

electrolytes :- معيونة على الحفاظ على Volume لا blood عشانه مت كد

الحاء يدخل للخلايا أو يخرج لبرا عشانه هيك في عندي balance

بيت الحاء وال electrdytle .. كمان بتخاف على acid-base

balance

ومعيلات ال Metabolism

ELECTROLYTES

are ions capable of carrying an electric charge (cations or anions)

The dietary requirements for electrolytes vary widely; some need to be Consumed only in small amounts.

Others, such as calcium, potassium and Phosphorus, are excreted continuously and must be ingested

regularly to Prevent deficiency

They are involved in many processes:

- ☐ Volume and osmotic pressure (Na, K, Cl) ✓
- ☐ Myocardial rhythm and contractility (K, Mg, Ca)
- ☐ Cofactors in enzyme activation (Mg, Ca, Zn)
- ☐ Regulation of ATPase ion pump (Mg)
- ☐ Acid-base balance (HCO_3 , K, Cl)
- ☐ Blood coagulation (Ca, Mg)
- ☐ Neuromuscular excitability (K, Ca, Mg)
- ☐ Production and use of ATP from glucose (Mg, PO_4)

WATER

كمية الماء بالجسم لحوزة 70kg هي 42L وفي تقسم لأجزاء هي: extra, intra

□ In a 70-kg man, the total body water is about 42L (60%), ICF(28L) and ECF (14 L, plasma (3.5 L) and interstitial fluid (10.5L))

□ Daily water intake is 1.5-2L

□ Women have lower water content than men (more fat)

□ Importance of water in human body:

□ Transport nutrient to the cells → glucose, amino acid

□ Determine cell volume by its transport into and out of cells

□ Remove waste products (urine) الماء بشلل الفضلات

□ Body coolant (sweating) → بالعرق

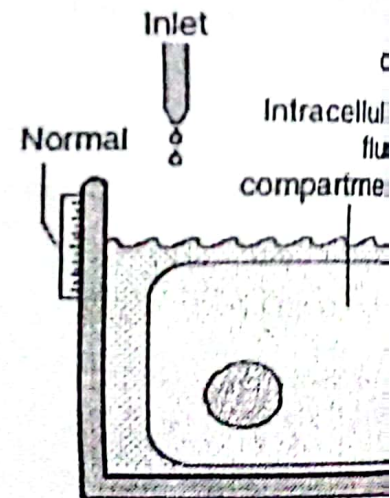


Fig 6.2 Water tank model compartments.

WATER

→ لازم زي ما حكينا يكون حتمي *water balance* بين *water* ، *electrolyte* ... لحا نخليها *hypernatremia* هي عبارة عن نقصان بلكا، أو زيادة بالهيدروجين ...

- ☐ The concentration of ions inside the cells and in plasma is maintained by passive diffusion and active transport through ATPase-dependent ion pump carrier لكن الحـ ... يعني ... يعني ...
- ☐ Most biological membranes are permeable to water but not ions

☐ Water and sodium output →

☐ Kidneys and gastrointestinal tract

☐ Sweat and expired air: about 1L daily

☐ Factors that affect the flow of water across the membrane ^{بـ ...} *osmotic pressure*

☐ Ions and proteins at one side of the membrane

☐ Blood pressure → *BP* ^{بـ ...}

لما نخلي إندو الواحد صار عند *hypotonic* بنحكي إندو الماء زاد
بالدم ... دهونه ما يطالع Na^+ من الداخل للخارج لاهو يدخل الماء للداخل
حتى يقدر الشفط

CONTROL OF WATER BALANCE

نظم في كم شرب ماء - كمية اخرج الماء -

- Both intake and loss of water are controlled by osmotic gradient across cell membrane in the brain hypothalamic osmoreceptor centre
الحالة اذا زادت Na^+ ينقل osm ... لكن الماء اذا قل ينزى $osmo$
- These centres control thirst and secretion of antidiuretic hormone (ADH)=AVP (arginine vasopressin hormone)
هاد في حالة قلعة الماء - مع تزيد مراكم -

