

COLLEGE OF OSTEOPATHIC MEDICINE OF THE PACIFIC

RENAL - FINAL EXAM

January 30, 1995

#1

Choose the ONE best answer.

Dr. Wong

- Which of the following diuretic agents is CORRECTLY matched with its primary mechanism and/or site of action in the nephron?
  - spironolactone (Aldactone)
  - chlorothiazide (Diuril)
  - ethacrynic acid (Edecrin)
  - triamterene (Dyrenium)
  - acetazolamide (Diamox)
  - proximal tubules
  - early segments of distal tubules
  - inhibits carbonic anhydrase at proximal and distal tubules
  - thick ascending limb of loop of Henle
  - decreases transtubular electrical potential difference in collecting tubules
- Chlorothiazide (Diuril) can produce all of the following effects EXCEPT
  - decreased calcium excretion.
  - hyperlipidemia.
  - hypokalemia.
  - increased uric acid excretion.
  - hyperglycemia.
- Furosemide (Lasix)
  - is effective in the treatment of nephrogenic diabetes insipidus.
  - may produce potassium depletion and metabolic alkalosis.
  - may increase LDL levels in some patients.
  - should not be given concomitantly with gentamicin (Garamycin) to a patient.
  - b and d of the above.
- All of the following statements about mannitol (Osmikrol) are correct EXCEPT:
  - It can be used to reduce intraocular pressure prior to eye surgery.
  - It is the prototype osmotic diuretic that is a pharmacologically inert substance.
  - It can prevent the symptoms of acute mountain sickness.
  - It produces a large amount of urine output by exerting an osmotic effect in the renal tubules and makes the kidneys less able to concentrate urine.
  - It is effective as prophylaxis of acute renal failure.

1/B 2/D 3/E 4/C

Dr. Weiss

8. Each of the following is a reason to perform surgery on a child with cryptorchidism EXCEPT

- a. psychological concerns over an empty scrotum. *yes.*
- b. increased incidence of hernia. *yes.*
- c. increased risk of testicular cancer. *yes.*
- d. increased incidence of Congenital Adrenal Hyperplasia.
- e. increased chance of injury due to abdominal position of testis. *yes.*

9. A male infant has been diagnosed as having dilated ureters and mild hydronephrosis in utero. After birth, these findings are confirmed. His urinary stream is very weak when observed. The most likely diagnosis for this infant is

- a. renal stones.
- b. posterior urethral valves.
- c. ureteropelvic junction obstruction.
- d. penile chordee.
- e. patent urachus.

10. A 4-year-old male presents to your office with a 4-hour history of severe scrotal pain. He awoke from a nap with the pain. The right testis is elevated on exam. There is no cremasteric reflex. The most likely diagnosis is

- a. spermatocele.
- b. epididymitis.
- c. torsion of the appendix testis.
- d. inguinal hernia.
- e. testicular torsion.

11. A 3-year-old presents to your office with painful, swollen joints and a weird rash. She had a viral illness 2 weeks ago and recovered without difficulty. Now she has abdominal pain, malaise, and mild edema. The rash is ecchymotic and non-blanching. The most likely diagnosis is

- a. Henoch-Schönlein purpura.
- b. idiopathic thrombocytopenic purpura.
- c. leukemia.
- d. idiopathic hypercalciuria.
- e. renal stones.

Dr. Fiorindo

9. In the presence of antidiuretic hormone (ADH, vasopressin), the greatest fraction of filtered  $H_2O$  is reabsorbed in the

- a. proximal convoluted tubule.
- b. loop of Henle.
- c. distal convoluted tubule.
- d. cortical collecting duct.
- e. medullary collecting duct.

