

Patho Renal

1. Which of the following diseases is characterized by autosomal recessive inheritance:

- a) Adulthood polycystic kidney disease
- b) Childhood polycystic kidney disease
- c) Familial polyposis
- d) All of the above
- e) None of the above

2. The following statements are true about post-streptococcal glomerulonephritis except

- a) It is an immune complex disease.
- b) Acute renal failure is the most common fate
- c) The glomeruli appear microscopically hypercellular
- d) It mostly affects children and young adults.
- e) OLiguria and hematuria are features of the disease

3. Which of the following statements is true about chronic glomerulonephritis:

- a) The disease is characterized by bilateral renal enlargement
- b) It represents the most common fate of post-streptococcal GN.
- c) Clinically the patient may develop hypertension and may complain of polyuria
- d) All of the above
- e) None of the above

4. Which of the following statements is true about crescentic glomerulonephritis

- a) It is characterized by glomerular necrosis.
- b) The bowman's capsules show parietal crescents
- c) The disease often rapidly progresses to renal failure
- d) All of the above
- e) None of the above

5. Which of the following is true about nephroblastoma (Wilm's tumor):

- a) It is a malignant embryonic tumor that may sometimes affect both kidneys.
- b) it most commonly affects children under the age of 15 years.
- c) It consists of a variable mixture of blastemal, epithelial and mesenchymal structures
- d) Cartilage may be seen within the tumor
- e) All of the above

6. Which of the following is true about renal cell carcinoma:

- a) The tumor usually arises at one pole of the kidney
- b) It most commonly arises in adult males with a peak in the 6th decade of life.
- c) The clear cell type is the most common types
- d) it may lead to pulmonary cannon ball metastases
- e) All of the above.

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7. Which of the following is true about renal cell carcinoma (RCC):

- a) It most commonly arises near the renal hilum.
- b) The peak incidence of the tumor is the third decade of life
- c) Renal cell carcinoma of right kidney may be associated with right varicocele
- d) Collecting duct type carcinoma is the most frequent type
- e) None of the above.

8. Chronic pyelonephritis is characterized by the following features except:

- a) The kidneys are hugely enlarged and show pelvicalyceal dilatation
- b) Females are more commonly affected than males
- c) Urinary tract obstruction by stones (or otherwise) is a commonly associated condition
- d) Hypertension is common
- e) The tubules often show thyroid-like casts

9. Any of the following may be a cause of urinary stones except:

- a) Excessive intake of water
- b) Hyperparathyroidism
- c) Gout
- d) Cystitis
- e) Familial cystinuria

10. Which of the following is true about stag horn stone

- a) It is termed so because it casts the shape of pelvis and calyces
- b) It can develop in the urinary
- c) It consists of calcium oxalate bladder
- d) All of the above
- e) None of the above

11. Which of the following statements is not true for hydronephrosis:

- a) It can be caused by acute complete bladder neck obstruction by a stone
- b) Hydronephrosis may be caused by an aberrant renal artery.
- c) Hydronephrosis predisposes to stone formation
- d) Some cases of hydronephrosis are accompanied by development of bladder diverticula
- e) Hydronephrosis may be complicated by pyonephrosis

12. Which of the following statements is true about bilharzial bladder carcinoma:

- a) Squamous cell carcinoma is more common than in non-bilharzial cancer
- b) It may commonly arise below the age of 50 years
- c) Nitrosamines are carcinogens that may be produced due to 2ry infection of the bladder
- d) it most commonly occurs in the lateral and posterior bladder walls
- e) All of the above

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13. Which of the following statements is true for urinary bladder carcinoma

- a) T2 means invasion of fat around the bladder
- b) Papillary urothelial carcinoma often has better prognosis than squamous cell carcinoma
- c) Blood spread occurs early to lungs
- d) All of the above
- e) None of the above

14. All of the following are features of renal failure except:

- a) Alkalosis
- b) High blood urea
- c) Anemia
- d) Inflammation of serous membranes
- e) Gastrointestinal inflammation.

15. Which of the following diseases may be associated with anemia

- a) Chronic renal failure
- b) Hepatic failure
- c) Gastric cancer
- d) Leukemia
- e) All of the above

16. Which of the following diseases is associated with pyuria (pus in urine):

- a) Acute post-streptococcal glomerulonephritis
- b) Acute pyelonephritis
- c) Hydronephrosis
- d) Chronic glomerulonephritis
- e) None of the above

17. Which of the following diseases leads to contracted kidneys:

- a) Chronic glomerulonephritis
- b) Polycystic kidney
- c) Hydronephrosis
- d) Malignant hypertension
- e) None of the above

18. Which of the following diseases is most liable to rapid progression to uremia:

- a) Acute post-streptococcal glomerulonephritis
- b) Crescentic glomerulonephritis
- c) Benign hypertension
- d) Stag horn stone of one kidney
- e) Bilharzial stricture of one ureter.

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19. All of the following are causes of hematuria except:

- a) Urinary stones
- b) Cystitis
- c) Nephrotic syndrome
- d) Urinary neoplasms
- e) Leukemia

20. Which of the following conditions can be complicated by renal failure

- a) Multiple myeloma
- b) Liver cirrhosis
- c) Urinary bladder stone
- d) All of the above
- e) None of the above

21. Which of the following tumors can produce "cannon ball" lung metastases:

- a) Osteosarcoma
- b) Renal cell carcinoma
- c) Nodular melanoma
- d) Non-Hodgkin's lymphoma
- e) All of the above

22. Which of the following tumors may consist of cells with pale or clear cytoplasm:

- a) Seminoma
- b) Renal cell carcinoma
- c) Krukenberg's tumors
- d) All of the above
- e) None of the above

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1. A 50-year-old man has noted passing darker urine for the past week. On physical examination there are no abnormal findings. A urinalysis shows pH 5.5, specific gravity 1.013, 2+ blood, no protein, and no glucose. A urine cytology is performed and there are atypical uroepithelial cells seen. A urologist performs a cystoscopy, but no mucosal lesions are noted. He has a 60 pack year history of smoking cigarettes. Which of the following is the most likely diagnosis?

- a) Adenocarcinoma of prostate
- b) Urothelial carcinoma of renal pelvis
- c) Acute interstitial nephritis
- d) Nodular glomerulosclerosis
- e) Squamous cell carcinoma of penis

2. A 62-year-old man has had back pain for the past 8 months. He has had a productive cough for the past 2 days. On physical examination his temperature is 39 C and there is dullness to percussion at the right lung base. Laboratory studies show gram-positive diplococci in the sputum. A chest radiograph shows right lower lobe consolidation. An abdominal CT scan shows multiple lytic lesions of the vertebrae. On the day prior to death his serum urea nitrogen was 63 mg/dL with creatinine 7.1 mg/dL. A dipstick urinalysis was normal. At autopsy, his kidneys are firm and pale. Microscopically, there is abundant pink hyaline material in glomeruli and around small vessels. This material stains positively with Congo red. Which of the following laboratory findings was most likely to have been present in this patient in the week prior to death?

- a) Positive antinuclear antibody test
- b) Serum glucose of 210 mg/dL
- c) CD4 lymphocyte count of 110/microliter
- d) Total serum protein of 9.2 g/dL
- e) Serum prostate specific antigen of 11.8 ng/mL

3. A 52-year-old previously healthy man has experienced episodes of discomfort with urination for 3 months. There are no remarkable findings on physical examination. Laboratory studies include a urinalysis that reveals sp. gr. 1.010, pH 7.5, no glucose, no protein, no ketones, and 1+ blood. Microscopic urine examination shows numerous RBCs, a few WBCs, and no casts. A urine culture is negative. A plain film radiograph of the pelvis shows a rounded, 1 cm radiopaque lesion in the region of the bladder. Which of the following laboratory test findings is most likely to be present in this man?

- a) Proteinuria
- b) Hypercalciuria
- c) Elevated transaminases in serum
- d) RBC casts in urine
- e) Hyperuricemia

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4. A 72-year-old man has been feeling tired and lethargic for 5 months. He has noted increasing hesitency with urination. On physical examination his prostate is diffusely enlarged. Laboratory studies show sodium 139 mmol/L, potassium 4.0 mmol/L, chloride 104 mmol/L, CO₂ 25 mmol/L, creatinine 1.9 mg/dL, and glucose 81 mg/dL. Which of the following renal abnormalities is most likely to be present in this man?

- a) Cortical atrophy
- b) Glomerulonephritis
- c) Papillary necrosis
- d) Polycystic change
- e) Renal cell carcinoma

5. A 35-year-old woman has experienced urinary frequency with dysuria for the past 4 days. On physical examination she has no flank pain or tenderness. A urinalysis reveals sp. gr. 1.014, pH 7.5, no glucose, no protein, no blood, nitrite positive, and many WBC's. She has a serum creatinine of 0.9 mg/dL. Which of the following is the most likely diagnosis?

