

The background of the slide is a light gray gradient. It is decorated with numerous water droplets of various sizes. Some droplets are large and prominent, while others are small and subtle. They are scattered across the slide, with a higher concentration in the top-left and bottom-right corners. The droplets have a realistic appearance with highlights and shadows, giving them a three-dimensional look.

DIURETICE

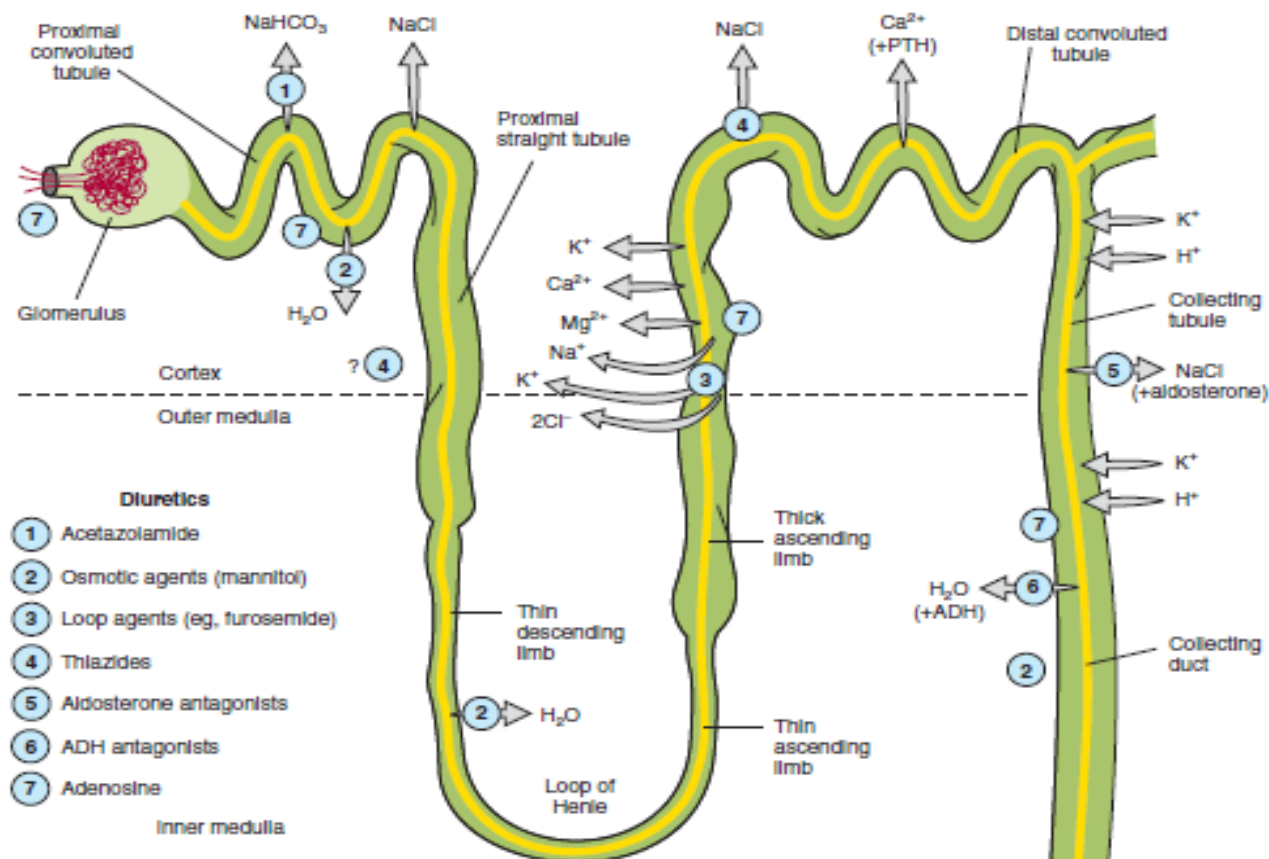


FIGURE 15-1 Tubule transport systems and sites of action of diuretics. ADH, antidiuretic hormone; PTH, parathyroid hormone.

TABLE 15-1 Major segments of the nephron and their functions.

