

RENAL TUBULAR ACIDOSIS

KIDNEY

* UNABLE to...

~ SECRETE H^+

~ REABSORB HCO_3^-



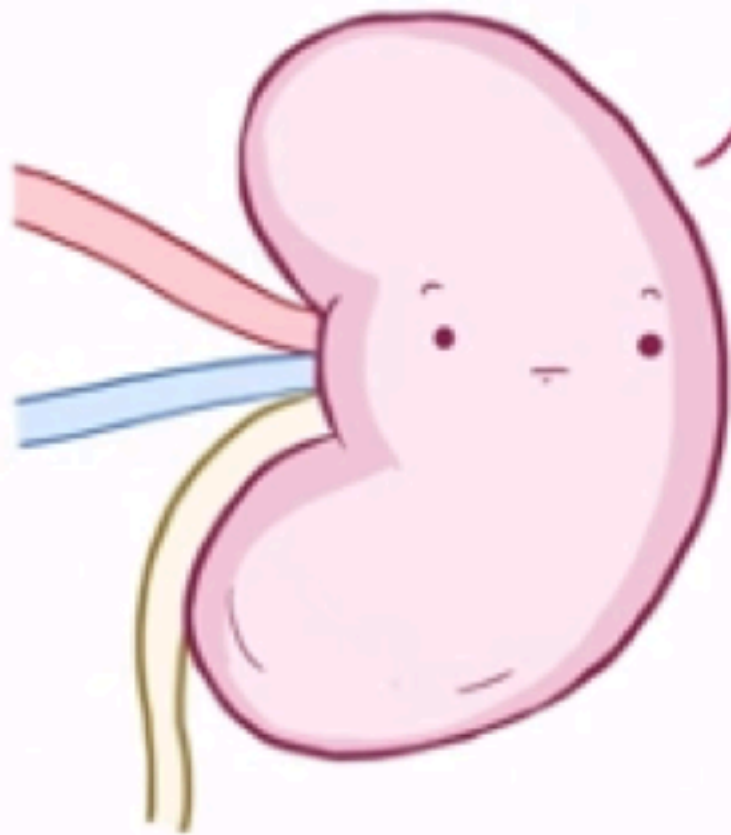
METABOLIC ACIDOSIS

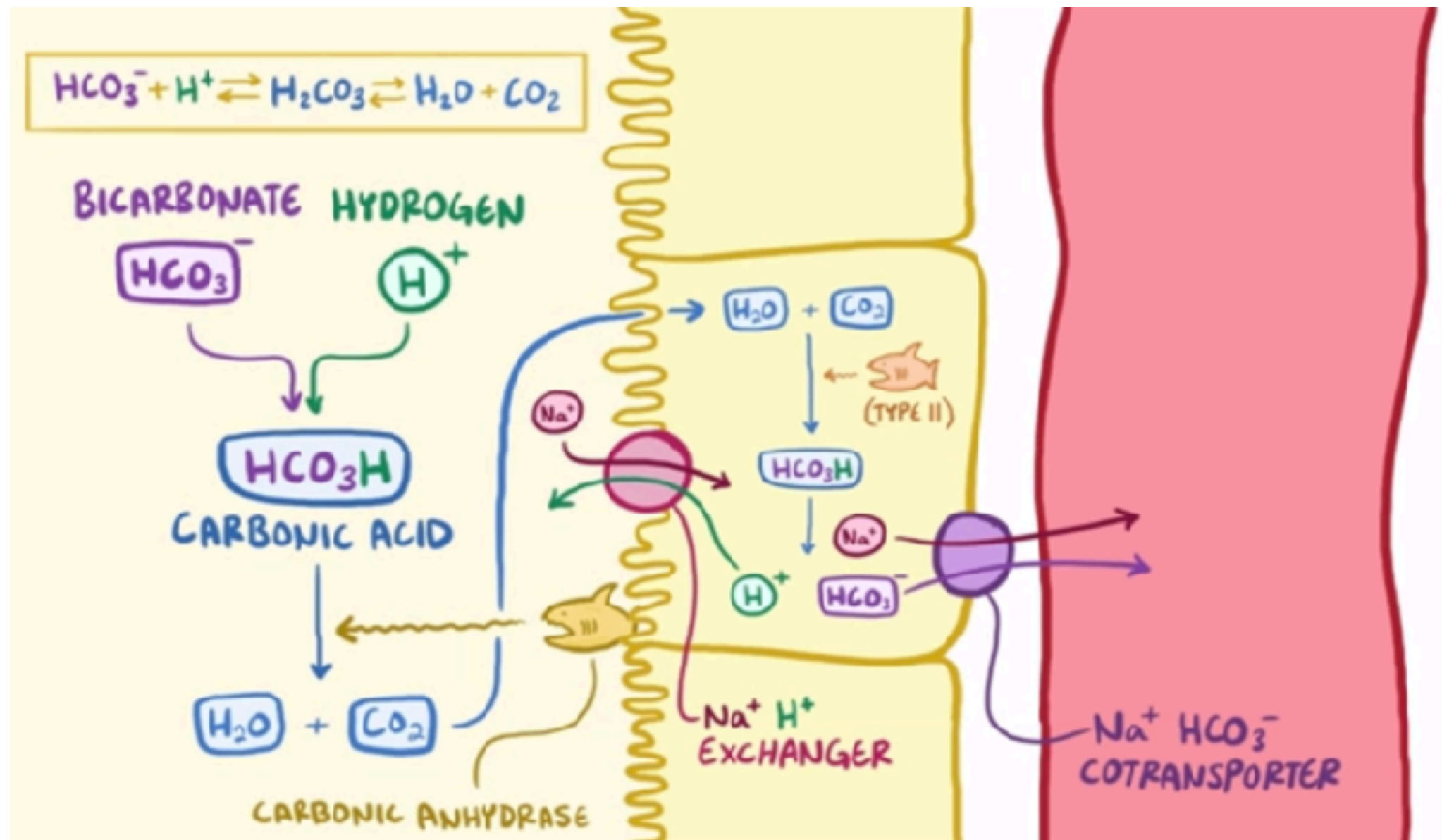