- a) Lupus nephritis
- b) Urinary tract lithiasis
- c) Acute bacterial cystitis
- d) Malakoplakia
- e) Urothelial carcinoma

6. A 70-year-old man incurs blunt abdominal trauma in a fall. On physical examination he has a contusion on his lower back. An abdominal CT scan shows 3 peripheral 1 to 2 cm cysts in his kidneys. The kidneys are normal in size. Laboratory studies show a serum urea nitrogen of 17 mg/dL and creatinine of 1.3 mg/dL. A urinalysis reveals no blood, ketones, protein, or glucose. Microscopic urinalysis reveals a few oxalate crystals. Which of the following is the most likely diagnosis?

- a) Dominant polycystic kidney disease
- b) Prostatic nodular hyperplasia
- c) Renal artery atherosclerosis
- d) Simple renal cysts in the cortex
- e) Recurrent urinary tract infection

7. A clinical study is performed with pediatric subjects who had minimal change disease. These patients are observed to have prominent periorbital edema. Laboratory test findings from serum and urine tests are analyzed. Which of the following laboratory test findings is most likely to be consistently present in these subjects?

- a) Nitrite positive urinalysis specimen
- b) Proteinuria >3.5 gm/24 hours
- c) Hematuria with >10 RBC/hpf
- d) Lipiduria in association with hypercholesterolemia
- e) Renal tubular epithelial cells and casts

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8. A 12-year-old boy is a member of a family with a history of renal disease, with males more severely affected than females. He is found to have auditory nerve deafness, corneal dystrophy, and ocular lens dislocation. A urinalysis shows microscopic hematuria. A renal biopsy is performed. Microscopically, the glomeruli show glomerular capillaries with irregular basement membrane thickening and attenuation with splitting of the lamina densa. The mesangial matrix is increased and epithelial cells may appear foamy. Which of the following is the most likely diagnosis?

- a) Goodpasture syndrome
- b) IgA nephropathy
- c) Alport syndrome
- d) Dominant polycystic kidney disease
- e) Diabetes mellitus, type I

9. A clinical study is performed of laboratory findings in subjects with renal diseases. Loss of physiologic function accompanies many diseases. Loss of which of the following renal functions is most likely to be identified by laboratory measurement of the urine specific gravity?

- a) Filtration
- b) Reabsorption
- c) Secretion
- d) Concentration
- e) Blood flow

10. A 45-year-old woman has had increasing malaise for the past year. On physical examination her blood pressure is 265/150 mm Hg. Laboratory studies show a plasma renin activity of 9 ng/mL/hr. She then suffers a "stroke" with a right basal ganglia hemorrhage and dies. At autopsy the kidneys are bilaterally small with granular surfaces. Microscopically they show hyperplastic arteriosclerosis with fibrinoid necrosis, petechial hemorrhages, and microinfarcts in the cortices. Which of the following conditions is most likely to be her underlying cause of death?

- a) Diabetes mellitus, type II
- b) Fibromuscular dysplasia
- c) Factor V Leiden mutation
- d) Analgesic abuse
- e) Diffuse scleroderma

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11. A 3-year-old child has become more irritable over the past two months and does not want to eat much at meals. On physical examination the pediatrician notes an enlarged abdomen and can palpate a mass on the right. An abdominal CT scan reveals a 10 cm solid mass involving the right kidney. The resected mass has the microscopic appearance of small blue cells with primitive tubular structures. The child receives chemotherapy and radiation therapy, and there is no recurrence. Which of the following neoplasms is this child most likely to have had?

- a) Angiomyolipoma
- b) Renal cell carcinoma
- c) Urothelial carcinoma
- d) Wilms tumor
- e) Medullary fibroma

12. A 5-year-old boy is noted to have increased puffiness around his eyes for the past week, and he has been less active than normal. On physical examination he has periorbital edema. Vital signs include T 37 C, P 75/minute, RR 18/minute, and BP 140/90 mm Hg. A urinalysis reveals sp. gr. 1.010, pH 6.5, no glucose, 4+ protein, no blood, no casts, and no ketones. Microscopic urinalysis reveals oval fat bodies, but no WBC's or RBC's. He improves following a course of corticosteroid therapy. Which of the following renal lesions is most likely to have been present in this boy?

- a) Glomerular crescents
- b) Fusion of podocyte foot processes
- c) Patchy tubular necrosis
- d) Hyperplastic arteriosclerosis
- e) Mesangial immune complex deposition

13. A clinical study is performed involving subjects with glomerulonephritis. One group of subjects has a diagnosis of crescentic glomerulonephritis and another group has membranous glomerulonephritis. Which of the following laboratory findings is most likely to be found in the absence of other findings in subjects with membranous glomerulonephritis?

- a) Rapid onset
- b) Red blood cell casts
- c) Oliguria
- d) Albuminuria
- e) Hypertension

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14. A 50-year-old man is hospitalized for acute myocardial infarction. He has decreased cardiac output with hypotension requiring multiple pressor agents. His urine output drops over the next 3 days. His serum urea nitrogen increases to 59 mg/dL, with creatinine of 2.9 mg/dL. Urinalysis reveals no protein or glucose, a trace blood, and numerous hyaline casts. Five days later, he develops polyuria and his serum urea nitrogen declines. Which of the following pathologic findings in his kidneys is most likely to have caused his azotemia?

- a) Patchy tubular necrosis
- b) Fusion of podocyte foot processes
- c) Glomerular crescents
- d) Hyperplastic arteriosclerosis
- e) Mesangial immune complex deposition

15. A clinical study is performed to determine the value of percutaneous renal biopsy. The medical records of subjects with renal diseases are analyzed to determine the circumstances in which the results of a renal biopsy facilitated determination of therapy that improved prognosis. In which of the following situations is a percutaneous needle biopsy of the kidney most useful?

- a) Fever with suspected acute pyelonephritis
- b) Prostatic hyperplasia with suspected hydronephrosis
- c) Premature neonate with suspected polycystic kidney disease
- d) Suspected renal cyst
- e) Systemic lupus erythematosus and acute renal failure

16. A 55-year-old man complains of dull flank pain for the past month. On physical examination he has tenderness to percussion at the right costovertebral angle. Laboratory studies show microscopic hematuria but no proteinuria or glucosuria. A urine cytology shows no atypical cells. A CBC shows WBC count 7800/microliter, Hgb 21.1 g/dL, Hct 63.5%, MCV 94 fL, and platelet count 195,000/microliter. His serum urea nitrogen is 17 mg/dL and creatinine 1.2 mg/dL. Which of the following radiographic findings is most likely to be present in this man?

- a) Hydronephrosis on intravenous pyelogram
- b) Renal mass on abdominal CT scan
- c) Radiopaque ureteral calculus on an abdominal plain film
- d) Enlarged, multicystic kidneys on abdominal ultrasound
- e) Pelvic mass below the bladder on MR imaging

17. A 43-year-old man goes to his physician for a routine check of his health status. He is found to have a blood pressure of 150/95 mm Hg. His urinalysis shows pH 6.5, specific gravity 1.015, no glucose, blood, or protein, and no casts. His serum creatinine is 1.4 mg/dL. If he is not treated, which of the following conditions will most likely cause his death?

- a) Intracerebral hemorrhage (stroke)
- b) Aortic aneurysm rupture
- c) Congestive heart failure
- d) Chronic renal failure
- e) Intracranial aneurysm rupture

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18. A 20-year-old previously healthy man has been feeling tired for the past 5 days. He goes to his physician when he passes dark-colored urine. On physical examination his blood pressure is 155/90 mm Hg. Laboratory studies show his serum creatinine is 4.4 mg/dL. A urinalysis reveals pH 6, specific gravity 1.011, 3+ blood, 1+ protein, no glucose, and no ketones. On urine microscopic examination there are numerous RBC casts. Which of the following pathologic findings on renal biopsy is most likely to be present in this man?

- a) Glomerular crescents
- b) Widened proximal tubules
- c) Polymorphonuclear infiltrates
- d) Lipiduria
- e) IgA deposited in glomerular capillaries

19. A 43-year-old man has had increasing malaise for the past 3 weeks. On physical examination he has a blood pressure of 150/95 mmHg and 1+ pitting edema of the lower extremities to the knees. Dipstick urinalysis shows no glucose, blood, ketones, nitrite, or urobilinogen, and the microscopic urinalysis reveals no RBC/hpf and only 1 WBC/hpf. Additional laboratory studies show a 24 hour urine protein of 4.1 gm. His serum creatinine is 2.2 mg/dL with urea nitrogen of 40 mg/dL. His hepatitis B surface antigen is positive. Which of the following is the most likely diagnosis?

