting Hormone

(iii) Gonadotropin releasing Hormone

(iv) Corticotropin releasing Hormone

(v) Thyrotropin releasing Hormone

(vi) Prolactin inhibiting Hormone.

Enumerate the Hormones involved in Blood sugar level Regulation?

Hyperglycemic:

(i) Glucagon

(ii) GH

(iii) ACTH

(iv) Cortisol

(v) Epinephrine

(vi) Estrogen

(vii) ADH

(viii) T_3 & T_4

Hypoglycemic:

(i) insulin

(ii) Somatomedin

(iii) Somatostatin

(iv) Drugs: sulfonylureas

Discuss Addison's disease in detail?

Addison Disease: It is a failure of Adrenal cortex to secrete Adrenocortical Hormones.

Causes:

(i) Primary Atrophy of Adrenal cortex due to Auto-immunity against Adrenal cortex

(ii) Tuberculosis destruction of Adrenal gland.

(iii) Failure of Ant. Pituitary to secrete ACTH

Features:

(i) **Mineralocorticoid Deficiency:** (i) Hyponatremia

(ii) Hyperkalemia

(iii) Acidosis

(iv) Shock

(ii) **Glucocorticoid Deficiency:**

(i) Depressed body metabolism

(ii) ↓ Gluconeogenesis → ↓ Glucose conc. b/w meals

(iii) **Melanin Pigmentation:**

(i) Melanin pigmentation in skin areas, Lips & nipples

Diagnose: → ↓ Urinary secretion of steroid.

Treatment: By small quantity of Fludrocortisone & Cortisol (Glucocorticoids & Mineralocorticoid) Person can live.

Female was brought in State of unconciousness with Deep and rapid breathing. There was Fruity Smell in her breath. PH = >7.0 ↑ Plasma insulin level

Diagnosis:

Diabetic Coma

What is Switching b/w CHO & lipid Metabolism:

Insulin promotes utilization of CHO for energy & Depress utilization of fat.

Conversal lack of insulin causes Fat utilization mainly to the exclusion of Glucose utilization Except Brain tissue.

How it is compensated:

Rapid & Deep breathing which causes ↑ expiration of CO_2. This mechanism Buffer the acidosis

Kidney compensate by ↓ Bicarbonate excretion and generate new Bicarbonate that is added back to ECF.

A 50 year old obese woman came to Hospital, She presented History OF waking up at night to Pass Urine & Complaining she is loosing weight inspite of taking large amount OF Food on lab. Blood sugar level ↑ upto 200 mg%

Diagnosis:

→ Type II Diabetes Mellitus

What other Test you will advise to Patient:

→ Glucose Tolerance Test

Complications may occur:

(i) ↑ Plasma glucose level

(ii) ↑ Plasma insulin level

(iii) insulin sensitivity reduced

(iv) Body mass obese

(v) ↑ Plasma glucagon.

Aleena 30 year old lady came and told extraordinarily Enlargment of Hands & feet From last 4 month. Blood Exam. revealed Hyperglycemia & Brain acidophilic tumer in Ant. Pituity.

Diagnose: acromegaly

Pathophysiology: Hyperpituitrism after Puberty (after Fusion OF epiphyses of long bone) Person cannot grow taller So only soft tissues grow.

→ Hepatomegaly
→ Tongue enlarged
→ Enlargment of Thymus

Write down Steps of Synthesis of Thyroid Hormone

(A) **Iodide Trapping**: Active transport of iodide from ECF into thyroid follicular cell and then into Follicle is called iodide Trapping.

(B) **Formation and Secretion of Thyroglobulin**:

ER & Golgi Appiatus of thyroid Follicular Cells Synthesize and Secrete into Follicles a glycoprotein called thyroglobulin, containing 70 amino acid residues. T_3 & T_4 is Formed.

(C) **Oxidation of iodide**:

Removal of electron.

Iodide is oxidized into Iodine in thyroid Follicle. This process is accelerated by Peroxidase & Hydrogen peroxide.

(d) **Iodination of Tyrosine**: In this process iodine Combine with Tyrosine of thyroglobulin and Forms thyroid metabolic Hormone T_3 & T_4 by Enzyme iodinase.

