

Pharmacy 501 – Renal Tubular Acidosis (RTA) Session

PRE-TEST

Please choose the best answer to each of the five questions below:

1. During alkalosis, what should be the body's compensation for a rise in serum bicarbonate of 8 mmol/L?
 - (a) a rise in pCO₂ of 8 mmHg
 - (b) a rise in pCO₂ of 5 mmHg
 - (c) a fall in pCO₂ of 5 mmHg
 - (d) a fall in pCO₂ of 8 mmHg
2. The hallmark feature of renal tubular acidosis is:
 - (a) anion gap hyperchloremic metabolic acidosis
 - (b) non-anion gap hypocholeemic metabolic alkalosis
 - (c) non-anion gap hyperchloremic metabolic acidosis
 - (d) anion gap hypocholeemic metabolic acidosis
3. In patients with RTA, the urinary anion gap is used primarily as an indicator of:
 - (a) the degree to which the nephron is reabsorbing potassium
 - (b) the pH of the urine
 - (c) the degree of sodium excretion
 - (d) the presence or absence of acid in the urine
4. If you wanted to calculate your patient's urinary anion gap, which set of lab tests would you request?
 - (a) urine pH, Na, Cl
 - (b) urine
 - (c) urine K, Cl, Na
 - (d) urine Na, K, Ca
5. Which of the following is NOT a potential consequence of untreated RTA?
 - (a) cholelithiasis
 - (b) osteomalacia
 - (c) nephrocalcinosis
 - (d) respiratory failure

CASE 1:

RW is a 60 kg, 63 y/o female whom you evaluate on your ward for the first time today, 12 hours after her admission.

CC: muscle weakness, nausea, general malaise.

HPI: progressive weakness over past 7-10 days. Barely able to walk today. Previously healthy, physically active.

PMH: Hypertension x 5 years. Well controlled with HCTZ 25 mg PO daily x 4 years, but BP has been increased (~150 / 95 mmHg) for the past year.

Medications: Enalapril 10 mg PO daily x 3 weeks
Moduret 1 tablet daily x 2 months
Omeprazole 20 mg PO daily
Acetaminophen 500 mg PO tid

O/E: Oriented x 3, decreased strength and reflexes to all 4 limbs. EKG shows loss of P, peaked T's, widened QRS (0.16 ms).

LAB: Na 142, Cl 118, K 6.6, HCO₃⁻ 16, SCr 107
CBC: Normal
ABG's: pH 7.25, pCO₂ 35, HCO₃⁻ 16, AG=

What type of acid-base disturbance(s) does RW have?

What evidence is there for RTA in this patient?

How would you confirm your suspicion?

How would you determine which type of RTA the patient has?

What therapeutic measures would you implement?

CASE 2:

LL is a 38 y/o 55kg F who has been hospitalized for 3 days for treatment of acute pyelonephritis.

CC: Fever, chills at night.

HPI: patient has been in hospital receiving antibiotics for 3 days. Onset of muscle weakness over last 24 hours. Pt. has a urogenital malformation and has had multiple recurrences of pyelonephritis with multiple courses of antibiotics over the past 12 months.

Medications: Ciprofloxacin 200 mg IV q12h
Gentamicin 50 mg IV q8h

O/E: Costovertebral angle tenderness, flank pain, afebrile, urine cloudy, cultures pending.

LAB: Na 140, Cl 121, K 4.8, HCO₃⁻ 15, SCr 89
WBC 18.9
ABG's: pH 7.22, pCO₂ 32, HCO₃⁻ 15, AG=
U/A: cloudy, nitrite +, Hgb +, WBC ++

Evaluate LL's acid-base status.

Do you think she has RTA? How would you test your suspicion?

If you think she has RTA, what type would it be, and what could have caused this situation?

How would you manage this patient's condition?

CASE 3:

ZZ is a 75 kg, 58 y/o male admitted to your ICU today.

CC/HPI: Found unconscious by a neighbor. Not seen for several days before. Tachypneic, using accessory muscles, fatiguing.

PMH: Multiple previous admissions for metabolic acidosis, usually accompanying sepsis.
Subarachnoid hemorrhage 2 y ago
Depression
Reflux esophagitis
?EtOH abuse

O/E: Obese, PERL, nonresponsive, tachypneic on A/C ventilation, urine +++ pus

LAB: Na 145, Cl 130, K 3.6, HCO₃⁻ 5, SCr 140
WBC 27.8
ABG's: pH 7.10, pCO₂ 25, HCO₃⁻ 5, AG=

Medications: Lorazepam + morphine infusion
Ceftriaxone 2g IV q24h

What type of acid-base disturbance(s) does ZZ have?

What additional information do you require to test your suspicion of RTA?

What type of RTA do you suspect he has?

What therapeutic measures would you implement for ZZ to treat his RTA?

CASE 4:

CC/HPI: A 37-year-old man presented with 3 days of progressive muscle weakness.

PMH: None

O/E: proximal muscle weakness (3/5), hyporeflexia and muscle tenderness, sensation preserved.

LABS: Na 140; K 2.0; Cl 120; Urea 5.4; SCr 83. ABG: pH 7.28; PCO₂ 32; HCO₃⁻ 14; AG =

MPTA: ibuprofen/codeine for several years, with a daily dose of 24 tablets (4.8 g ibuprofen).
Smoker. No other medications.

What type of acid-base disturbance(s) does he have?

What additional information do you require to test your suspicion of RTA?

What type of RTA do you suspect he has?

What therapeutic measures would you implement for ZZ to treat his RTA?

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CASE 5:

QK is a 78 y/o F who presents with a 2 year history of anorexia, and recurrent LUTI's. She has received chronic therapy with TMP/SMX for 3 years now for UTI prophylaxis. No other med's.

LABS: Na 143, K 6.0, Cl 114, HCO_3^- 19
WBC 8.9, SCr 208, BUN 5.2 mmol/L, albumin 18 (31-43 g/L)
ABG: pH 7.28, pCO_2 34, HCO_3^- 19, AG=

Evaluate QK's acid-base status....

Do you think she has RTA? If so, what type?