DIURETICE

- **STIMULAREA DIUREZEI ($\uparrow$ CRESTEREA EXCRETIEI DE NA SI H₂O)**
- **FOLOSITE CA ANTIHIPERTENSIVE, REDUCEREA EDEMELORE, ETC.**

DIURETICE

I. DIURETICE DE ANSA

- cele mai potente
- act. la nivelul portiunii ascende a ansei Henle

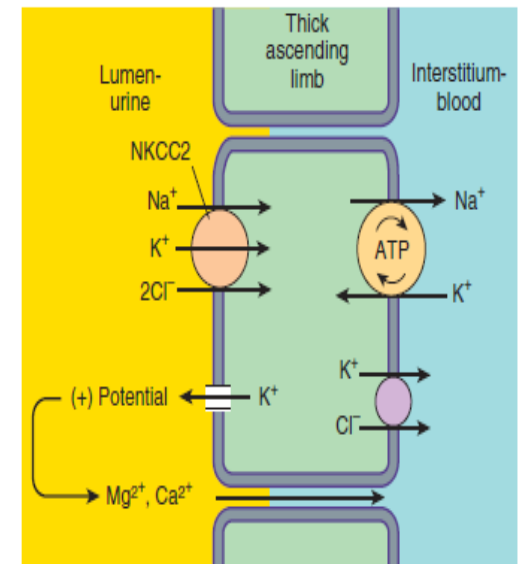


FIGURE 15-3 Ion transport pathways across the luminal and basolateral membranes of the thick ascending limb cell. The lumen positive electrical potential created by K^+ back diffusion drives divalent (and monovalent) cation reabsorption via the paracellular pathway. NKCC2 is the primary transporter in the luminal membrane.

DIURETICE DE ANSA

→diureticele de ansa **blocheaza** co-transportorul
→25% din Na filtrat glomerular ramane neabsorbit,
impreuna cu un echivalent de apa =>cantitati
importante de K, Mg si Ca raman neabs.→
dezechilibre electrolitice!

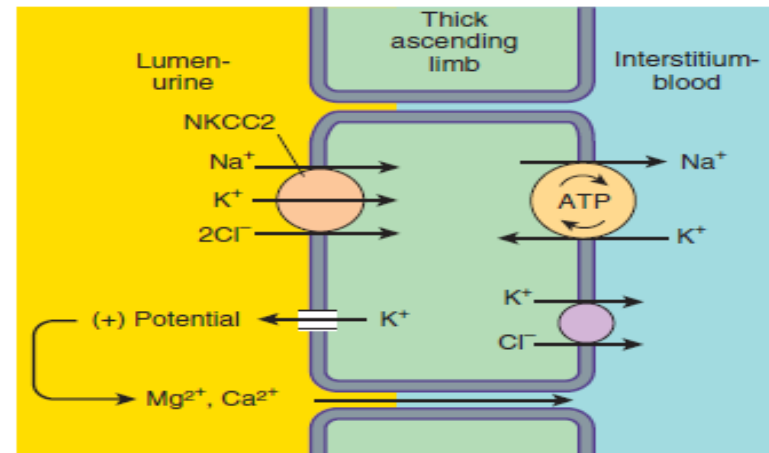


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DIURETICE DE ANSA

Indicatii:

- **Edemul pulmonar acut**
- **Insuficienta renala acuta**
- **Criza hipertensiva**
- Hipercalcemie
- Hiperkaliemie
- Edeme
- Tratamentul cronic al HTA

DIURETICE DE ANSA

Interactiuni: AINS, in special indometacin, ↓ efectul, probabil prin ↓filtratului glomerular

!!! singurele diuretice al caror efect este direct proportional cu doza!