- Tyrosine + I_2 ⟶ Mono-ido tyrosine
- MIT + I_2 ⟶ Di-iodo Tyrosine
- MIT + DIT ⟶ Tri-iodo Thyronine
- DIT + DIT ⟶ Tetra-Iodo thyronine

Describe Effect of Thyroid Hormone on Growth regarding Carbohydrate & Fat metabolism?

Effect on CHO Metabolism:

- ↑ Glucose Absorption from GIT
- ↑ Peripheral Utilization of Glucose
- ↑ Glycolysis in Liver
- ↑ Gluconeogenesis
- ↑ Uptake of Glucose by cells

Effect on Fat metabolism:

- ↑ mobilization of lipids from their sources
- ↑ oxidation of free Fatty acids

Decrease Cholestrol, Phospholipids & Triglycerides level of blood.

What is Reverse T_3 ?

Reverse T_3 is an isomer of triiodothyronine.

Reverse T_3 is Third-most Common iodothyronine the thyroid gland releases into bloodstream, of which 0.9% is rT_3. Tetraiodothyronin is 90% & T_3 is 9%.

It is a byproduct of thyroid Hormone metabolism

Revers T_3 is elevated in sick euthyroid syndrome.

Discuss the role of insulin in Carbohydrates and Protein metabolism?

Carbohydrate metabolism:

(i) ↑ Utilization of Glucose for energy

(ii) Inhibit Gluconeogenesis in liver

(iii) ↑ Glycogen storage in cells

(iv) It increase Conversion of Glucose into Fat & stored in Adipose tissue

(v) Promote glycogen synthesis by activating Glycogen Synthesize.

Protein Metabolism:

(i) ↑ Protein synthesis, so overall ↑ muscle mass

(ii) ↑ active transport of amino Acid into cell

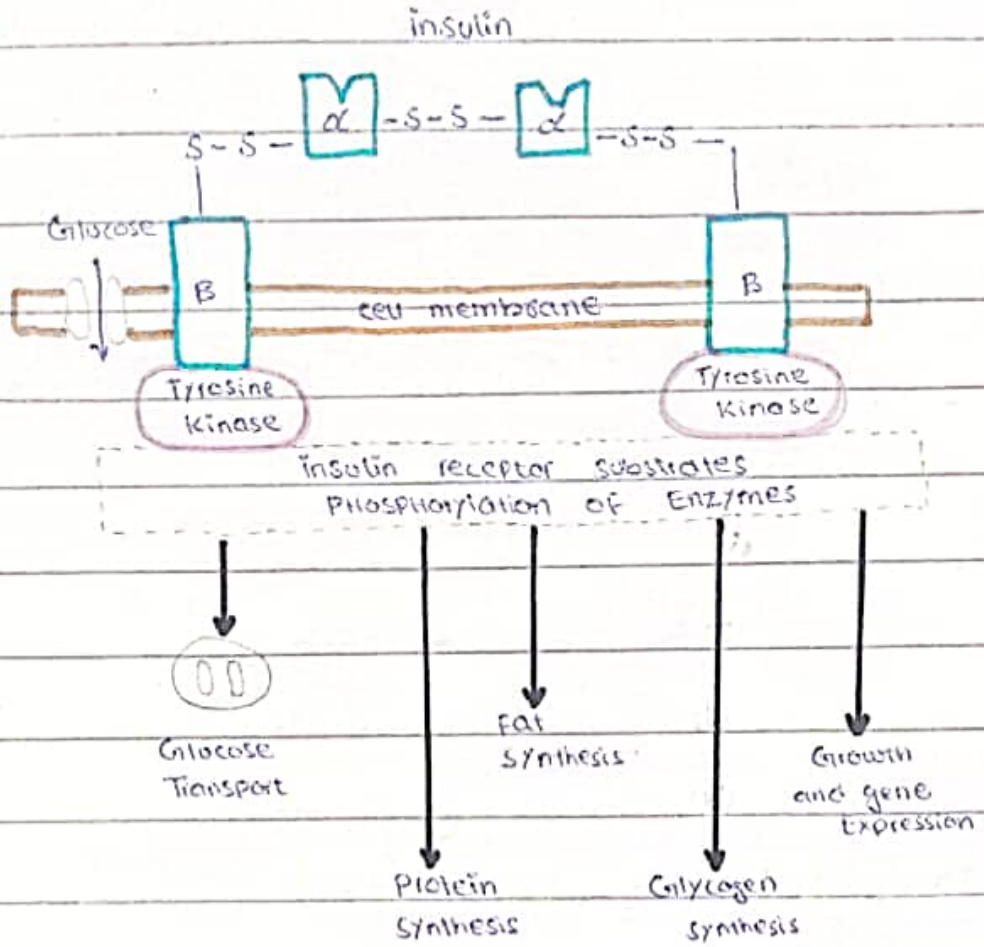
(iii) Inhibit protein catabolism

(iv) Inhibit Gluconeogenesis from Amino Acid

(v) Promote transcription of DNA in nucleus to Form mRNA

(vi) Promote translation of mRNA in ribosomes to form new protein

Diagrametically show events occuring after insulin bind to receptor on target tissue ?



Compare & Contrast Pituitary DM with Adrenal DM:

Pituatory DM	Adrenal DM
(i) Due to ↑ GTH / All anterior pituatory Hormone. ↑ Blood Glucose level.	(i) Blood glucose level is ↑ Due to ↑ Gluconeogenesis & ↓ Glucose utilization.
(ii) Not sensitive to insulin	(ii) Sensitive to insulin
(iii) Not affected by insulin injection	(iii) Affected by insulin injection
(iv) Glucose utilization is ↓	(iv) Glucose utilization is ↓

Difference b/w Cushing Disease & Syndrome?

Cushing Disease: It is caused by excessive Secretion of ACTH. by Basophilic Adenoma of Ant. Pituatiry gland.

Cushing Syndrome: It is caused by excessive Secretion of Cortisol by Adrenal cortex tumor.

Features:

(i) Moon Like Face

(ii) Fat on the Neck

(iii) ↑ Blood Glucose level

(iv) Masculinizing Effect

Enlist the Following Hormones?

Ant. Pituitary	Post. Pituitary	Placenta	Pancreas
(i) GH	(i) ADH	(i) HCG	(i) insulin → B-cell
(ii) LH	(ii) oxytocin	(ii) Somatommatropin	(ii) Glucagon → α-cell
(iii) Prolactin		(iii) Estrogen	
(iv) ACTH		(iv) Progesterone.	
(v) FSH			
(vi) TSH			

Normal value of Serum Calcium ?

9.8 mg/l

Features of Tetany: A condition marked by intermittent muscular spasm, caused by malfunction of parathyroid gland and a Deficiency of Ca^{++}.

If Serum calcium level is below

> 6mg/100ml caused Tetany.

(i) Numbness & tingling of Extremities

(ii) Feeling of Stiffness in Hand & Feet

(iii) Cramps in Extremities

(iv) laryngeal stridor

(v) Facial irritability / Chvostek sign

(vi) impaired blood clotting.

Treatment: → I/v calcium

→ oral calcium + vitamin D

→ Surgical removal of parathyroid gland.

Features of Hypocalcaemia:

Confusion or memory loss

Depression

weakness of nails

Muscle Cramp

Hallucination

Easy Fraturing of Bone

Patient is Feeling nervousness and his sleep is reduced. He has Palpitation and intolerance to Hea sweating en Hands. ↑ appetite and reduced body weight. There was protrusion of Eyeball, Heart rate ↑ & BP was raised.

Diagnose:

Grave's Disease (Hyperthyroidism)

Pathophysiology:

localized Adenoma in thyroid gland.

↑ Secretion OF T_3 & T_4.

Iodine Test

BMR measurment Test

Write down Pathophysiology and Features of Grave's Disease?

This is the commonest cause of Hyperthyroidism.

Pathophysiology: It is Autoimmune process in which serum IgG Antibodies bind to TSH receptor & produce

↓

Stimulation of thyroid hormone production Behiving like TSH.

The antibodies are known as thyroid Stimulating immunoglobulin.

Causes:

localized Adenoma in thyroid gland.

