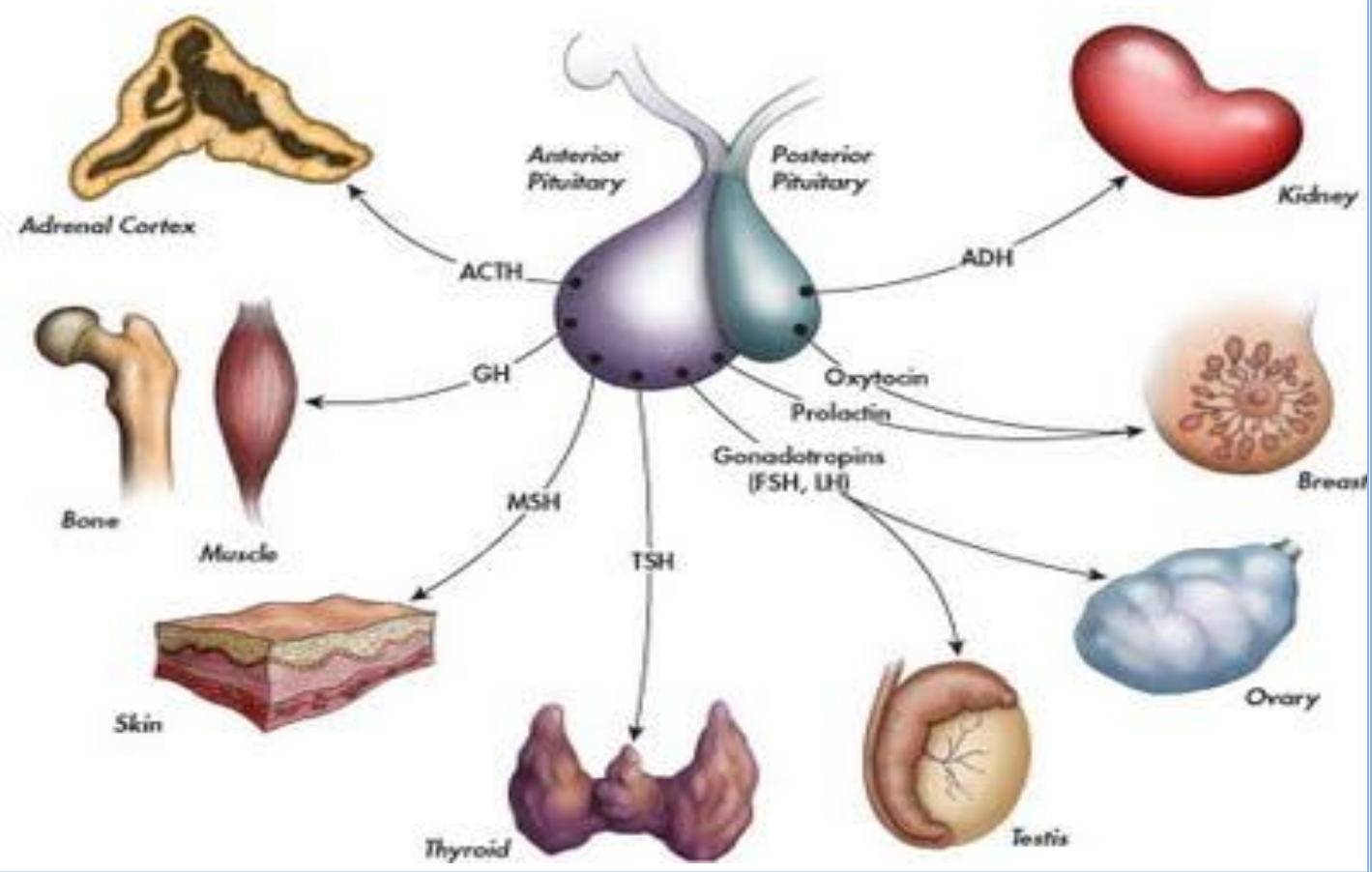
Endocrine Block

5th Lecture

Diabetes Insipidus



PHYSIOLOGY TEAM – 430

Physiology Team Leaders:

Al-Waleed Al-Johar Layan Akkielah

This Lecture is done by:

Hadeel Al-Sajjan

Organized by : Hadeel Al-Sajjan

• Diabetes insipidus (DI) is a condition where the person:

- passes large amounts of urine (polyuria)
- Feels thirsty most of the time
- Drinks excessive amounts of water (polydipsia)

DI is a disorder resulting from deficiency of anti-diuretic hormone (ADH) or its action and is characterized by the passage of copious amounts of dilute urine.