* NORMAL ANION GAP

COMPLICATIONS

* PERIPHERAL
VASODILATION

* SHOCK





Proximal

Urine: H^+

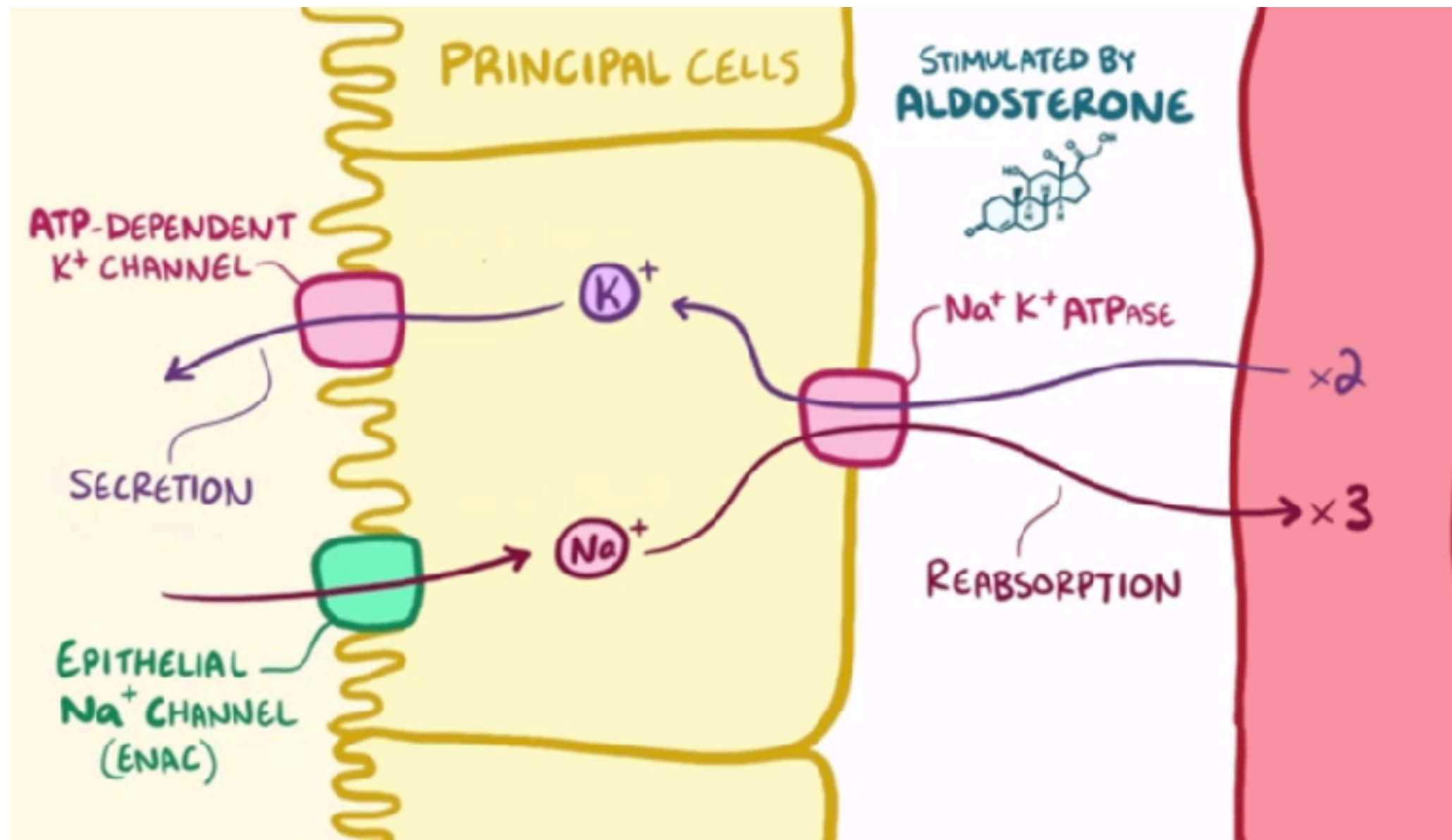
Blood: Na , HCO_3^-