Thirst is the major defense mechanism against hyperosmolality and hypernatremia

Antidiuretic hormone: →

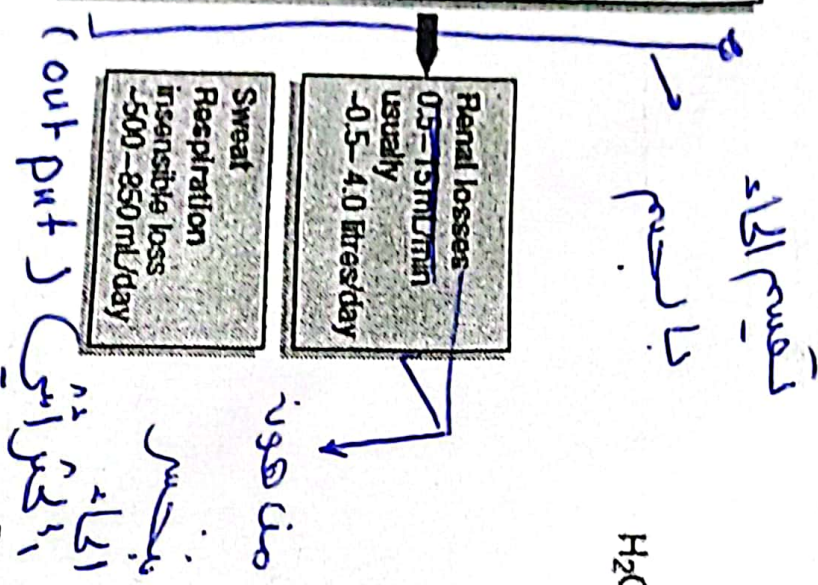
بناظر على الماء - الماء عندى
بالكم بار بالهر بكونه مدمر جد مراكز العطش

- Is polypeptide with $t_{1/2}$ of 20 min
- Synthesized by the hypothalamus and secreted by the posterior pituitary → بنغز من هوه
- 2% increase in osmolality lead to 4 times increase in ADH
- Low blood pressure and severe hypovolemia stimulate ADH release
- Stress due to vomiting, nausea and pain may increase ADH secretion
- ADH act by increasing the reabsorption of water in cortical and medullary collecting tubules

لـ برجع على هادي الماء - tube بـزيد الماء - من دون

الاصور ديوم ، المناس الذي يتعرفن للحوادث ما عندى

هاد الهدر مودنه اذا كان 15 بأمكن تصنيعه وبالحالي لازم يترى
ماء كثير -



20

ADH $\rightarrow$ osmolarity $\downarrow$

Σ 6
* 6 *

3

2. 40

د جلال صاحب

5

ngly likely example of the effectiveness of thirst in preventing dehydratio

□ A patient with diabetes insipidus (no ADH) may excrete 10 L of urine daily, but as w:

OSMOLALITY

← osmolality ... urea , glucose, sodium

Physical property based on the conc. of solutes (in mmol) per kg of solvent (w/w). This affect different properties of solution as:

- Freezing point depression sodium, urea, glucose, Calculated (Major) ...
- Vapor pressure decrease

Increase in osmolality will induce secretion of ADH enzyme while decrease in osmolality will lead to turning off ADH secretion

- Osmolal gap is the difference between the measured osmolality and the calculated osmolality
- Osmolal gap indirectly indicates the presence of osmotically active substances other than sodium, urea, or glucose, such as ethanol, methanol, ethylene glycol, lactate, or β -hydroxybutyrate.

في خرق سنالقيانو Major اننا نشتك كالكوليد لكن
ار Calculated ... سنالقيانو ... تكون في خرق بالرقم
لكن مايزيد (5-10) ... اذا زاد ... يكون في اشتباه

دما نخس مثل Ketoadidosis ...

بقيس بالاعتقاد على Free من خلال مثل الملاح مبدى
عليه ملح عتامة نذود ... فتلك Free

SIGNIFICANCE OF OSMOLALITY

Concent
العقدية
وبقيس
درجتها الاساسية

التي ...

DETERMINATION OF OSMOLALITY

Urine , Serum ... osmolality

□ Osmolality may be measured in serum or urine.

Coagulated Plasma can

osmotic activity

□ Plasma use is not recommended because osmotically active substances may be introduced into the specimen from the anticoagulant.

□ Samples must be free of particulate matter to obtain accurate results.

بعض الحويصلات
بعض الحويصلات

□ Turbid serum and urine samples should be centrifuged before analysis

measured and this is compared to the calculated value as double of serum sodium according to the following 2 formulas:

$$2\text{Na} + \frac{\text{Glucose (mg/dl)}}{20} + \frac{\text{BUN (mg/dl)}}{3}$$

$$1.85 \text{ Na} + \frac{\text{Glucose}}{18} + \frac{\text{BUN}}{2.8} + 9 \quad (\text{Eq 15-1})$$

glucose
BUN T ,
180 140 P 900000
مريضه

gap 50 (280) - Eugene Major

$$\text{Majority} = (1.86 \times 1140) + \left(\frac{120}{18} \right) + \frac{7}{2.8} + a$$

~~SECRET~~

www.mmaoff.co.uk