• Polydipsia:

It differs from diabetes mellitus in that

- Urine is dilute
- Urine does not contain sugar (no glycosuria)
- Blood sugar is normal
- Reduction of fluid intake does not change urine concentration

• Types of Diabetes Insipidus:

Mainly 2 types :

- Cranial DI (The commonest) : due to vasopressin (ADH) deficiency → defect in the posterior pituitary gland . (The defect can also be in the Hypothalamus or Pituitary stalk)
- Nephrogenic DI : there is enough ADH is being but the kidney fails to respond to it → defect in the kidney.

• Other conditions that also manifest polydipsia and should not be confused with DI are:

- Psychogenic Polydipsia (Physiological ADH inhibition)
- Diabetes mellitus

Causes of (Central) Cranial DI

-Brain tumors or metastasis → Lung cancer, leukemia, lymphoma most common
-Infections → meningitis, encephalitis
-Head trauma
-Post-neurosurgery
-Idiopathic – 30-50% → Pituitary atrophy, possible autoimmune
-Congenital → Mutations of ADH gene, usually autosomal dominant
-Infiltrative diseases → such as Histiocytosis X or sarcoidosis

• Central (Cranial) Diabetes Insipidus:

- This is the most common type of DI
- It is due to Vasopressin deficiency
- Caused by damage to the Hypothalamus or Pituitary Gland, e.g., by tumor , infection, head injury or cranial surgery

• Features:

- Patient is thirsty, lethargic & irritable .
- Patient passes large amounts of urine (polyuria) and needs to go to the toilet (to urinate) frequently.
- Urine is dilute (has very low Specific Gravity) & does not contain sugar

Causes of Nephrogenic DI (Acquired)

-Drugs → lithium, amphotericin, gentamicin, loop diuretics
-Electrolyte disorders: hypercalcemia, hypokalemia
-Renal disaeases → obstructive uropathy, chronic renal failer , polysystic kidney, post-transplant, pyelonephritis
-Systemic processes → sarcoid, amyloid, multiple myeloma, sickle cell disease,
-pregnancy

Causes of Nephrogenic DI (Congenital rare)

-Present in 1st week of life
-V2 ADH receptor defect – X-linked recessive
-AQP2 water channel defect – will respond to ADH

• Symptoms and signs of DI:

Polyuria > 3 liters in 24 hrs (Sudden onset more typical of central DI) .. Nocturia .. *Polydipsia *Dilute urine, urine osm < 200 .. * Anorexia, constipation .. *Serum Na > 150 rare if free access to H2o *Dehydration (Dry mouth, Muscle weakness, Hypotension, Sunken eyes) .. * Hyperthermia & lack of sweating .. * Rapid heart rate .. *Weight loss .. Electrolyte imbalance (Hypernatremia, Hyperchloremia) *Headache, Fatigue, Irritibility (Due to the electrolyte imbalance) .. *Seizure secondary to hypernatremia

• Signs of hypovlemia (decreased ECF volume) & dehydration such as:

- poor skin turgor & dryness of the skin & mucous membranes
- small (weak) , rapid pulse (tachycardia) , & hypotension (fall in BP) .
- Haemoconcentartion & increased plasma osmolarity .
- Increased body temperature & hyperthermia if treatment is delayed.

- If we decrease the patient's water intake, his urine output does not decrease → this proves that the patient cannot produce ADH in response to decreased ECF volume.
- If left untreated, diabetes insipidus can result in severe dehydration, shock and death.

• Management

- Strict measurement & recording of fluid intake & urine output + urine specific gravity & testing and osmolarity testing hourly in the early stages
- Recording the pulse and BP hourly in the early stages , to detect early any signs of shock
- Vasopressin test → If desired , Vasopressin can be injected subcutaneously → if urine output decreases → this is not nephrogenic DI
- Pitressin (aqueous vasopressin) can be used for treatment

Desmopressin → Drug of choice in Diabetes Insipidus

• Psychogenic Polydipsia :

- In this condition the person has psychologic urge (strong desire) to drink much water though he doesn't need it .
- He has normal ADH l secretion & normal kidney response to ADH , but the patient has psychiatric disturbance that produces urges to drink large amounts of water .
- Urine has large volume & is dilute
- However, if you deprive this person of water → urine volume decreases & urine osmolarity increases (urine becomes more concentrated)
- Subject shows normal response to water restriction