Distal: α -intercalated Cells

Urine: H^+

Blood: NaCl , HCO_3^-



Distal: Principle Cells

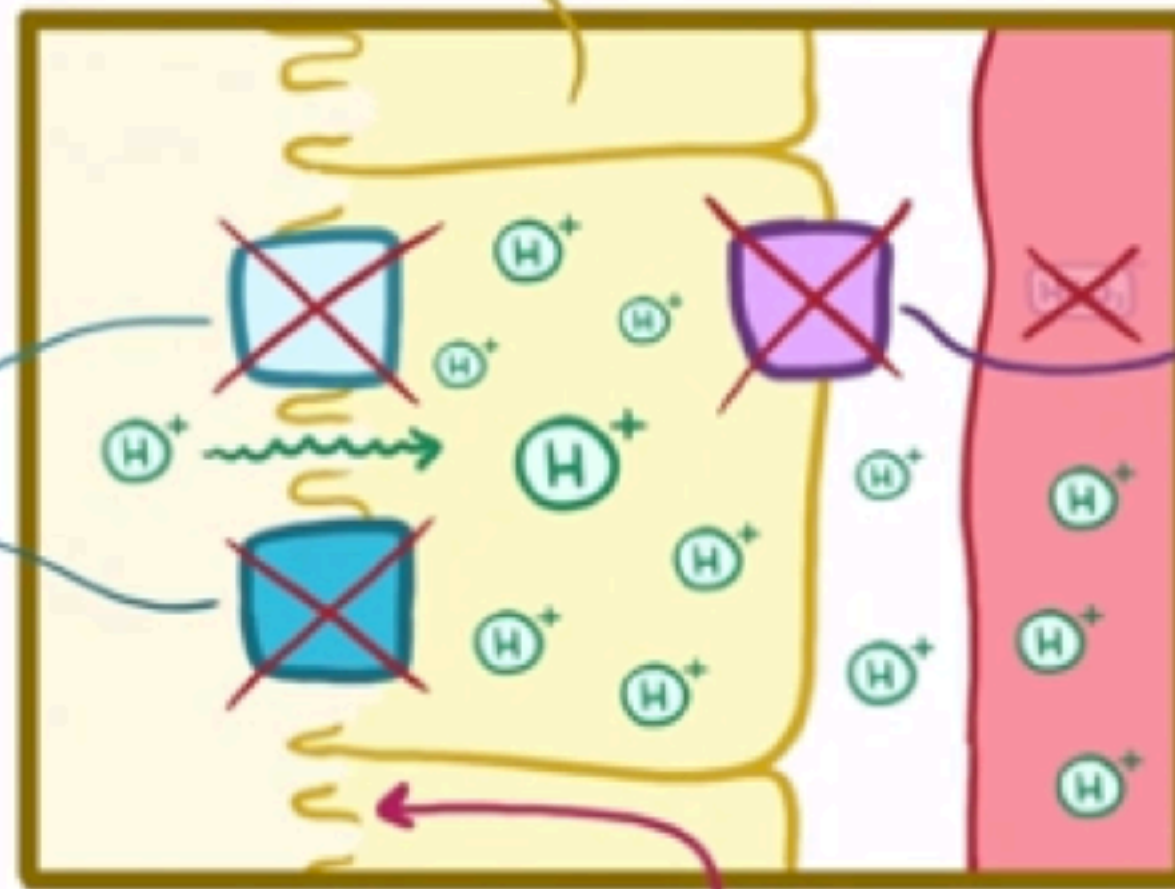
Urine: Na^+
Blood: K^+

RENAL TUBULAR ACIDOSIS ~ TYPE I