5/D 6/B 7/E<sub>2</sub> 8/A 9/A

10. The "single effect" of the countercurrent multiplier system, i.e., the separation of solute transport from H<sub>2</sub>O transport, occurs specifically in the
- proximal convoluted tubule
  - thick portion of the descending limb of the loop of Henle.
  - thin portions of both the ascending and descending limbs of the loop of Henle.
  - thick portion of the ascending limb of the loop of Henle.
  - distal convoluted tubule.
11. The tubular fluid, as it leaves the proximal tubule and enters Henle's loop, is very close to being isosmotic. However, because of the processes which occur in Henle's loop, the tubular fluid which exits the loop and enters the distal tubule is:
- isosmotic.
  - hyperosmotic.
  - hypoosmotic.
  - sometimes hyperosmotic, sometimes hypoosmotic, depending upon physiologic conditions.
  - sometimes hyperosmotic, sometimes isosmotic, depending upon physiologic conditions, but never hypoosmotic.
12. The difference between the countercurrent mechanism that exists in the loop of Henle compared to the countercurrent mechanism that exists in the vasa recta is that
- the mechanism in the vasa recta only involves the movement of H<sub>2</sub>O.
  - the mechanism in the vasa recta tends to reduce the vertical osmotic gradient in the medulla, whereas the Henle's loop mechanism works to increase it.
  - Tubular fluid flow in Henle's loop is much greater than the flow of plasma in the vasa recta.
  - Solute and H<sub>2</sub>O movements occur in the vasa recta solely via passive mechanisms.
  - There is no difference. The countercurrent mechanisms that exist in the loops of Henle and the vasa recta are exactly the same.
13. Due to the active and passive transport of H<sub>2</sub>O and solutes that occurs in Henle's loop, a vertical osmotic gradient is established in the renal medulla that can result in an osmolality in the papillary interstitium that can reach 600-700 m Osm/kg. When hyperosmotic urine is being produced, however, the papillary interstitium can reach a value of 1200 m Osm/kg. This increased osmolality is achieved by
- an increased H<sub>2</sub>O uptake from the medullary interstitium.
  - an increased movement of NaCl from the ascending loop of Henle.
  - an increase in H<sub>2</sub>O reabsorption by the thick epithelium of the ascending loop of Henle.
  - an increased movement of urea into the interstitium from the tubular fluid of the cortical collecting ducts.
  - a facilitated diffusion of urea across the epithelial cell membranes in the inner medullary collecting ducts.

10/D 11/C 12/D 13/E

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14. An increase in the osmolality of the body fluids would \_\_\_\_\_ discharge frequencies of neurons of the supraoptic and paraventricular nuclei, \_\_\_\_\_ antidiuretic hormone (ADH) secretion rates by the neurohypophysis, and \_\_\_\_\_ urine volume flow rates (I, increase; D, decrease).

- a. I, I, I
- b. I, I, D
- c. I, D, I
- d. D, D, I
- e. D, I, D

15. All of the following would lead to an increase in vasopressin (antidiuretic hormone, ADH) secretion EXCEPT

- a. stimulation of the parasympathetic autonomic neurons.
- b. an injection of adrenaline (epinephrine).
- c. imbibition of a half-liter of Jose Cuervo's finest tequila.
- d. an overdose of Seconal.
- e. a febrile condition of 104°F.

16. Sudden expansion of the extracellular fluid volume due to an infusion of isotonic (0.9%) NaCl solution would be expected to cause

- a. decreased secretion of vasopressin (ADH).
- b. increased secretion of atrial natriuretic peptide.
- c. decreased secretion of renin.
- d. decreased secretion of aldosterone.
- e. all of the above.

Dr. Cundat

17. Which of the following relationships is INCORRECT?

- a. Chief complaint (CC): "My urine is red"
- b. Social history: Denies tobacco or etoh use
- c. Review of systems (ROS)-GEN: Health good
- d. Physical Exam (PE)-Chest: Denies cough and dyspnea
- e. Physical Exam (PE)-Abd: 1+ /4 suprapubic tenderness

18. A 65-year-old white male presents with a 3-day history of dark urine. Denies nausea, vomiting, diarrhea, constipation, frequency, urgency or hesitancy. He was recently released from the hospital for thrombophlebitis of his left leg. Vital signs are within normal limits. He appears his stated age and in no apparent distress. The physical examination is within normal limits. The most likely cause of his dark urine is which of the following?

- a. UTI
- b. prostatitis
- c. trauma
- d. cholelithiasis
- e. coumadin therapy

14/B 15/C 16/E 17/D 18/E

19. A 22-year-old black female presents with a 3-day history of frequency, hesitancy, urgency and bloody urine. She was treated empirically with ampicillin for a suspected cystitis 2 weeks prior to the onset of the current symptoms. Family history is negative and there is no history of congenital disorders, drug abuse or current medications. She is afebrile and vital signs are within normal limits. The physical examination is normal except for slight suprapubic tenderness. Which of the following orders is most appropriate to assess the suspected diagnosis?