Fc: absorbtie digestive buna, metabolizare hepatica, eliminare renala, sub forma de metaboliti inactivi

Efecte adverse:

→ ↓Na, K, Mg

→ ↓K → aritmii

→ ototoxicitate, de obicei reversibila

DIURETICE DE ANSA

EFECTE ADVERSE:

- alcaloza sistemică
- hiperuricemie
- rr alergice
- deshidratare, hipovolemie, hTA ortostatică
- cresc calciuria

Precautii: ciroza hepatică avansată, insuficiență cardiacă avansată, insuficiență renală stadiile 3, 4

DIURETICE DE ANSA

Reprezentanti:

→ **Furosemid:** cpr 40mg; fiole 20mg

-efect in 3-15 minute dupa inj iv, max in 15-30 min, durata 2-5 ore

-oral: efect in 20-60 minute, max 2-3 ore, durata 4-6 ore, maximum 240mg/zi

Indicatii: ca diuretic, in toate tipurile de edeme, inclusiv in urgente-edem cerebral, edem pulmonar acut

-insuf. renala acuta cu oligurie

-ca antihipertensiv, inclusive in crize

DIURETICE DE ANSA

Exemplu prescriptie:

Dg: Criza hipertensiva

Rp/Furosemid 0.04g

Fiole V

DS inj iv, 1 fiola, repetata la nevoie

II. DIURETICE TIAZIDE

-blocheaza reabsorbția de Na la nivelul TCD, prin blocarea transportorului Na/Cl

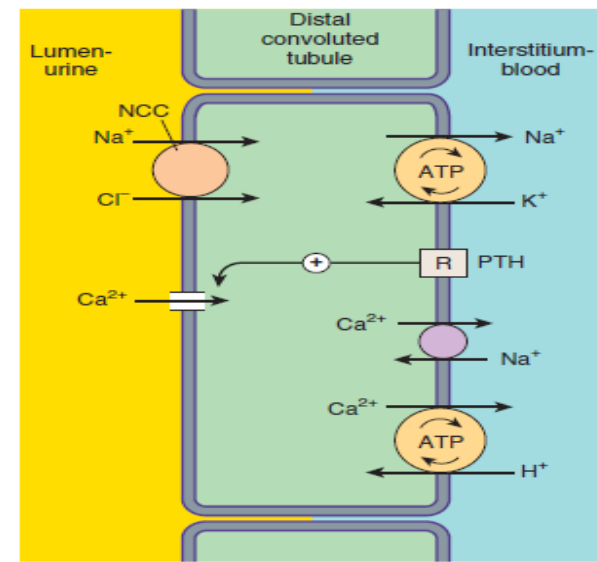


FIGURE 15-4 Ion transport pathways across the luminal and basolateral membranes of the distal convoluted tubule cell. As in all tubular cells, Na⁺/K⁺ ATPase is present in the basolateral membrane. NCC is the primary sodium and chloride transporter in the luminal membrane. (R, parathyroid hormone [PTH] receptor.)

-spre deosebire de diureticele de ansa, ↑ reabsorbția de Ca: la nivelul TCP, secundar depletiei volemice, produc reabs. activa de Na si pasiva de Ca, iar la nivelul TCD → schimb Na/Ca

→ ↑ calcemiei este rar semnificativa clinic, dar poate evidentia hipercalcemia secundara altor afectiuni (hiperparatiroidism, tumori maligne, sarcoidoza)

DIURETICE TIAZIDE

Reprezentanti:

→potenta mare (eficace in doza de 0.25-1.5mg/zi): **indapamida**,
ciclotiazida, politiazida, ciclopentiazida, meticlotazida

→potenta medie (eficace in doza de 25-50mg/zi): clopamid, clorotiazida
(singurul care se poate administra si injectabil!), **hidroclorotiazida**

→potenta redusa (eficace in doze de 50-100mg/zi): clortalidona

DIURETICE-TIAZIDE

HIDROCLOROTIAZIDA

- po abs.rapida si completa;
- legare 85% de prot.plasmatice
- elim. renala, nemetabolizata, prin filtrare glomerulara si secretie tubulara.
- latenta 1-1.5 ore, durata 8-12 ore

DIURETICE-TIAZIDE

HIDROCLOROTIAZIDA

Efecte adverse:

- dezechilibre hidro-electrolitice si acido-bazice ($\downarrow$ k, alcaloza hipercloremica),
- dezechilibre metabolice (hiperglicemie, hiperlipemie, hiperuricemie, hipocalciurie, hiperazotemie)
- leucopenie, agranulocitoza, trombocitopenie
- reactii alergice cutanate (eruptii, fotosensibilizare)