α -INTERCALATED CELLS

GENETIC MUTATION

* H^+ ATPASE
* H^+ K^+ ATPASE



GENETIC MUTATION

* HCO_3^- Cl^- ANTIporter

ACIDEMIA

MEDICATION

* LITHIUM
* AMPHOTERICIN B

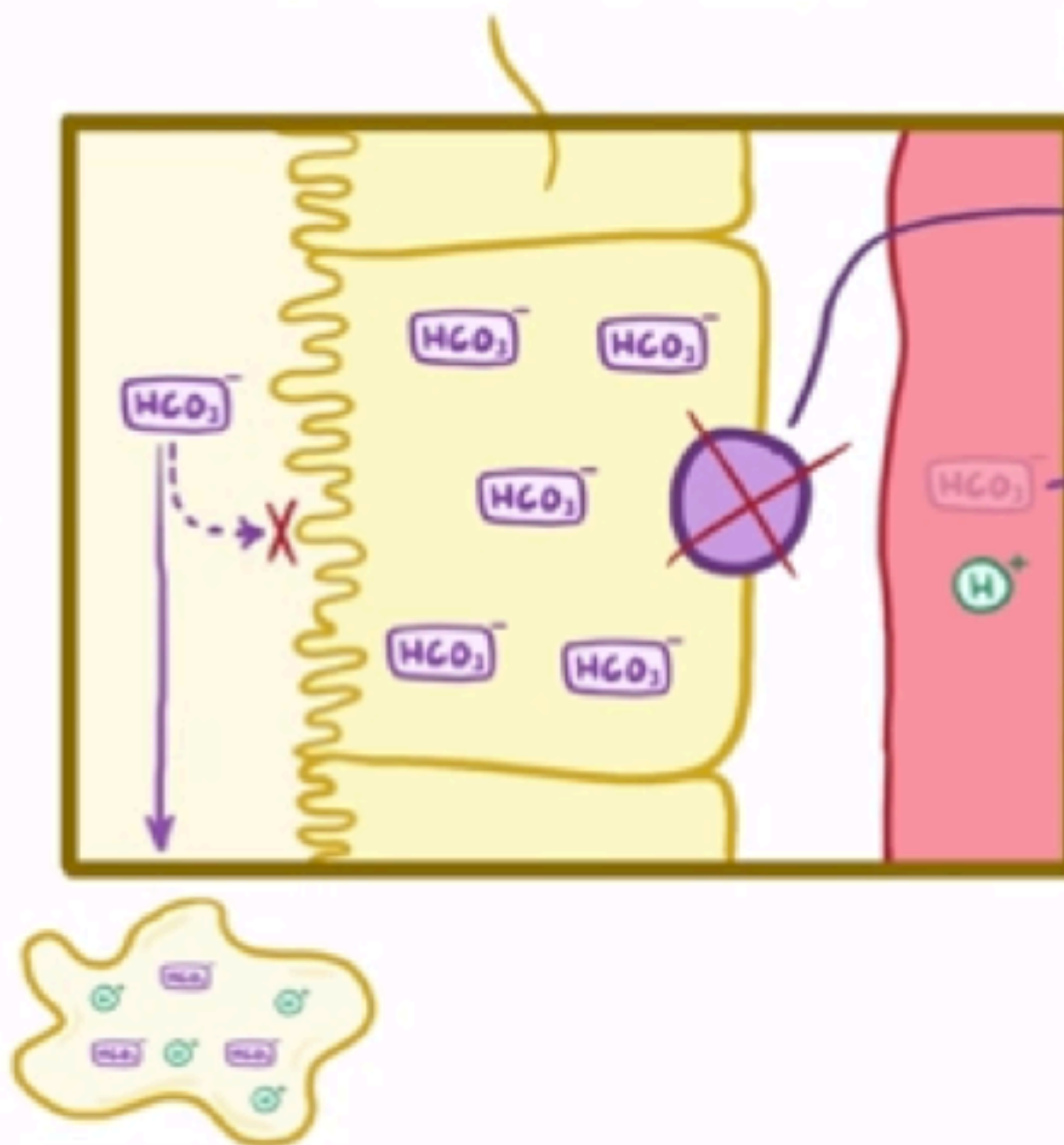
RENAL TUBULAR ACIDOSIS ~ TYPE II

PROXIMAL CELL

FANCONI SYNDROME

- * PHOSPHATURIA
- * GLYCOSURIA
- * AMINOACIDURIA
- * URICOSURIA
- * PROTEINURIA