- a) Membranous glomerulonephritis
- b) Systemic lupus erythematosus
- c) Acute tubular necrosis
- d) Diabetic nephropathy
- e) Post-streptococcal glomerulonephritis

20. A 60-year-old woman is admitted with sudden onset of chest pain and is diagnosed with an acute myocardial infarction. There is difficulty maintaining adequate blood pressure and tissue perfusion for 3 days. Her serum lactate becomes elevated. Her serum urea nitrogen and creatinine are noted to be increasing. Granular and hyaline casts are present on microscopic urinalysis. Which of the following renal lesions is most likely to be present in this situation?

- a) Chronic pyelonephritis
- b) Acute tubular necrosis
- c) Nodular glomerulosclerosis
- d) Renal vein thrombosis
- e) Minimal change disease

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21. A 50-year-old man was diagnosed at age 15 with type 1 diabetes mellitus. His disease has been poorly controlled, as evidenced by elevated hemoglobin A1C levels. He develops a non-healing ulcer of his foot at age 35. At age 45, he has an increasing serum urea nitrogen and a urinalysis shows sp gr 1.012, pH 6.5, 1+ protein, no blood, 1+ glucose, negative leukocyte esterase, negative nitrite, and no ketones. Which of the following renal diseases is he most likely to have?

- a) Nodular glomerulosclerosis
- b) Hyperplastic arteriolosclerosis
- c) Papillary necrosis
- d) Crescentic glomerulonephritis
- e) Pyelonephritis

22. A 39-year-old woman is found to have a blood pressure of 160/105 mm Hg while at a free health screening clinic. She feels fine and has had no major medical problems in her life. An abdominal ultrasound reveals that the left kidney is smaller than the right, but that neither is cystic and no masses appear to be present. MR angiography reveals focal narrowing with thickening and beading of the left main renal artery. A urinalysis reveals no abnormal findings. She has an elevated plasma renin. Which of the following is the most likely diagnosis?

- a) Diabetes mellitus
- b) Antiphospholipid syndrome
- c) Fibromuscular dysplasia
- d) Thrombotic thrombocytopenic purpura
- e) Cholesterol emboli syndrome

23. A 70-year-old woman has had a fever for the past 3 days. She has burning dysuria. On physical examination her temperature is 37.8 C and there is dull pain on palpation of her left lower back. Laboratory studies show Hgb 13.3 g/dL, Hct 40.2%, MCV 86 fL, platelets 222,000/microliter, and WBC count 12,300/microliter with differential count 72 segs, 9 bands, 13 lymphs, 5 monos, and 1 eosinophil. A urine dipstick analysis shows sp gr. 1.017, pH 6, leukocyte esterase positive, nitrite positive, protein negative, glucose negative, and blood negative. Which of the following microscopic urinalysis findings would be most diagnostic for her renal disease?

- a) Broad renal casts
- b) Oval fat bodies
- c) Renal tubular epithelial cells
- d) White blood cell casts
- e) Triple phosphate crystals

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24. A 53-year-old woman has had chronic arthritis pain for the past 3 years. She has taken 2 gm of phenacetin a day for her pain over that time. She now has increasing fatigue. There are no abnormal findings on physical examination. Laboratory studies show her serum urea nitrogen is 52 mg/dL and creatinine 5.4 mg/dL. Which of the following pathologic findings is most likely present in her kidneys?

- a) Papillary necrosis
- b) Focal segmental glomerulosclerosis
- c) Nephrocalcinosis
- d) Acute interstitial nephritis
- e) Arteriolosclerosis

25. A 25-year-old woman has been hospitalized for treatment of a Staphylococcus aureus abscess of her left thigh complicating a puncture wound. The wound is incised and drained and she receives antibiotic therapy. She is improving and discharged home a week later, but the next day she develops a fever. On physical examination her temperature is 38.1 C and there is a diffuse erythematous skin rash of her trunk and extremities. A urinalysis shows sp gr 1.020, pH 6.5, 1+ blood, 1+ protein, no glucose, and no ketones. There are 10-20 WBCs/hpf and 1-5 RBCs/hpf, and a few eosinophils are noted on urine microscopic examination. Which of the following is the most likely diagnosis?

- a) Acute tubular necrosis
- b) Analgesic abuse nephropathy
- c) Drug-induced interstitial nephritis
- d) Hemolytic-uremic syndrome
- e) Post-infectious glomerulonephritis
- f) Urinary tract infection

26. A 40-year-old previously healthy man has the sudden onset of severe right flank pain that comes in waves all night long. When he is seen in the emergency room, after waiting for two hours, he is exhausted. On physical examination there are no abnormal findings. Urinalysis reveals no ketones, glucose, protein, nitrite, or urobilinogen, but blood is present. Urine microscopic examination shows many RBCs but few WBCs. The specific gravity is 1.015 and the pH is 5.5. Which of the following is the most likely diagnosis?

- a) Benign prostatic hyperplasia
- b) Membranous glomerulonephritis
- c) Ureteral calculus
- d) Renal angiomyolipoma
- e) Urothelial carcinoma of bladder

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27. A 15-year-old girl has had increasing lethargy following a bout of the "flu" 3 weeks ago. On physical examination there are no abnormal findings. Her condition does not improve after 3 weeks on corticosteroid therapy, so a renal biopsy is performed. Microscopic examination shows segmental sclerosis of 3 of 10 glomeruli identified in the biopsy specimen. Immunofluorescence studies and electron microscopy do not show immune deposits. What is the most appropriate advice to give the girl's parents regarding her condition?

- a) She may require a renal transplant in 10 years
- b) She will probably improve with additional corticosteroid therapy
- c) She will likely develop a restrictive lung disease
- d) She has an underlying malignancy
- e) She will improve if she loses weight

28. A 59-year-old man notes blood in his urine for the past week. On physical examination there are no abnormal findings. A urinalysis confirms the presence of blood, but no proteinuria or glucosuria. A urine culture is negative. A cystoscopy is performed, and a 3 cm exophytic mass is seen in the dome of the bladder. A biopsy of this mass is performed and microscopic examination reveals fibrovascular cores covered by a thick layer of transitional cells. Which of the following risk factors is most likely to have led to development of this lesion?

- a) Diabetes mellitus
- b) Recurrent urinary tract infection
- c) Therapy with methicillin
- d) Cigarette smoking
- e) Tuberous sclerosis
- f) Use of NSAIDs

29. A 53-year-old woman has noted fever and right flank pain for the past 3 days. On physical examination her temperature is 38.4 C and there is right costovertebral angle tenderness. A urinalysis reveals sp. gr. 1.010, pH 7.5, no glucose, no protein, no ketones, and 1+ blood. Many WBCs and WBC casts are seen on urine microscopic examination. An abdominal radiograph reveals a radiopaque calculus that forms a cast of a dilated right renal collecting system. A urine culture grows *Proteus vulgaris*. Which of the following crystals is most likely to be seen in large numbers on microscopic urinalysis in this woman?

- a) Calcium oxalate
- b) Cystine
- c) Calcium phosphate
- d) Uric acid
- e) Magnesium ammonium phosphate

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30. A 60-year-old man was diagnosed last year with adenocarcinoma of the lung, and he underwent right lower lobectomy. For the past 3 weeks he has had increasing malaise. On physical examination he has pitting edema to his knees and presacral edema. Abdominal and chest CT scans show scattered hepatic mass lesions and hilar lymphadenopathy. A urinalysis reveals 4+ proteinuria, and his 24 hour urine protein is 2.7 gm. His serum urea nitrogen is 55 mg/dL with creatinine of 6.1 mg/dL. A renal biopsy is performed, and there is focal deposition of IgG and C3 with a granular pattern. Which of the following forms of glomerular disease is he most likely to have?

- a) **Membranous glomerulonephritis**
- b) Rapidly progressive glomerulonephritis
- c) Nodular glomerulosclerosis
- d) Goodpasture syndrome
- e) Membranoproliferative glomerulonephritis, type II

31. A clinical study is performed with subjects born with congenital urinary tract anomalies to assess the development of long term complications. One group of subjects is found to have an increased risk for development of urothelial carcinoma. Which of the following congenital anomalies is most likely to carry this risk?

- a) Unilateral renal agenesis
- b) **Bladder exstrophy**
- c) Bilateral ureteral duplication
- d) Horseshoe kidney
- e) Medullary sponge kidney

32. A 55-year-old man has had dysuria for the past week. Over the past 2 days he has experienced shaking chills. On physical examination his temperature is 39.3 C.. A urinalysis shows sp gr 1.016, pH 6, 1+ glucose, 1+ blood, no ketones, and no protein. Urine microscopic examination shows numerous WBCs and WBC casts. His serum creatinine is 1.5 mg/dL and glucose 155 mg/dL with hemoglobin A1C 8.7%. A renal ultrasound scan shows a 0.3 cm free floating echodense object in the left renal pelvis. Which of the following complications has this man most likely developed?