DIURETICE-TIAZIDE

HIDROCLOROTIAZIDA

Indicatii:

→toate tipurile de edeme+/alte diuretice

→HTA

→hipercalciurie idiopatica (pentru prevenirea litiazei), litiaza urinara oxalica (ca tratament adjuvant)

Administrare: 50-100mg/zi initial apoi 25mgx2-3/zi

Exemplu prescriptie:

Dg: HTA gr. II

Rp/ Hidroclorotiazida 0.025g

Cp LX

DS intern 1cprx2/zi

DIURETICE-TIAZIDE

INDAPAMID

-profil similar cu hidroclorotiazida, cu anumite particularitati si avantaje:

Avantaje:

- durata lunga (24-36 h),
- ! act.vasodilatatoare, cu reducerea rezistentei vasculare arteriolare si vasculare totale→potenteaza efectul antihipertensiv si grabeste aparitia aparitiei efectului maxim
- absenta reactiilor adverse asupra metabolismului glucidic si lipidic

DIURETICE-TIAZIDE

INDAPAMID

EA: hTA , hipopotasemie

CI: AVC recente (datorita actiunii vasodilatatoare), hipopotasemie refractara, sarcina, alaptare; precautie in guta.

-cpr 1.5mg, 1cpr/zi

Exemplu prescriptie:

DG: HTA gr.II

Rp/ Indapamid 0.0015g

Cpr XXX

DS intern 1cpr/zi dimineata

DIURETICE-TIAZIDE

CLORTALIDONA

- profil similar cu hidroclorotiazida*
- durata lunga 24-48h*
- latenta instalarii efectului aprox. 2h*

Indicatii si doze:

HTA: 50-100mg/zi

Diuretic: initial 50-200mg priza unica, ulterior doze ajustabile

Diabet insipid: initial 200mgx2/zi, intretinere 50mg/zi

DIURETICE-TIAZIDE

CLORTIAZIDA

-flacon inj. 500mg

-cpr 250mg/500mg

*-conc. plasmatica maxima injectabil 30min; po
4h*

*Indicatii: HTA, edeme-insuf. cardiaca, ciroza,
insuf. renala...*

DIURETICE-TIAZIDE

XIPAMIDA

-similar cu hidroclorotiazida, cu anumite particularitati

Mecanism de actiune:

- Inhiba reabsorbtiia de Na si Cl la nivelul TCD-similar cu hidroclorotiazida*
- Stimuleaza secretia de K la nivelul TCD si tubului colector → hiperK-similar cu hidroclortiazida*
- La doze mari intervine si la nivelul TCP, prin inhibarea anhidrazei carbonice, si creste eliminarea urinara de bicarbonat de sodiu, cu alcalinizarea urinei.*

DIURETICE-TIAZIDE

XIPAMIDA

Administrare:

- *Ca diuretic, in edeme, 40-80mg/zi, cu posibilitatea reducerii dozei*
- *In HTA 20mg/zi, priza unica*

Reactii adverse:

- *hipopotasemie (modif.EKG, aritmii, greata, voma),*
- *hipoNa-emie,*
- *hipoMg-emie,*
- *alcaloza hipocloremica,*
- *hTA-in special in asociere cu alte antihipertensive.*

III. DIURETICE-CARE ECONOMISESC POTASIU (ANTI-ALDOSTERONICE)

-actioneaza la nivelul portiunii finale a TCD si tubului colector

Clasificare:

❖ **antagonisti competitivi**

(antialdosteronice)

spironolactona

❖ **pseudoantialdosteronice**

amilorid, triamteren

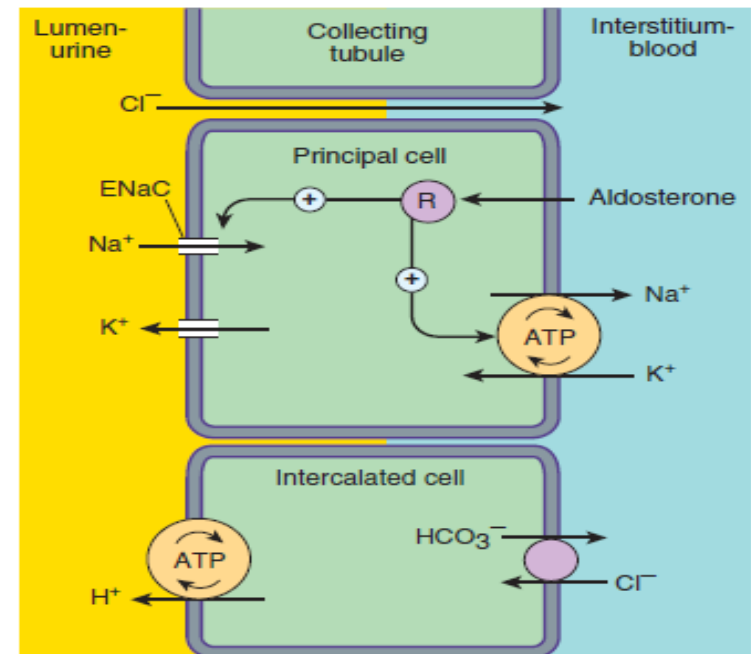


FIGURE 15-5 Ion transport pathways across the luminal and basolateral membranes of collecting tubule and collecting duct cells. Inward diffusion of Na^+ via the epithelial sodium channel (ENaC) leaves a lumen-negative potential, which drives reabsorption of Cl^- and efflux of K^+ . (R, aldosterone receptor.)

III. DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

III.I ANTIALDOSTERONICE

→ diureticele antialdosteronice → blochează
fixarea aldosteronului pe receptor →
↓ absorbția de Na și
secretia de K, H → se elimină Na, Cl și
un echivalent osmotic de apă
- urina devine alcalină (se elimină bicarb)

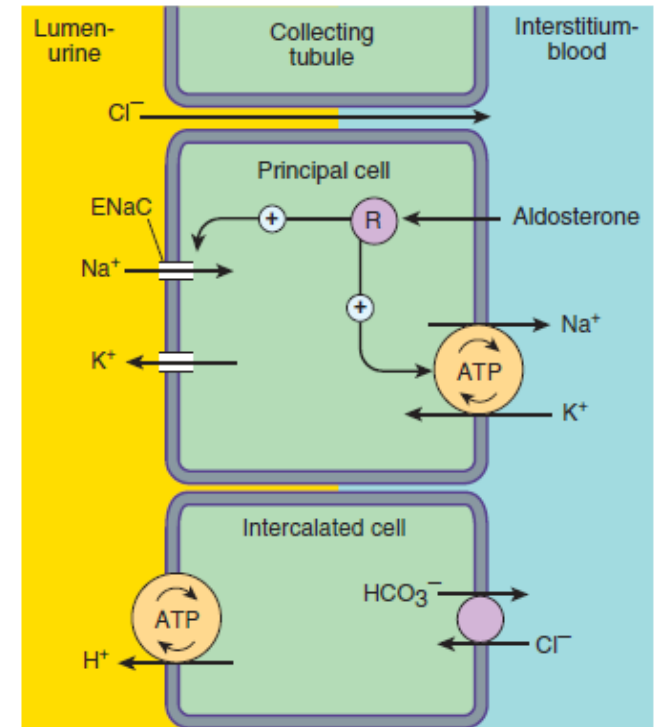


FIGURE 15-5 Ion transport pathways across the luminal and basolateral membranes of collecting tubule and collecting duct cells. Inward diffusion of Na⁺ via the epithelial sodium channel (ENaC) leaves a lumen-negative potential, which drives reabsorption of Cl⁻ and efflux of K⁺. (R, aldosterone receptor.)

DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

I. Antialdosteronice

→ **Spironolactona**

-absorbție orală bună, metabolizare hepatică, eliminare renală

-T_{1/2} lung, aproximativ 14 ore

Farmacodinamica: latentă >24h, efect maxim 2-3 zile, durată 2-3 zile de la întreruperea tratamentului

EA: ↑K, erupții cutanate, hiperandrogenism → hirsutism la femei, ginecomastie, uneori dureroasă, la bărbați

Exemplu prescripție:

DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

I. Antialdosteronice

→ Spironolactona

Indicatii: edeme cu hiperaldosteronism primar sau secundar (ICC, ciroza hepatica), $\downarrow$ k, insuficienta hepatica HTA

Administrare: ca diuretic 25-50mgx4/zi (in retentie hidrosalina cu hiperaldosteronism), HTA 50-100/zi

Contraindicatii: hiperpotasemie, IR acuta, insuficienta hepatica grava; !
Scade efectul digitalicelor prin hiperpotasemie

DG: Ciroza hepatica decompensata portal si parenchimatosa

Rp/ Spironolactona 0.025g

Cpr LX

DS intern 1cpr2/zi

DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

I. **Antialdosteronice**

→ **Eplerenona (Inspra)**

-mai selectiva comparativ cu Spironolactona, in ceea ce priveste activitatea mineralcorticoida, cu risc<<<<<<< ef. hormonale

-Cpr 25/50mg

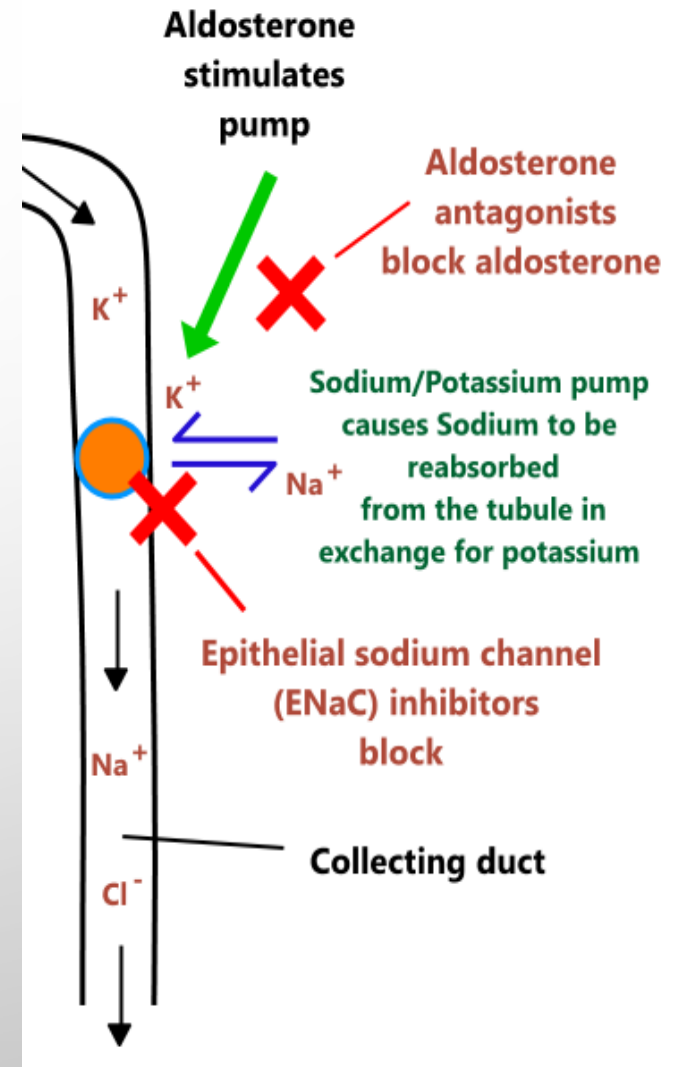
-tp. de 1/2: 3.5-6h, max. 1-2h

DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

III.II.PSEUDOANTIALDOSTERONICE

→ *Triamteren*

-antagonism de efect, avand efect
contrar aldosteronului la nivelul TCD
-inhiba schimbul Na/K prin blocarea
canalelor de Na la nivelul membranei
apicale a portiunii finale a TCD si
tubului colector → blocheaza reasorbția
Na, K nu se mai excreta,
crește eliminarea de NaHCO_3



DIURETICE-CARE ECONOMISESC POTASIU (ANTIALDOSTERONICE)