~ INHERITED or
from MEDICATIONS



* GENETIC MUTATION *

* $\text{Na}^+ \text{HCO}_3^-$
COTRANSPORTER

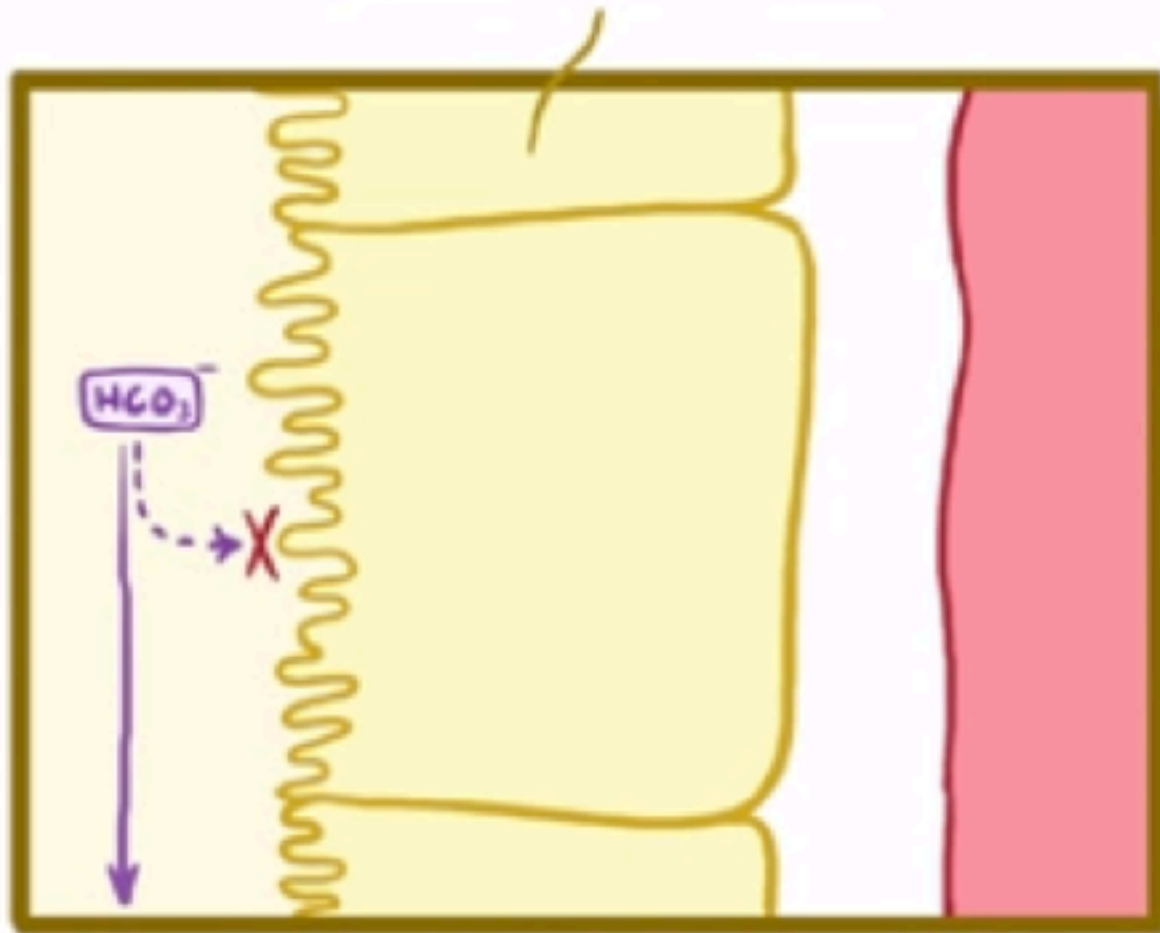
NO HCO_3^- to
COUNTERBALANCE