- a) Acute tubular necrosis
- b) Aspergillus fungus ball
- c) Cystine calculus
- d) Hematoma
- e) **Papillary necrosis**
- f) Renal cell carcinoma
- g) Urothelial carcinoma

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33. A 49-year-old woman has had increasing malaise for the past 6 months. On physical examination there are no abnormal findings except for diminished sensation to pinprick and light touch in her lower legs and feet. She is afebrile and normotensive. Laboratory studies show serum creatinine 4.5 mg/dL, urea nitrogen 42 mg/dL, glucose 130 mg/dL, and hemoglobin A1C 7.9%. A urinalysis shows 1+ glucose, 1+ protein, no blood, and no ketones. Urine microscopic examination shows 1 RBC/hpf and 1 WBC/hpf. Which of the following pathologic abnormalities is she most likely to have in her kidneys?

- a) Acute pyelonephritis
- b) Acute tubular necrosis
- c) Chronic glomerulonephritis
- d) Hydronephrosis
- e) Hyperplastic arteriosclerosis
- f) Membranous glomerulonephritis
- g) Nodular glomerulosclerosis
- h) Polycystic change

34. A 25-year-old G3 P2 woman has felt no fetal movement by 18 weeks gestation. Fetal ultrasound scan reveals the lack of amniotic fluid, making imaging difficult, but bilaterally asymmetrically enlarged fetal kidneys are seen. No fetal bladder can be visualized. The fetal heart appears to have four chambers, and the feet have marked varus deformities. At the time of birth at 36 weeks gestation, the neonate has severe respiratory difficulty. Which of the following is the most likely diagnosis?

- a) Bilateral Wilms tumor
- b) Dominant polycystic kidney disease
- c) Urethral atresia
- d) Hypospadias
- e) Multicystic renal dysplasia

35. A 49-year-old woman has been hospitalized for the past 10 days for treatment of bronchopneumonia. She has developed chills and fever over the past 2 days. On physical examination her temperature is 38.8 C and she has a diffuse erythematous skin rash. Laboratory studies show serum creatinine 2.2 mg/dL and glucose 73 mg/dL. A peripheral blood smear reveals eosinophilia. On urinalysis she has 2+ proteinuria but no blood, glucose, or ketones. Which of the following is the most likely diagnosis?

- a) Post-streptococcal glomerulonephritis
- b) Drug-induced interstitial nephritis
- c) IgA nephropathy
- d) Acute tubular necrosis
- e) Acute serum sickness

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36. A clinical study is performed with subjects diagnosed with hypertension who underwent an extensive workup to determine possible treatable causes for the hypertension. It is observed that some causes for hypertension are surgically correctable, while other causes are amenable to pharmacologic therapy. Laboratory findings in the subjects are analyzed. Which of the following laboratory test findings is most likely to be present in subjects with hypertension treated by drugs, rather than by surgery?

- a) Hyperaldosteronemia
- b) Hyperreninemia
- c) Increased catecholamines
- d) Hypercalcemia
- e) Positive serology for antinuclear antibody

37. A 30-year-old man has had increasing malaise with fever, abdominal pain, and weight loss of 3 kg over the past 3 weeks. On physical examination his blood pressure is 160/110 mm Hg. He has a stool positive for occult blood. A urinalysis reveals hematuria but no proteinuria or glucosuria. He has no serum anti-neutrophil cytoplasmic autoantibodies and his antinuclear antibody test is negative. Aneurysmal arterial dilations and occlusions are seen in the medium sized renal and mesenteric arteries with angiography. He improves with corticosteroid therapy. Which of the following is the most likely diagnosis

- a) Benign nephrosclerosis
- b) Fibromuscular dysplasia
- c) Nodular glomerulosclerosis
- d) Polyarteritis nodosa
- e) Systemic lupus erythematosus
- f) Thrombotic microangiopathy
- g) Wegener granulomatosis

38. A young, sexually active man has a two day history of burning pain with urination. Physical examination reveals no penile lesions. A urinalysis reveals no blood, glucose, protein, or ketones, but the leukocyte esterase is positive. Urine microscopic examination shows 50 WBCs/hpf. A culture of penile secretions is negative for *Neisseria gonorrhoeae*. Which of the following infectious agents is most likely to cause his disease?

- a) Human papillomavirus
- b) *Hemophilus ducreyi*
- c) *Chlamydia trachomatis*
- d) *Treponema pallidum*
- e) Herpes simplex virus

Patho Renal

39. A 59-year-old man has experienced lower back pain for 4 months. On physical examination there are no abnormal findings. A urinalysis shows microscopic hematuria, but no proteinuria or glucosuria. An abdominal CT scan reveals a 6 cm solid mass in the upper pole of the right kidney. A right nephrectomy is performed, and the grossly variegated mass is seen microscopically to be composed of nests of cells with clear cytoplasm. Which of the following laboratory test findings likely to be associated with this lesion?

- a) Hypercalcemia
- b) Increased catecholamines
- c) Positive serology for hepatitis B surface antigen
- d) Hyponatremia
- e) Hyperaldosteronemia

40. A 30-year-old man has noted puffiness around his eyes and swelling of his feet for the past 2 weeks. On physical examination his blood pressure is 155/95 mm Hg. Urine microscopic examination reveals oval fat bodies. Which of the following conditions is he most likely to have?

- a) Ascending pyelonephritis
- b) Nephritic syndrome
- c) Nephrotic syndrome
- d) Obstructive uropathy
- e) Renal infarction
- f) Papillary necrosis

41. An 18-year-old primigravida has noted minimal fetal movement during pregnancy. She gives birth at 30 weeks gestation to a 2000 gm girl infant with Apgar scores of 4 and 5 at 1 and 5 minutes. The baby dies from respiratory distress within an hour of birth. At autopsy, the kidneys are markedly enlarged bilaterally. Microscopically, the renal parenchyma is replaced by numerous small radially arranged cysts. These findings are most likely to be seen in association with which of the following pathologic conditions?

- a) Holoprosencephaly
- b) Hepatic cysts and hepatic fibrosis
- c) Concomitant presence of an imperforate anus
- d) Lack of ureteral development
- e) Papilloma of the bladder

42. A 55-year-old man is found down and unconscious. On physical examination he is afebrile. After catheterization, he passes a small amount of dark urine. The urine dipstick test for blood is positive but no red blood cells are seen on microscopic examination of the urine sediment. Which of the following is the most likely diagnosis?

- a) Post-streptococcal glomerulonephritis
- b) Renal papillary necrosis
- c) Ureteral lithiasis
- d) Myoglobinuria
- e) Renal infarction

Patho Renal

43. A 5-year-old child has been noted by his mother to be lethargic for 2 weeks. On physical examination he has periorbital edema. He is afebrile. Dipstick urinalysis reveals no glucose, ketones, or blood, but he has 4+ proteinuria present. Microscopic urinalysis reveals no casts, but oval fat bodies are seen. He is treated with corticosteroid therapy and his condition improves. Which of the following renal electron micrographic findings is most characteristic for this child's disease?

- a) Fusion of foot processes
- b) Subepithelial electron dense deposits
- c) Duplication of glomerular capillary basement membranes
- d) Irregular thickening of the glomerular basement membranes
- e) Mesangial cell proliferation

44. A 70-year-old man has noted passing darker urine for the past week. On physical examination he has vital signs with T 37.1 C, P 73/minute, RR 16/minute, and BP 130/80 mm Hg. Laboratory studies include urinalysis with sp gr 1.015, pH 7, 2+ blood, no glucose, no protein, and no ketones. Urine microscopic examination shows 10 to 15 RBC/hpf and no WBCs, casts, or crystals. Cystoscopy is performed and no lesions are noted. Intravenous urography shows a 2 cm filling defect in the left renal pelvis. Which of the following laboratory test findings is most likely to be present in this man?

- a) Polycythemia
- b) Leukocytosis
- c) Hypercalciuria
- d) Positive serology for antinuclear antibody
- e) Urine cytology with atypical cells

45. A 10-year-old girl is brought to the physician because of increasing lethargy and passing dark-coloured urine for the past week. She had a sore throat two weeks prior to this. On physical examination she is afebrile with blood pressure 140/90 mm Hg. Laboratory studies show her serum creatinine is 2.8 mg/dL and urea nitrogen 24 mg/dL. Urinalysis shows 2+ blood, 1+ protein, no glucose, and no ketones. Microscopic urinalysis shows dysmorphic RBC's. A renal biopsy is performed and on microscopic examination shows glomerular hypercellularity, with PMNs present. Electron microscopy shows subepithelial electron dense "humps". Which of the following laboratory test findings is most likely to be present in this girl?