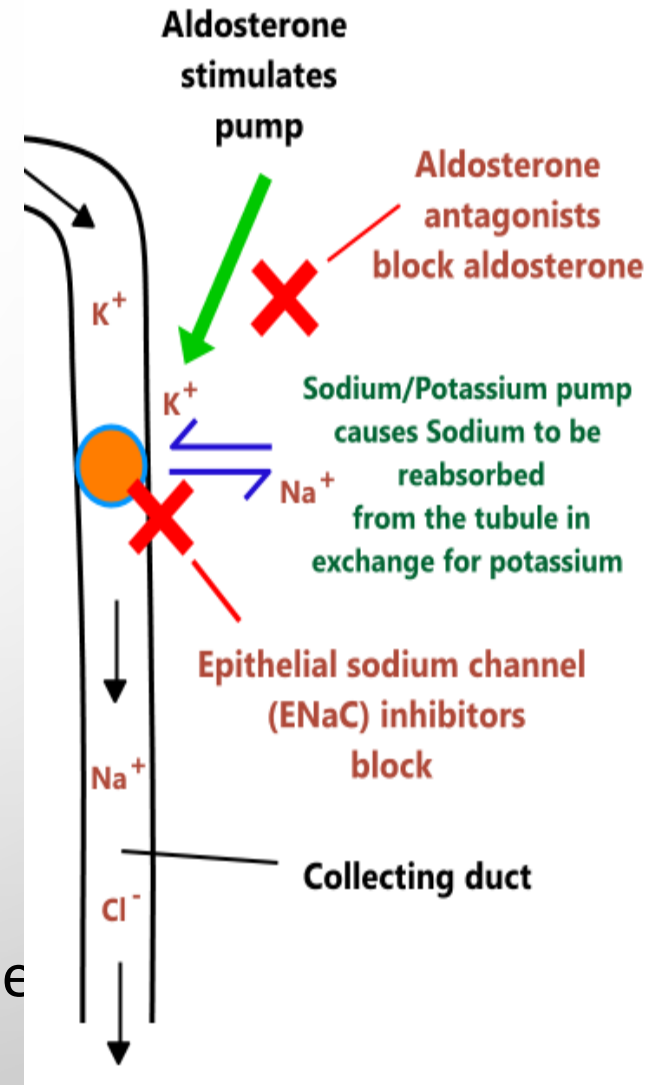
III.II.PSEUDOANTIALDOSTERONICE

→ *Triamteren*

- durata medie de actiune (7-10h),
latenta 2 ore, efect maxim la 2-3 zile de
tratament
- administrare: initial 100mgx3/zi,
maxim 600mg/zi; intretinere 100mgx2/zi

→ *Amilorid*

- similar cu triamteren
- tp. de ½ lung, de aproximativ 21 de ore,
durata de actiune lunga, de aprox.24h, late
aproximativ 2 h.
- 15-20mg/zi



IV.DIURETICE OSMOTICE

- TCP si ramura descendenta a ansei Henle sunt permeabile pentru apa
- orice agent osmotic care este filtrat glomerular, dar nu este absorabil, determina cresterea presiunii osmotice a urinei tubulare, retentia unui echivalent osmotic de H_2O si eliminarea acesteia-diureza apoasa, cu o concentratie redusa de Na
- prototip: **manitol**
 - adm. po→diaree
 - inj.iv→nu se metabolizeaza→eliminare renala in 30-60minute

IV.DIURETICE OSMOTICE

INDICATII:

- profilaxia anuriei la pacientii cu soc, arsuri
- ↓ presiunii intraoculare in glaucomul acut congestiv, ↓presiunii intracraniene la pacientii cu edem cerebral, -
- edeme
- iv lent sau perfuzabil, 1-1.5g/kgc/zi (flacon 200mg/ml, 100ml-20g)
- efecte adverse: -expansiunea volumului extracelular si hiponatremie de dilutie→agradeaza insuf.cardiaca si poate precipita aparitia unui edem pulmonar acut cardiogen
- cefalee, greata, varsaturi