↓
ACIDEMIA

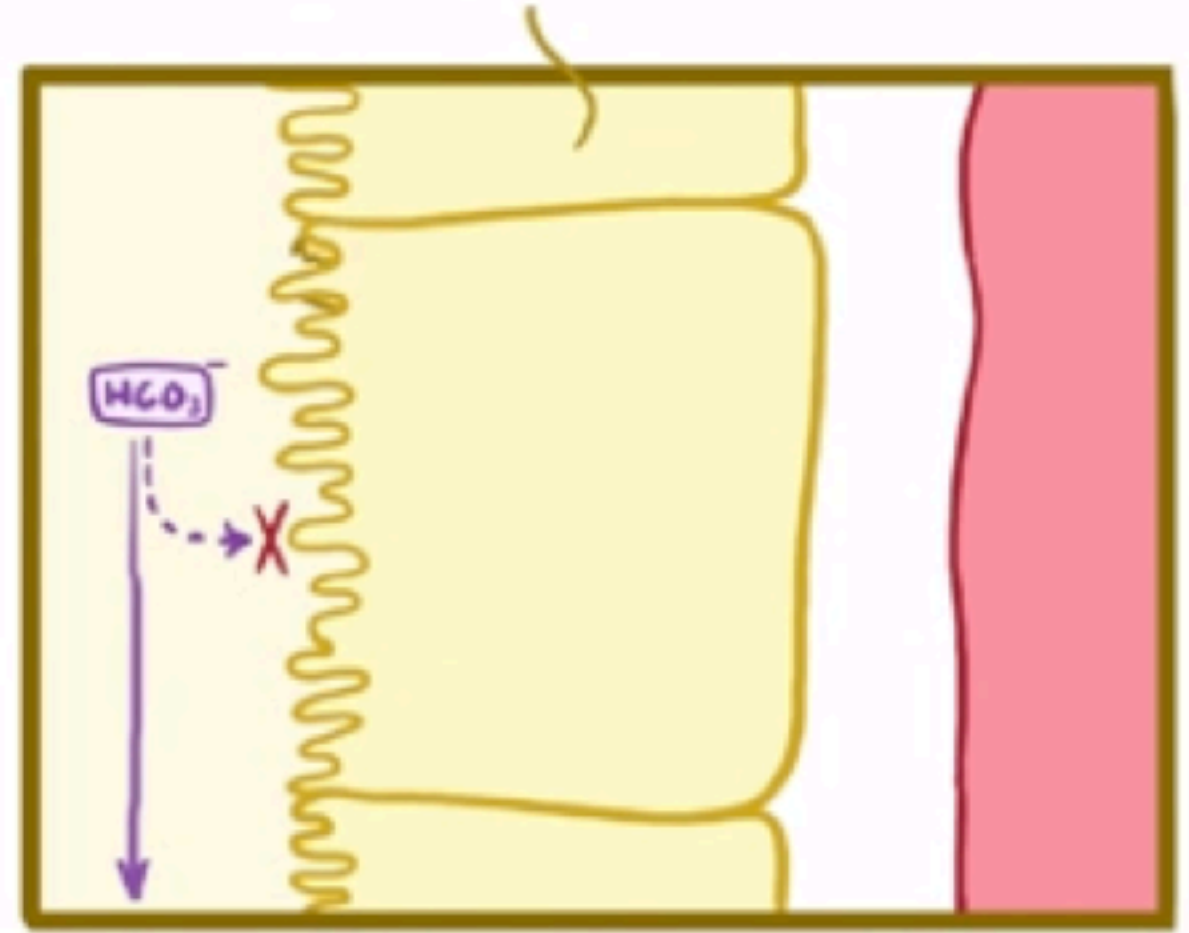
RENAL TUBULAR ACIDOSIS ~ TYPE III

* CONGENITAL CARBONIC ANHYDRASE
DEFICIENCY (?)

PROXIMAL CELLS



DISTAL CELLS



RARE!