- a) Elevated serum glucose
- b) Antibody to double stranded DNA
- c) Antiglomerular basement membrane antibody
- d) Positive C3 nephritogenic factor
- e) Elevated antistreptolysin O titer

Patho Renal

46. A 41-year-old previously healthy man has had increasing nausea and lethargy for the past 4 days. He notes that his urine has a darker color. Physical examination reveals a blood pressure of 135/90 mm Hg. Laboratory findings reveal a serum urea nitrogen of 40 mg/dL and creatinine 3.8 mg/dL. Urinalysis shows sp gr 1.018, pH 6.5, 3+ blood, 1+ protein, no glucose, and no ketones. Urine microscopic examination shows numerous RBCs and RBC casts. He develops worsening renal failure over the next week, requiring emergent hemodialysis. Which of the following light microscopic findings on renal biopsy is most likely to be present in this man?

- a) Renal tubular epithelial necrosis
- b) Hypercellular glomeruli with neutrophils
- c) Nodular glomerulosclerosis
- d) Glomerular crescents
- e) Acute interstitial inflammation

47. A 45-year-old man has had a low-grade fever and malaise for the past 3 months. A physical examination shows his T 37.7 C, P 78/minute, RR 16/minute, and BP 125/80 mm Hg. Laboratory studies include a urinalysis showing sp gr 1.019, pH 7, 1+ blood, positive leukocyte esterase, and negative nitrite, protein, glucose, and ketones. Urine microscopic examination shows many WBC's in the urine but no casts or crystals. Urine bacterial culture is negative. Which of the following is the most likely diagnosis?

- a) Renal cell carcinoma
- b) Renal tuberculosis
- c) Renal infarction
- d) Renal artery stenosis
- e) Renal vein thrombosis

48. A 25-year-old man goes to his physician for a routine health maintenance examination. There are no abnormal findings on physical examination. A urinalysis shows sp. gr. 1.016, pH 6, blood 3+, protein 2+, and negative glucose, ketones, and nitrite. Urine microscopic examination shows RBC's but no casts. He has similar findings 6 months later. A renal biopsy is performed and microscopic examination shows mesangial IgA deposits by immunofluorescence. Which of the following clinical outcomes is most likely to occur in this man?

- a) Rapid progression to renal failure
- b) Slow progression to chronic renal failure
- c) Increased susceptibility to opportunistic infection
- d) Complete resolution following corticosteroid therapy
- e) Deafness

Patho Renal

49. A 55-year-old man has been a 2 pack per day smoker for the past 40 years. He has had a recent episode of hematuria. He has no abnormal physical examination findings. A cystoscopy is performed, and a 3 cm irregular, exophytic mass is seen in the right dome of the bladder. The mass is biopsied and reveals papillary fronds lined by 10 layers of cells with hyperchromatic nuclei and moderate amounts of pink cytoplasm. There are occasional mitoses. The tumor shows scattered areas of necrosis. The underlying muscularis is invaded by the tumor. Which of the following histologic criteria is most likely to determine therapy for this patient?

- a) Presence of papillary growth pattern
- b) Thickness of the epithelium
- c) Necrosis
- d) Presence of mitoses
- e) Muscular wall invasion

50. A 61-year-old woman has had malaise for the past 2 weeks. On physical examination she has presacral edema. Laboratory studies show a serum urea nitrogen of 50 mg/dL with creatinine 5.8 mg/dL. Which of the following urinalysis findings is most likely to be indicative of glomerulonephritis as a cause for her illness?

- a) Oval fat bodies
- b) Proteinuria
- c) Red blood cell casts
- d) Broad waxy casts
- e) White blood cell casts

51. A 32-year-old woman has had a cough for 3 days along with increasing weakness. She was surprised yesterday by coughing up a small amount of red-tinged sputum. Physical examination shows some small nodular purple lesions beneath the skin of her lower extremities. Her chest x-ray shows bilateral interstitial markings but no areas of consolidation and no masses. A urinalysis reveals microscopic hematuria and proteinuria. Her antinuclear antibody test is negative, but she has antineutrophil cytoplasmic autoantibodies. A renal biopsy is performed and on microscopic examination shows necrotizing glomerulonephritis without immune deposition. Which of the following is the most likely diagnosis?

- a) Diffuse scleroderma
- b) Systemic lupus erythematosus
- c) Post-infectious glomerulonephritis
- d) Microscopic polyarteritis
- e) Hemolytic-uremic syndrome
- f) Goodpasture syndrome

Patho Renal

52. A 40-year-old man has the sudden onset of severe lower abdominal pain last night. He notes passing bloody urine this morning. Physical examination reveals no abdominal tenderness or masses, and bowel sounds are active. An abdominal CT scan reveals a small bright rounded object in the region of the left ureter. Which of the following conditions is most likely to be the underlying cause for his acute illness?

- a) Hypercalciuria
- b) Hyperparathyroidism
- c) Urinary tract infection
- d) Gout
- e) Cystinosis

53. A 57-year-old man has been bothered by arthritis for the past 5 years. As a consequence, without reading the labels on over-the-counter medications, he has consumed large quantities (greater than 3 gm per year) of analgesics (aspirin, phenacetin, acetaminophen) for the past 5 years. He now has increasing malaise. On physical examination he is afebrile with blood pressure 140/90 mm Hg. Laboratory studies show serum creatinine 3.4 mg/dL, glucose 71 mg/dL, and hemoglobin 11.8 g/dL. Which of the following renal pathologic findings is most likely to be present in this patient?

- a) Acute tubular necrosis
- b) Urothelial carcinoma
- c) Chronic interstitial nephritis
- d) Diffuse glomerulosclerosis
- e) Urinary tract lithiasis

54. An experiment is performed in which glomerular injury is induced by cytokines obtained from T lymphocytes from subjects with minimal change disease. It is observed by electron microscopy that the podocyte foot processes become effaced. This fusion results in leakage of albumin, but not globulins, into Bowman's space. Through which of the following mechanisms is this selective proteinuria most likely mediated?

- a) Fenestrations in endothelial cells are enlarged.
- b) The anionic charge barrier is lost.
- c) The basement membrane is attenuated.
- d) Type IV collagen is lost.
- e) Glomerular filtration pressure is increased.

55. A 61-year-old man with a history of diabetes mellitus has been on hemodialysis for the past 12 years. During that time he has continued working and has had no major illnesses. Which of the following cystic changes is most likely to be present as a consequence of the chronic hemodialysis?

- a) Multiple cystic dilations of medullary collecting ducts
- b) Normal left kidney but enlarged right kidney with variably-sized cysts
- c) Markedly enlarged kidneys with multiple cysts along with a polycystic liver
- d) Bilaterally enlarged cystic kidneys along with congenital hepatic fibrosis
- e) Multiple 1 to 2 cm cortical and medullary cysts with small kidneys bilaterally

Patho Renal

56. A 69-year-old woman with Parkinson disease dies from pneumonia. She was treated for hypertension for the past 10 years of her life. Just prior to death her serum urea nitrogen was 15 mg/dL. At autopsy her slightly small kidneys have a granular surface. On microscopic examination the kidneys show scattered hyalinized glomeruli, interstitial fibrosis with focal tubular atrophy, and arteriolar thickening. Which of the following renal diseases is most likely to be present?

- a) Nodular glomerulosclerosis
- b) Hyperplastic arteriolosclerosis
- c) Analgesic abuse nephropathy
- d) Benign nephrosclerosis
- e) Chronic pyelonephritis

57. A 49-year-old man has had pain and swelling of several joints, including the 1st metatarsophalangeal joint, knee, elbow, and 2nd proximal interphalangeal joint, episodically for the past 7 years. He has developed a nodule on his elbow during the past year. On physical examination there is a 2 cm diameter subcutaneous mass over his left elbow with overlying eroded skin. His blood pressure is 155/100 mm Hg. Laboratory findings include serum urea nitrogen of 55 mg/dL, creatinine 6.1 mg/dL, glucose 110 mg/dL, alkaline phosphatase 22 U/L, and uric acid 18.2 mg/dL. This mass is excised and is composed of chalky white material. A month later he passes a small urinary calculus along with bloody urine. Which of the following pathologic findings is most likely to be present in his kidneys?

- a) Polycystic change
- b) Chronic inflammation with plasma cells
- c) Needle-like interstitial crystals
- d) Hyperplastic arteriosclerosis
- e) Glomerular basement membrane thickening

58. A 26-year-old African-American man has had a history of painful abdominal crises for the past 20 years. On physical examination there are no abnormal findings. Laboratory studies include a hemoglobin electrophoresis that shows 96% Hgb S, 3% Hgb A2, and 1% Hgb F. Which of the following renal pathologic abnormalities is he most likely to develop?