- a. order an IVP
- b. order a calcium, bun, creatinine
- c. order a culture and sensitivity of the urine
- d. order an acid phosphatase
- e. order a complete blood count

20. Which of the following is LEAST likely to be a differential diagnosis for proteinuria in a 19-year-old Caucasian male athlete?

- a. sickle cell disease
- b. toxic nephropathies: drugs
- c. orthostatic (postural) proteinuria
- d. benign proteinuria: fever, heat, or cold exposure
- e. functional (after heavy exercise)

21. In obstructive uropathy, all of the following would be expected EXCEPT

- a. bun/creatinine ratio greater than 20.
- b. urine osmolality equal to plasma osmolality.
- c. urine pH 6.0
- d. bacteriuria and leukocytes in the urine signify accompanying infection.
- e. no urine production for 24 hours.

22. Which of the following relationships is INCORRECT?

- a. Physical exam (PE)-HEENT: Fundi shows normal appearing disks
- b. Review of systems (ROS)-Gu: See hpi, no additional information
- c. Social history (SH): Freshman university athlete
- d. Review of systems (ROS)-Gi: Denies constipation, nausea or pain
- e. Physical exam (PE)-Neck: Denies prior thyroid disease or lymphadenopathy

Dr. Hegler

23. A 33-year-old male presents with a 2-day history of dull left flank pain which does not radiate, and fever. He walks sidebent left and forward bent with an exteriorly rotated left leg. His lungs are clear to auscultation. Urinalysis reveals many WBCs. In addition to appropriate antibiotic and fluid therapy, which of the following would be best to treat the somatic component of his illness?

- a. non-steroidal anti-inflammatory medication and bed rest
- b. aerobic exercise and "ballistic" stretching
- c. lumbar inhibitory pressure to decrease PNS stimulus to ureters
- d. high velocity low amplitude thrust to increase left femur internal rotation
- e. muscle energy technique to increase left hip extension

19/C 20/A 5 21/E 22/E 23/E

24. A 12-year-old prepubertal girl presents with urinary urgency and occasional incontinence. Upon close questioning, you determine this began shortly following a fall from a horse. Which of the following is the MOST LIKELY cause?

- a. diabetes insipidus from a hypothalamoneurohypophyseal tract lesion
- b. pelvic diaphragm imbalance from innominate rotation
- c. regression as a ploy to get her own horse
- d. cauda equina syndrome causing a hypertonic bladder
- e. ureteral irritability from psoas muscle spasm

Dr. Foley

25. Which of the following statements regarding the renal tubular mechanisms which add new  $\text{HCO}_3^-$  ions to the plasma is CORRECT?

- ~~a.~~ The  $\text{H}^+$  ions secreted by the renal tubular cells are not excreted in the urine.
- ~~b.~~ An increase in  $\text{NH}_4^+$  ion secretion results in a decrease in the addition of new  $\text{HCO}_3^-$  ions to the plasma.
- ~~c.~~ It is first required that carbonic acid be formed in the tubular lumen from  $\text{H}^+$  and  $\text{HCO}_3^-$  ions secreted by the renal tubular cells.
- ~~d.~~ The mechanisms cannot operate under conditions which result in complete reabsorption of  $\text{HCO}_3^-$  ions filtered by the glomerulus.
- e. For each new  $\text{HCO}_3^-$  ion added to plasma the equivalent of one  $\text{H}^+$  ion is excreted in the urine.

26. In the urine, the titratable acid

- ~~a.~~ refers to only uric acid and creatinine in the urine
- ~~b.~~ refers to the total number of  $\text{H}^+$  ions secreted by the renal tubules.
- ~~c.~~ refers to only the  $\text{H}^+$  ions involved in the reabsorption of filtered bicarbonate ions.
- d. includes  $\text{H}^+$  ions excreted in the urine as  $\text{H}_2\text{PO}_4^-$  ions.
- ~~e.~~ refers to only the  $\text{H}^+$  ions in the urine which were filtered from the plasma by the glomeruli.