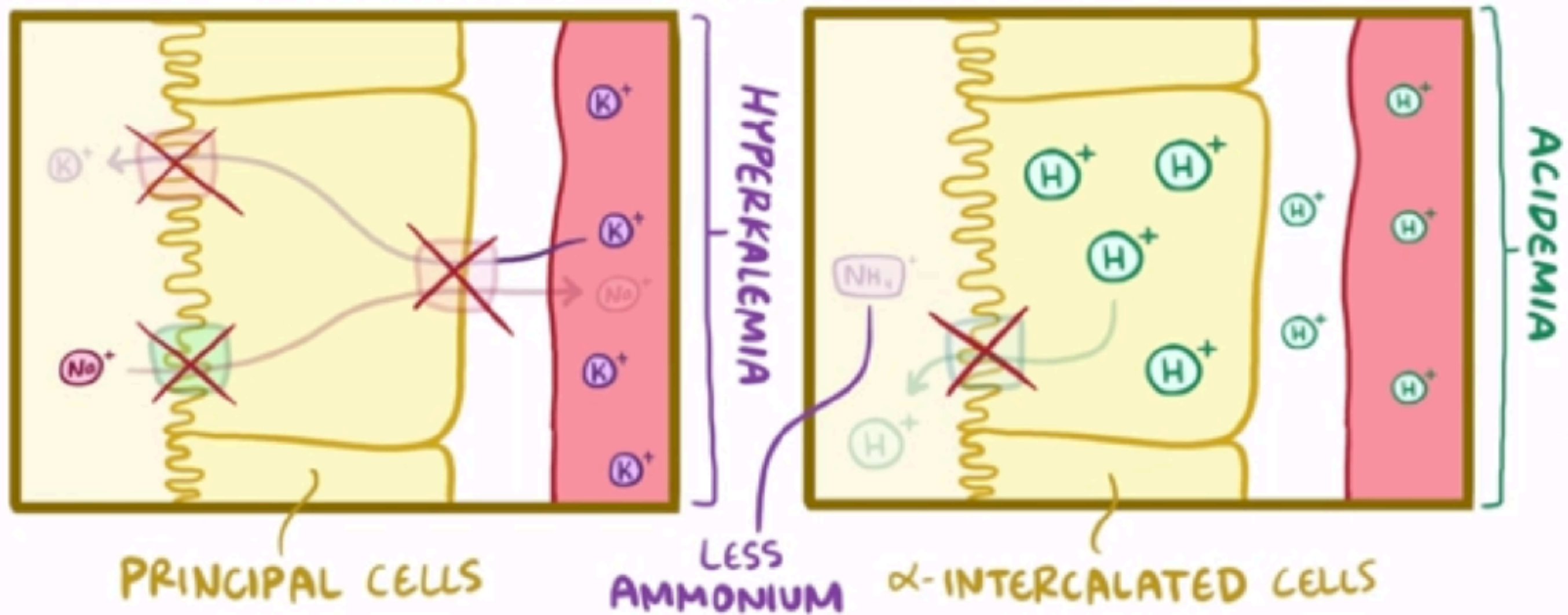
Middle Eastern / North African Children

RENAL TUBULAR ACIDOSIS ~ TYPE IV (HYPERKALEMIC ACIDOSIS)

* ALDOSTERONE

└ DEFICIENCY ~ ADDISON'S DISEASE

└ RESISTANCE ~ ENAC GENETIC MUTATION



RTA Summary

Type	Where	Can't do...	Look for...	HCO ₃ ⁻ Plasma	K ⁺ Blood	Urine pH	Tx
1	Distal	secrete H ⁺ into urine	Hypocitraturia Renal calcs Kidney Stones	<10	↓	>6.5	Alkali Therapy (HCO ₃ ⁻ , Citrate)
	Proximal	reabsorb HCO ₃ ⁻	Fanconi Syndrome	14-20	↓	<6.5	Alkali Tx + K ⁺ + Thiazide
	Distal	secrete H ⁺ & K ⁺ into urine	Lower urine ammonia	>15	↑	<5.5	Mineralocorticoid (Fludrocortisone)

References

Images: [https://en.wikipedia.org/wiki/
File:Renal_tubular_acidosis.webm](https://en.wikipedia.org/wiki/File:Renal_tubular_acidosis.webm)

Summary Table: [https://www.uptodate.com/contents/
etiology-and-clinical-manifestations-of-renal-tubular-
acidosis-in-infants-and-children](https://www.uptodate.com/contents/etiology-and-clinical-manifestations-of-renal-tubular-acidosis-in-infants-and-children)

[https://www.uptodate.com/contents/overview-and-
pathophysiology-of-renal-tubular-acidosis-and-the-effect-
on-potassium-balance](https://www.uptodate.com/contents/overview-and-pathophysiology-of-renal-tubular-acidosis-and-the-effect-on-potassium-balance)