- a) Chronic glomerulonephritis
- b) Medullary sponge kidney
- c) Nephrocalcinosis
- d) Necrotizing vasculitis
- e) Papillary necrosis

Patho Renal

59. Four young Marines with no medical problems (but with disciplinary problems) abscond with 3 cases of beer from the officer's club and commandeer a landing craft. After consuming the beer in transit to a nearby offshore island, they "hit the beach" both literally and figuratively. Which of the following injuries to these Marines is most likely to occur in this situation?

- a) Ruptured bladder
- b) Penile hematoma
- c) Renal laceration
- d) Ureteral avulsion
- e) Renal arterial laceration

60. A 28-year-old man has had increasing malaise with myalgias and arthralgias for the past month. He notes a lot of foam in the toilet when he urinates. On physical examination he has 2+ pitting edema to the knees and blood pressure 140/90 mm Hg.. A urinalysis shows: sp gr 1.012, pH 6, 4+ protein, 1+ blood, and no glucose or ketones. He has a positive antinuclear antibody test and negative antineutrophil cytoplasmic autoantibody test. He receives a course of corticosteroid therapy and does not improve. A renal biopsy is performed and on microscopic examination shows increased mesangial cells and mesangial matrix, with reduplication of basal lamina seen by electron microscopy. There is granular deposition of C3 and IgG by immunofluorescence staining. Which of the following diseases is he most likely to have?

- a) Nodular and diffuse glomerulosclerosis
- b) Rapidly progressive glomerulonephritis
- c) Focal segmental glomerulosclerosis
- d) Membranoproliferative glomerulonephritis
- e) Minimal change disease

61. In an international World Cup football (soccer) match, the Italian mid-fielder is victimized by some vicious tackling by the Argentinian defense. Following the game (and after several beers at a local bar) a urine sample from the mid-fielder is obtained. Which of the following urine microscopic findings is most likely to be present?

- a) Proteinuria
- b) Oval fat bodies
- c) Hemolyzed RBC's
- d) Renal tubular epithelial cells
- e) White blood cells

Patho Renal

62. A 33-year-old man has had episodes of dysuria and frequency of urination over the past 14 years. There are no abnormal physical examination findings. A urinalysis shows a positive leukocyte esterase and nitrite but negative blood, protein, glucose, and ketones. Urine microscopic examination shows numerous WBCs. An intravenous urogram demonstrates a 1.5 cm true diverticulum of the bladder. Which of the following is most likely to be the origin for his disease?

- a) Recurrent urinary tract infection
- b) Persistent urethral obstruction
- c) Congenital anomaly
- d) Bladder calculi
- e) Urothelial carcinoma

63. A 6-year-old girl has had dysuria with multiple bacterial urinary tract infections diagnosed over the past 2 years. There are no abnormal findings on physical examination. A urinalysis reveals a positive leukocyte esterase but negative blood, protein, glucose, and ketones. An abdominal ultrasound scan reveals that her kidneys are of normal size and consistency, but that there is mild hydroureter on the right. Voiding cystourethrography reveals obstruction on the right at the level of the bladder. Which of the following conditions is most likely to be present in this girl?

- a) Urothelial carcinoma
- b) Abnormal ureteral insertion
- c) Schistosomiasis
- d) Ureteritis cystica
- e) Ureteral calculus

64. A 60-year-old woman has had increasing malaise along with back pain for the past month. On physical examination there are no abnormal findings. Laboratory studies show hemoglobin 10.9 g/dL, hemoglobin A1C 3.3%, serum urea nitrogen 48 mg/dL, creatinine 2.8 mg/dL, total protein 8.5 g/dL, and albumin 3.9 g/dL. A renal biopsy is performed and on microscopic examination shows pink, amorphous, irregular glomerular deposits which by electron microscopy contain only irregular fibrils in a beta-pleated sheet. Which of the following is the most likely diagnosis?

- a) Multiple myeloma
- b) Systemic lupus erythematosus
- c) Metastatic breast carcinoma
- d) Diabetes mellitus
- e) Chronic lymphocytic leukemia

Patho Renal

65. A 51-year-old woman has had multiple urinary tract infections for most of her adult life. A variety of bacterial organisms, including Streptococcus, Proteus, and Escherichia have been cultured, and the infections have responded to antibiotic therapy. She does not have any other significant medical problems. A physical examination reveals no abnormal findings. An intravenous urogram and voiding cystourethrogram have shown no evidence for obstruction. Which of the following renal complications is most likely to develop in this patient?

- a) Polycystic change
- b) Acute pyelonephritis
- c) Urothelial carcinoma
- d) Urate nephropathy
- e) Benign nephrosclerosis

66. A 55-year-old man has had uncontrolled diabetes mellitus for over 20 years. Laboratory studies show his serum creatinine is 6.7 g/dL with urea nitrogen 61 mg/dL and glucose 139 mg/dL. He undergoes renal transplantation from a cadaveric donor. Which of the following pathologic abnormalities is most likely to recur or occur de novo in his transplanted kidney?

- a) Nodular glomerulosclerosis
- b) Lupus nephritis
- c) Membranous glomerulonephritis
- d) Renal cell carcinoma
- e) Antiglomerular basement membrane disease

67. An 11-year-old boy has had increasing lethargy for the past week. On physical examination he is afebrile; his blood pressure is 135/85 mm Hg. He has periorbital edema. Urinalysis reveals 3+ proteinuria with both albumin and immunoglobulins, but no glucosuria or hematuria. A 24 hour urine protein is 2.1 gm. His serum complement C3 and C4 levels are normal. His antinuclear antibody test is negative. The child does not improve despite corticosteroid therapy. Which of the following is the most likely diagnosis?

- a) Membranous glomerulonephritis
- b) Minimal change disease (MCD)
- c) Systemic lupus erythematosus
- d) Focal segmental glomerulosclerosis
- e) Membranoproliferative glomerulonephritis
- f) Goodpasture syndrome
- g) IgA nephropathy

Patho Renal

68. A 40-year-old man comes to the emergency room because of excruciating pain in the lower abdomen. The pain has come in waves for 3 hours. On physical examination he is afebrile and normotensive. A urinalysis reveals hematuria, but no proteinuria, glucosuria, or WBCs. Which of the following is the most likely diagnosis?

- a) Urothelial carcinoma of the bladder
- b) Prostatic hyperplasia with obstructive uropathy
- c) Idiopathic hypercalciuria with calcium oxalate stone
- d) Acute pyelonephritis with staghorn calculus
- e) Gout with uric acid stone

69. 46-year-old African-American man dies suddenly, and the medical examiner performs an autopsy. She finds a large right basal ganglia hemorrhage. There is arteriosclerosis of small cerebral arterial branches. Which of the following pathologic findings is most likely to be present in this man's kidneys?

- a) Fibromuscular dysplasia of the renal artery
- b) Vasculitis with mononuclear cell infiltrates
- c) A linear pattern of glomerular capillary IgG deposition by immunofluorescence
- d) Arteriolar fibrinoid necrosis with microhemorrhages
- e) Nodular and diffuse glomerulosclerosis

70. A 27-year-old woman has felt tired for 6 weeks. She "aches all over" from myalgias and arthralgias. On physical examination there is a malar skin rash. She has no joint deformities or decreased range of motion of extremities. Laboratory studies show a positive antinuclear antibody test with titer of 1:512. Her serum urea nitrogen is 61 mg/dL and creatinine 5.4 mg/dL. Which of the following pathologic abnormalities is most likely to be present in her renal biopsy?

- a) Mesangial C1q deposition
- b) Increased neutrophils
- c) Duplication of the glomerular basement membrane
- d) Segmental glomerular scarring
- e) Proximal tubular necrosis

71. A 34-year-old woman has been bothered for years by severe migraine-like headaches for which she has taken large quantities of phenacetin and aspirin. She presents in the emergency room with sudden onset of flank pain and hematuria after she voided fragments of necrotic appearing tissue. On physical examination she is afebrile but has a blood pressure of 155/105 mm Hg. After this crisis, it is noted that on urinalysis, the specific gravity never exceeds 1.010. Which of the following pathologic findings is most likely to be present in her kidneys?

- a) Nephrolithiasis
- b) Acute tubular necrosis
- c) Renal papillary necrosis
- d) Chronic pyelonephritis
- e) Nodular glomerulosclerosis

Patho Renal

72. In an experiment, subjects collect all voided urine over a 24 hour period. The volume of the samples is recorded. The amount of creatinine in these samples is measured. These findings are most likely to be useful as an index of which of the following renal physiologic functions?