27. Metabolic acidosis

- ~~a.~~ is characterized by a greater than normal rate of filtration of  $\text{HCO}_3^-$  ions by the glomerulus.
- b. results in an increase in the excretion of  $\text{NH}_4^+$  ions in the urine.
- ~~c.~~ is always accompanied by an increase in excretion of  $\text{K}^+$  ions in the urine.
- ~~d.~~ results in a decrease in the excretion of titratable acid in the urine.
- ~~e.~~ can be generated by a combination of abnormally low plasma  $\text{K}^+$  ion concentration and abnormally high aldosterone secretion.

28. The renal compensation for respiratory alkalosis would include all of the following directional changes EXCEPT

- ~~a.~~ a decrease in titratable acid in the urine.
- ~~b.~~ a decrease in  $\text{NH}_4^+$  ions in the urine.
- c. a decrease in the excretion of  $\text{HCO}_3^-$  ions in the urine.
- ~~d.~~ a decrease in the reabsorption of  $\text{HCO}_3^-$  ions filtered by the glomerulus.
- ~~e.~~ a decrease in the rate of  $\text{H}^+$  ion secretion by the renal tubules.

24/B

25/E

26/D

27/B

28/C

Dr. Saud

29. The most common abnormal abdominal mass in an infant is

- a. splenomegaly.
- b. hydronephrosis.
- c. hepatomegaly.
- d. prune belly

30. The three narrow ureter locations are

- a. UPJ, across the iliac vessels, UVJ.
- b. UPJ, UVJ, urethral meatus.
- c. UPJ, retrocaecal ureter, UVJ.
- d. calyx, infundibulum, UPJ.

31. Bladder diverticulum

- a. contains no muscle fibers.
- b. is smooth walled.
- c. is lined by bladder epithelium.
- d. all of the above.
- e. none of the above.

32. A renal angiogram shows an area of non-contrast uptake. The likely significance is

- a. a renal cyst.
- b. the area is supplied by an accessory renal artery.
- c. a renal infarct or scar.
- d. all of the above.
- e. none of the above.

Dr. Packer

33. A good choice for use for a fluid challenge is

- a. D5water.
- b. normal saline.
- c. isolyte M.
- d. Bartle's & James.

34. Some patients with oliguria require diuretics. The best choice would be

- a. thiazides.
- b. carbonic anhydrase inhibitors.
- c. calcium channel blockers.
- d. loop agents.

29/B 30/A 31/D 32/D 33/B 34/D

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35. All of the following represent laboratory models for acute renal failure EXCEPT
- a. the Kf model.
  - b. tubular obstruction.
  - c. backleak.
  - d. ion flux.
36. All of the following can be useful in the treatment of acute renal failure EXCEPT
- a. digoxin.
  - b. dopamine.
  - c. diet.
  - d. diuretic.
37. The first agent used to treat life-threatening hyperkalemia is
- a. kayexalate.
  - b. bicarb.
  - c. insulin.
  - d. calcium
38. All of the following can be used to treat hyperkalemia EXCEPT
- a. kayexalate.
  - b. bicarb.
  - c. dialysis.
  - d. calcibind.
39. A patient with hyponatremia who has edema may have any of the following problems EXCEPT
- a. cirrhosis.
  - b. nephrosis.
  - c. CHF.
  - d. polydipsia.
40. The single easiest way to detect excess body sodium is
- a. serum sodium.
  - b. edema.
  - c. urinary sodium.
  - d. fractional excretion of sodium.
41. All of the following are part of nephrotic syndrome EXCEPT
- a. proteinuria.
  - b. edema
  - c. dysgeusia.
  - d. hyperlipidemia.

35/D 36/A 37/D 38/D 39/D 40/B 41/C

42. Which of the following BEST represents glomerulonephritis in an adult with a normal GFR?

- a. 500 mg protein/240
- b. 5000 mg protein/240
- c. 100 mg protein/240
- d. 1000 mg protein/240

43. Which of the following is/are useful for treating hypercalcemia?

- a. lasix
- b. saline
- c. thiazide
- d. a and b of the above
- e. all of the above

44. Which can BEST be called TRUE as the pH increases? *alkalosis*

- a. More calcium is protein bound.
- b. Less calcium is protein bound.
- c. Protein binding of calcium is not affected.
- d. Proton concentration increases.