V. DIURETICE INHIBITOARE ALE ANHIDRAZEI CARBONICE

Anhidraza carbonica =enzima ce exista in toate tesuturile, dar concentrata in hematii, tubi renali, mucoasa gastrica, pancreas, SNC, globi oculari

-catalizeaza formarea acidului carbonic (din CO_2 si H_2O), care disociaza in H^+ si HCO_3

Anhidraza carbonica intervine in:

→ secretia de H^+ in tubii renali proximali, cu reabsorbția prin schimb a Na (NaHCO_3)

→ secretia de H^+ de catre celulele parietale gastrice si formarea de HCl

→ secretia alcalina a pancreasului exocrin

→ secretia umorii apoase ocular

→ sedare

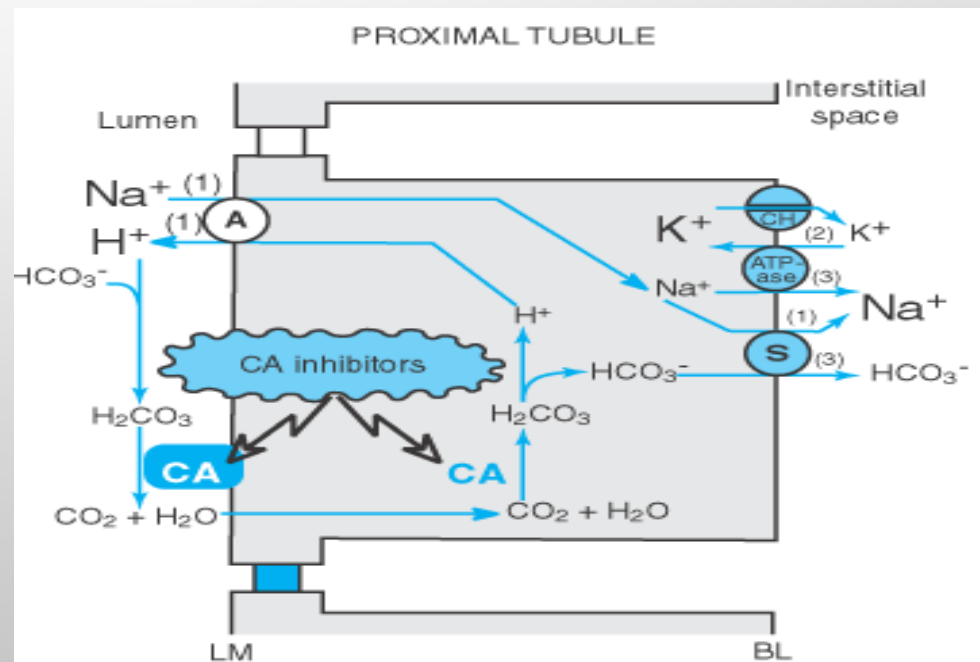
DIURETICE INHIBITOARE ALE ANHIDRAZEI CARBONICE

***ACETAZOLAMIDA-ACT.DIURETICA:**

-bloc.formarea de H^+ , cu diminuarea secretiei de H si reabsorbtiei de schimb a ionului de Na

=>excretie crescuta de Na ($NaHCO_3$), cu un echivalent osmotic de apa (urina alcalina)

-se elimina HCO_3 , sub forma de $KHCO_3 \rightarrow \downarrow K$
-acidoza hipocloremica



DIURETICE INHIBITOARE ALE ANHIDRAZEI CARBONICE

***ACETAZOLAMIDA**

EA:

- numeroase tulburari hidro-electrolitice si acio-bazice*
- cristalurie, litiaza renala, hiperglicemie, hiperuricemie*
- leucopenie, trombocitopenie*
- greata, voma, dureri abdominale*
- somnolenta*

DIURETICE INHIBITOARE ALE ANHIDRAZEI CARBONICE

***ACETAZOLAMIDA**

INDICATII:

- diuretic, in edeme*
- antisecretor gastric, in ulcer gastric si duodenal*
- glaucom, forme rezistente la tratamentul local si preoperator*
- epilepsie, adjuvant*
- comprimat 250mg, 250-1000mg/zi*