- a) Glomerular filtration rate
- b) Renal blood flow
- c) Tubular secretory capacity
- d) Concentrating ability
- e) Reabsorption capacity

73. A clinical study of urine colour is performed. Subjects who are healthy and have serum creatinine values in the normal range and urinalysis specimens without proteinuria, hematuria, or glucosuria are included in the study. It is observed that the colour is light amber. This colour is most likely due to the presence of which of the following substances in the urine?

- a) Bilirubin
- b) Melanin
- c) Lipochrome
- d) Urochrome
- e) Homogentisic acid

74. A 10-year-old girl has had increasing malaise for a week. On physical examination she has periorbital edema. Her blood pressure is 140/90 mm Hg. Laboratory studies show a serum urea nitrogen of 30 mg/dL and creatinine 3.4 mg/dL. A microscopic urinalysis shows hematuria with dysmorphic RBC's. A renal biopsy is performed and on microscopic examination shows glomerular hypercellularity with PMN's present. There are subepithelial electron dense "humps" seen by electron microscopy. What additional laboratory test finding is most likely to be present in this girl?

- a) Elevated serum glucose
- b) Antibody to double stranded DNA
- c) Elevated antistreptolysin O titer
- d) Antiglomerular basement membrane antibody
- e) Positive C3 nephritogenic factor

75. A 20-year-old previously healthy man has noted darker urine for the past week, but this abates in a week. Three months later, he passes reddish urine. On physical examination he is afebrile, but his blood pressure is 145/90 mm Hg. A urinalysis reveals 4+ blood, 4+ protein, no ketones, and no glucose. On urine microscopic examination, a few RBC casts are noted, but no WBC casts. He progresses to end stage renal disease in 10 years. Which of the following pathologic findings is most characteristic on renal biopsy for this man's disease?

- a) Linear deposition of IgG along basement membranes
- b) Mesangial IgA deposition
- c) Granular deposition of IgG and C3 within basement membranes
- d) Reduplication of basement membranes
- e) Nodular deposition of mesangial matrix in glomerular tufts

Patho Renal

76. A study is performed utilizing renal biopsy specimens from patients who had minimal change disease. On light microscopy of these specimens, there are no abnormal findings. Immunohistochemical staining with antibody to renin is performed on these biopsies. In which of the following cells is renin most likely to be localized?

- a) Glomerular capillary endothelium
- b) Glomerular mesangium
- c) Juxtaglomerular cells
- d) Podocytes
- e) Medullary interstitium

77. A clinical study is performed with subjects who develop severe, degenerative renal disease progressing to end stage renal disease. The urinalysis findings of these subjects are reviewed. It is observed that urinary casts are frequently seen on urine microscopic examination from these subjects. Which of the following type of urinary cast is most likely to be seen in the urine of these subjects?

- a) Coarse granular cast
- b) Fatty cast
- c) Hyaline cast
- d) RBC cast
- e) Waxy cast

78. A 70-year-old has had increasing lethargy for the past 5 years. There are no remarkable physical examination findings. Laboratory studies have shown that his serum creatinine has risen from 1.9 to 6.6 mg/dL over that time. He also has ischemic heart disease. Following an episode of severe angina, he became hypotensive for 12 hours. Following this episode he was placed on hemodialysis. Which of the following laboratory test findings is most characteristic for his underlying disease process leading to chronic renal failure?

- a) Hypergammaglobulinemia
- b) Anti-glomerular basement membrane antibody
- c) Elevated hemoglobin A1C
- d) Increased prostate specific antigen
- e) High anti-streptolysin O titer

79. A 33-year-old man has been diagnosed with Hodgkin disease. As part of a staging workup an abdominal CT scan is performed that shows the lower poles of the kidneys are bridged by tissue with the same attenuation as the kidneys. A urinalysis is performed and no abnormal findings are noted. His serum creatinine is 1.1 mg/dL. This man's CT scan finding is most likely to represent which of the following categories of disease?

- a) Neoplastic
- b) Congenital
- c) Inflammatory
- d) Traumatic
- e) Vascular

Patho Renal

80. An 18-year-old woman has had arthralgias for the past 6 months along with intermittent fevers. On physical examination her temperature is 36.9 C with blood pressure 165/110 mm Hg. A chest radiograph reveals bilateral pleural effusions. A CBC shows a WBC count of 3200/microliter, hemoglobin 10.8 g/dL, and platelet count of 74,000/microliter. She has proteinuria of 3.8 g/day. Which of the following is the most likely cause for her renal disease?

- a) Chronic pyelonephritis
- b) Amyloidosis
- c) Systemic lupus erythematosus
- d) Alport syndrome
- e) Membranous glomerulonephritis

81. A 30-year-old G2 P1 woman has not felt any fetal movement during pregnancy. An ultrasound is performed at 18 weeks gestation and reveals oligohydramnios. Visualization of fetal structures is difficult, but it appears that both kidneys are present, though both appear to have cysts present, and the left kidney is larger than the right. The bladder is not seen. No other anomalies are noted. A termination of pregnancy is elected. At autopsy, the fetal kidneys are replaced by cysts from 0.2 to 1 cm in size. Microscopically, there are thin walled cysts with intervening fibrous stroma containing some residual glomeruli and scattered islands of cartilage. Which of the following is the most likely diagnosis?

- a) Dominant polycystic kidney disease
- b) Medullary sponge kidney
- c) Acquired cystic kidney disease
- d) Recessive polycystic kidney disease
- e) Multicystic renal dysplasia

82. An autopsy study is conducted in which cases of adult patients dying from Alzheimer disease are analyzed for associations with renal vascular diseases. In one set of cases, microscopic examination of the kidney shows hyaline arteriosclerosis. Which of the following conditions is most likely to be associated with this finding?

- a) Renal artery stenosis in the opposite kidney
- b) Elevated titer of C-ANCA antibodies
- c) Viral hepatitis
- d) Systemic lupus erythematosus
- e) Sickle cell anemia

Patho Renal

83. A 50-year-old man has experienced several episodes of severe lower abdominal pain during the past week. Yesterday he passed a small calculus in his urine, which was reddish. On physical examination there are no abnormal findings. Laboratory studies show hematuria. Analysis of this stone reveals that it is composed of magnesium ammonium phosphate. Which of the following conditions is this man most likely to have?

- a) Gout
- b) Pyelonephritis
- c) Hyperparathyroidism
- d) Chronic liver disease
- e) Oxalosis

84. A clinical study is performed with adult subjects diagnosed with hypertension. It is observed that one group of patients had conditions which could be treated by surgery rather than by long-term use of antihypertensive drugs. Which of the following diseases is most likely to be amenable to surgical therapy?

- a) Wegener granulomatosis
- b) Fibromuscular dysplasia
- c) Polyarteritis nodosa
- d) Malignant nephrosclerosis
- e) Renal vein thrombosis

85. A 65-year-old woman has had increasing malaise for the past 6 months. On physical examination she has a blood pressure of 145/95 mm Hg. Laboratory studies show her serum creatinine is 3.5 mg/dL. A renal scan reveals bilateral small, shrunken kidneys. Her serum creatinine continues to rise. 5 years later she receives a cadaveric renal transplant. She initially does well, but two years later she now has slow and progressive loss of renal function with diminished renal blood flow in the transplant kidney. What is the most probable cause for her loss of renal function following the transplant procedure?

- a) Lupus nephritis
- b) Amyloidosis
- c) Chronic rejection
- d) Urate nephropathy
- e) Microscopic polyangiitis

86. A 41-year-old woman has an abdominal CT scan performed because of a family history of renal neoplasms and seizures. A 5 cm right upper renal mass is present that is solid but heterogenous. A partial nephrectomy is performed. Microscopically, the mass is composed of adipose tissue with admixtures of smooth muscle and thick-walled blood vessels. Which of the following abnormalities of the nervous system is most likely to be present in this woman?

- a) Encephaloele
- b) Berry aneurysm
- c) Auditory nerve deafness
- d) Vasculitis
- e) Cerebral cortical tubers

Patho Renal

87. A 49-year-old woman has developed a fever with nausea and headache over the past week. On physical examination her blood pressure is 150/90 mm Hg. Laboratory studies show a serum urea nitrogen of 27 mg/dL and creatinine of 2.5 mg/dL. Her serum antinuclear antibody test is negative, but the cytoplasmic pattern of antineutrophil cytoplasmic antibody is positive. A renal biopsy is performed and microscopic examination shows a granulomatous vasculitis. She improves following a course of prednisone and cyclophosphamide therapy. Which of the following is the most likely diagnosis?