45. A pH of 7.47 is best approximated by

- a.  $[H^+] = 27$
- b.  $[H^+] = 53$
- c.  $[H^+] = 47$
- d.  $[H^+] = 33$

$$40 - 33 = 30$$

46. A patient's electrolytes are Na = 140 K = 4.0 Cl = 86  $tCO_2 = 20$ . Which of the following BEST represents the "anion gap"?

- a. 38
- b. 34
- c. 24
- d. 14

$$140 - (86 + 20) = 34$$

47. A patient has diabetic ketoacidosis. His pH is 6.83. You administer alkali and raise the pH to 7.38. During this time, he becomes progressively more obtunded. Why?

- a. He was simply "too far gone."
- b. His CNS became more acidotic.
- c. The bicarb led to alkalosis.
- d. His potassium rose from the administration of bicarb.

*"paradoxical"*

42/B 43/D 44/A 45/D 46/B 47/B

48. Metabolic alkalosis must be

- a. created.
- b. detained.
- c. maintained.
- d. a and c of the above.
- e. all of the above.

49. Patients with chronic renal failure have a better survival if

- a. phosphate binders initiated early. ✓
- b. they are referred for evaluation early. ✓
- c. erythropoietin is administered. ✓
- d. they receive a kidney transplant. ✓
- e. a, b, and c of the above

50. Treatment of end-stage renal disease could involve

- a. transplant. ✓
- b. dialysis. ✓
- c. diet.
- d. a and b of the above.
- e. all of the above.

51. A patient with nephrotic syndrome presents with shortness of breath. You must consider

- a. pulmonary embolism.
- b. pneumonia.
- c. CHF.
- d. a and c of the above.
- e. all of the above.

52. All of the following can be helpful in assessing a patient with oliguria EXCEPT

- a. weight.
- b. skin turgor.
- c. creatinine level.
- d. serum ammonia.

Dr. Feldman

53. A 25-year-old male was involved in a motorcycle accident and sustained injury at vertebral level T10 with spinal cord injury. What type of neurogenic bladder would one expect to find?

- a. areflexive
- b. autonomic
- c. hyperreflexive
- d. motor paralytic

48/D 49/E 50/E 51/E 52/D 53/C

54. The external sphincter is innervated by what nerve?
- pelvic
  - hypogastric
  - internal pudendal
  - external pudendal
55. Spinal cord injury at the level of the conus medullaris will result in what type of neurogenic bladder?
- areflexive
  - uninhibited
  - hyperreflexive
  - motor paralytic
56. Alpha adrenergic blockade of the internal sphincter will result in
- contraction.
  - relaxation.
  - dysynergia.
  - no change.
57. Treatment of choice for a hyperreflexive neurogenic bladder is
- intermittent catheterization.
  - intermittent catheterization and anticholinergic drugs.
  - intermittent catheterization and antadrenergic drugs.
  - none of the above.
58. What combination will result in extremely elevated intravesical pressure with possible renal injury?
- hyperreflexia and external sphincter dysynergia
  - hyperreflexia and internal sphincter dysynergia
  - hyperreflexia alone
  - hyperreflexia and external sphincter relaxation

Dr. Saperstein

59. Renal cysts are best described as

- greater than renal density, vascularity invasive, well defined.
- poorly defined, of greater density than renal parenchyma, peripheral.
- poorly defined, decreased density in relation to renal tissue, peripheral or central.
- well defined, decreased density in relation to renal tissue, may calcify.
- poorly defined, decreased density in relation to renal tissue, peripheral and central.

54/C 55/A 56/B 57/B 58/A 59/D

59. Scrotal scanning

- a. decreased blood flow with decreased uptake in the scrotum equals torsion
- b. increased blood flow with decreased uptake in the scrotum equals torsion
- c. is used to differentiate urethrits from torsion
- d. decreased blood flow with increased testicular uptake equals torsion
- e. increased blood flow with an increased uptake in the testicle equals torsion

60. On routine IVP examination you can expect to see all of the following structures EXCEPT

- a. ureter.
- b. infundibulum.
- c. kidney.
- d. urethra.
- e. bladder.

61. Renal calcification may be

- a. idiopathic, obstructive, or affects micturition.
- b. lucent, located in the calyx or parenchyma.
- c. associated with urethra, lucent, and multiple.
- d. lucent or dense, associated with many clinical entities, and rarely obstruct.
- e. dense, associated with tuberculois, or cause of high blood pressure.

60/A 61/D 62/B