Symptoms:

(i) Protrusion of Eyeballs
(ii) ↓ Body weight
(iii) ↑ Hair Growth
(iv) ↓ Tolerance to Heat
(v) ↑ GIT motility
(vi) CNS :- → Psychic disorder
→ Nervousness
(vii) CVS :- → ↑ C.O
→ Hypertension

Treatment: → Surgical removal of thyroid gland
→ Radioactive Iodine destroy secretory cells.

SCENARIOS

40 year male calls on his family physician complaining of fatigued, decreased libido & impotence over past 2 years. Physical Examination reveals Hypotension, Pallor, Small testes, loss of axillary Hair, dry Skin, Laboratory result reveals low Na^+, FSH, TSH, T3 & T4, LH, ACTH.

What is your diagnose:

Pan-hypopituitrism

What is Hypothalamic-Hypophysial Portal System?

Cappilaries in median Portion / eminence
(lower portion of Hypothalamus)
↓
Forms Hypophysial-Hypothalamic portal System
↓
Enter anterior pituitary sinuses
↓
This is called Hypophysial-Hypothalamic Portal System

It carries Hypothalamic releasing & inhibitory Hormones.

Hormones secreted From Hypothalamus:

Growth Hormone releasing Hormone

Growth Hormone inhibitory Hormone

Thyrotropin-releasing Hormone

Corticotropin-releasing Hormone

Gonadotropin-releasing Hormone

Prolactin-inhibitory Hormone.

Addisonian Crisis ?

Critical need of Extra Glucocorticoids in Severe dibility in time of Stress is termed as addisonian crisis.

Compare dwarfism due to Hypopituitrism with that due to cretinism ?

Dwarfism

Pituitary Disorder Characterized by Stunt growth in Childiens.

Causes:

↓ GH secretion in infant or early Childhood due to

(i) Chromophobes Tumor
(ii) Deficiency of somatomdin C
(iii) Pan Hypopitutrism
(iv) Atrophy of Acidophilic cell in Ant. pituatry

Features:

(i) Short Stature
(ii) Dispropotionate growth in different body Parts.

Cretinism

Due to Deficiency of thyroid Hormone which Cause dwarfism and mental retardation.

Causes:

(i) Due to deficency of iodine in our body
(ii) Due to congenital absence of thyroid gland
(iii) low iodine diet.

Features:

(i) impairment in body Growth & mental retardation.

(iii) Facial features may affected
Head may enlarged

(iv) May caus intellectual disability

(v) Sexual development
Delayed reproduction affect

Treatment:

→ Hormone replacement in childhood
→ Medicine
→ May surgery is performed

Dwarfism

(i) Deficiency of Ant. Pituitary Secretion
(ii) Abnormality of GH secretion
(iii) Growth in appropriate manner but decrease
(iv) Symptoms appear earlier
(v) NO mental retardation

(ii) Swelling of Skin & loss of Hairs

(iii) Thoughts & reflexes Slower

(iv) Enlarge Tongue may obstruct air passage way

(v) Sluggish body movement.

(vi) Bone maturation & puberty Delayed

Treatment:

→ By including Proper amount of iodine in diet

Creatinism

(i) Caused by Extreme Hypothyroidism in childrens
(ii) lack of I_2
(iii) Skin thick
(iv) Symptoms appear within 6 mon
(v) Mental retardation
(vi) inappropriate growth pattern
(vii) Face bloated.

List the Hormones of Adrenal gland?

Adrenal gland is divided into 3 Layers.

(i) Zona Glomerulosa:

This is the outer most zone secrete the "Mineralocorticoid".

(i) Aldosterone

(ii) Desoxycorticosterone

Na^+, K^+ and water Homeostasis.

(ii) Zona Fasciculata:

This is the middle zone secreting the "Glucocorticoids"

(i) Cortisol

(ii) Corticosterol

(iii) corticosterone

Glucose homeostasis and many other

(iii) Zona Reticularis:

This is the innermost zone secreting Sex Hormon

(i) Androgens — Testosterone, ~~Progesterone~~ Androstendione

Medulla (i) Catecholamines

(ii) Epinephrine

(iii) Nor-Epinephrine