- a) Scleroderma
- b) Polyarteritis nodosa
- c) Diabetes mellitus
- d) Wegener granulomatosis
- e) Goodpasture syndrome

88. A 31-year-old man has noted increased swelling of his feet over the past month. On physical examination he is afebrile but his blood pressure is 140/90 mm Hg. There is 2+ pitting edema to his knees. A urinalysis reveals 4+ proteinuria but no hematuria or glucosuria. No WBCs or RBCs are seen on microscopic urinalysis. He receives a course of corticosteroid therapy and does not improve. Over the next 3 years his serum urea nitrogen and creatinine become increasingly elevated. He requires hemodialysis. He then receives a cadaveric renal transplant which functions well for 18 months, but then the proteinuria recurs, and progressive renal failure ensues. Which of the following conditions is most likely to produce these findings?

- a) Focal segmental glomerulosclerosis
- b) Goodpasture syndrome
- c) Minimal change disease
- d) IgA nephropathy
- e) Systemic lupus erythematosus

89. A 20-year-old woman has a routine pre-employment check of her health status. There are no abnormal findings on physical examination. A urinalysis is performed and shows sp gr 1.017, pH 6.5, and no blood, protein, glucose, or ketones. Urine microscopic examination shows many squamous epithelial cells. The presence of the squamous cells in her urine is most likely the result of which of the following?

- a) Contamination
- b) Schistosomiasis
- c) Chronic cystitis
- d) Urinary tract calculus
- e) Nephrotic syndrome

Patho Renal

90. A 28-year-old man has the sudden onset of hemoptysis and hematuria. On physical examination his blood pressure is 150/95 mm Hg. Laboratory studies show a serum urea nitrogen of 64 mg/dL. A renal biopsy is performed. By immunofluorescent staining there is linear deposition of IgG along the glomerular basement membrane. He has antiglomerular basement membrane antibody in his serum. Which of the following is the most likely diagnosis?

91. A 29-year-old woman has developed a fever over the past week along with pleuritic chest pain. On physical examination her temperature is 37.5 C. Laboratory studies show her serum creatinine is 2.7 mg/dL with urea nitrogen 25 mg/dL. Microscopic urinalysis reveals numerous RBC, WBC, and granular casts. She has decreased serum levels of both C3 and C4 complement. A renal biopsy is performed. By light microscopy there are thickened capillary loops and mesangial proliferation in all glomeruli. Deposition of IgG and C3 in the glomerular basement membrane is seen by immunofluorescence. By electron microscopy there are epimembranous, subendothelial, and mesangial electron dense deposits. Which of the following is the most likely diagnosis?

- a) Alport syndrome
- b) Membranous glomerulonephritis
- c) Diabetic glomerulosclerosis
- d) Systemic lupus erythematosus 91
- e) Goodpasture syndrome 90
- f) Minimal change disease
- g) IgA nephropathy
- h) Wegener granulomatosis

92. A 65-year-old woman has developed problems swallowing over the past 4 months. On occasion, her fingers turn cold and blue upon exposure to cold. On physical examination she has sclerodactyly. Though hypertensive for years, she now is noted to have a blood pressure of 300/150 mm/Hg. Upper GI endoscopy reveals lower esophageal narrowing. Which of the following vascular findings is most likely to be present in her kidneys?

93. A 42-year-old woman has had a fever with increasing dyspnea and cough productive of rust-colored sputum for 3 weeks. On physical examination her temperature is 37.4 C and blood pressure 155/100 mm Hg. A chest radiograph reveals nodular infiltrates. Laboratory studies show a serum creatinine of 3.5 mg/dL with urea nitrogen of 35 mg/dL, negative antinuclear antibody test, anti-streptolysin O titer that is not increased, and increased C-ANCA, but negative P-ANCA. Which of the following vascular lesions is most likely to involve her kidneys?

- a) Fibromuscular dysplasia
- b) Leukocytoclastic angiitis
- c) Arteriolar fibrinoid necrosis 92
- d) Microaneurysms
- e) Hyaline arteriosclerosis
- f) Calcific medial sclerosis
- g) Occlusive atherosclerosis
- h) Granulomatous vasculitis 93

Patho Renal

94. A 58-year-old man has noted passing dark colored urine for the past week. On physical examination there are no abnormal findings. Urinalysis reveals hematuria without proteinuria, glucosuria, or pyuria. He worked in the printing and dyeing business had exposure to aniline dyes for many years. Which of the following neoplasms is he most likely to have?

95. A 5-year-old boy is noted to have the need to urinate frequently, and he complains of discomfort in doing so. On physical examination there are no abnormal findings. A urinalysis shows the sp gr 1.017, pH 5.5, 4+ blood, 1+ protein, glucose negative, leukocyte esterase negative, and ketones negative. A pelvic CT scan reveals a large mass that involves the bladder wall. Which of the following neoplasms is he most likely to have?

- a) Angiomyolipoma
- b) Mesoblastic nephroma
- c) Adenocarcinoma
- d) Squamous cell carcinoma
- e) Neuroblastoma
- f) Pheochromocytoma
- g) Rhabdomyosarcoma 95
- h) Urothelial carcinoma 94

96. A 50-year-old man with chronic renal failure on hemodialysis undergoes renal transplantation. The allograft ceases to function abruptly within minutes after anastomosis during surgery. Which of the following is the most likely reason for failure of his transplanted kidney?

97. A 60-year-old woman with dominant polycystic kidney disease develops chronic renal failure and receives a living-related donor kidney. There is a slow and progressive loss of renal function 6 months following renal transplantation. Which of the following is the most likely reason for failure of her transplanted kidney?

- a) Hyperacute rejection 96
- b) Acute rejection
- c) Chronic rejection 97
- d) Cyclosporin nephrotoxicity
- e) Preservation injury

Patho Renal

98. A study is performed with subjects who were healthy who had routine urinalysis performed. It is observed that these subjects have almost no findings on urine microscopic examination. Which of the following types of urinary cast is most likely to be observed in these subjects?

99. A study is performed with subjects who had more than 3.5 g/day of protein in their urine. Routine urinalysis is performed on these subjects and they have almost no findings on urine microscopic examination. Which of the following types of urinary cast is most likely to be observed in these subjects?

- a) Waxy casts
- b) WBC casts
- c) RBC casts
- d) Fatty casts 99
- e) Hyaline casts 98

100. A 35-year-old woman has a history of intravenous drug use and develops the sudden onset of fever. On physical examination her temperature is 39.5 C and blood pressure 80/40 mm Hg. Laboratory studies include a blood culture positive for *Staphylococcus aureus*. Which of the following pathologic findings is most likely to be present in her kidneys?

101. A 28-year-old man suffers a severe crush injury to the lower extremities. On physical examination he is afebrile and normotensive. However, he develops rhabdomyolysis and his urine output drops. Which of the following pathologic findings is most likely to be present in his kidneys?

- a) Acute tubular necrosis 101
- b) Subepithelial "hump" deposits
- c) Thrombosis and necrosis of interlobular renal arteries
- d) Chronic interstitial nephritis
- e) Microabscesses 100

102. A 49-year-old man from the northeastern part of Africa has recently emigrated to Italy. He is bothered by increasing difficulty urinating. He states that in the past, he had episodes when he observed blood in his urine, but this has not happened since he arrived in Italy. On physical examination there are no abnormal findings. Cystoscopy reveals a mass lesion in the dome of the bladder, and on microscopic examination this is a squamous cell carcinoma. Which of the following is the most likely risk factor for development of his disease?

103. A 56-year-old woman has had episodes of dysuria in the past from urinary tract infections. On physical examination now there are no abnormal findings. Laboratory studies show both glucosuria and proteinuria on urinalysis, but there is no blood or ketones. Her serum hemoglobin A1C is 8.5%. Which of the following is the most likely risk factor for development of her disease?

- a) Ethylene glycol
- b) Cigarettes
- c) Snails 102
- d) Cheeseburgers 103
- e) Aniline dyes

Patho Renal

104. A 55-year-old woman goes to her physician for a routine examination. She is found to have a blood pressure of 165/105 mm Hg but no other abnormal physical exam findings. Laboratory studies show her serum creatinine is 2.8 mg/dL with urea nitrogen 25 mg/dL. An abdominal ultrasound reveals bilaterally enlarged kidneys that appear to be composed of multiple large cysts. Which of the following statements regarding these findings is most appropriate to make to this patient?

- a) You are likely to have type II diabetes mellitus
- b) A fourth of your children are likely to develop this disease
- c) You are likely to need a liver transplant in 10 years
- d) Half your siblings are likely to have similar findings
- e) Your risk for developing a malignancy is very high

105. A 25-year-old woman has the sudden onset of fever, malaise and nausea. On physical examination she is afebrile. Her blood pressure is 160/90 mm Hg. She has presacral edema. A routine urinalysis shows 1+ protein, no ketones, no glucose, and 4+ blood, with RBC casts seen on urine microscopic examination. A renal biopsy is performed and by light microscopy the glomeruli are hypercellular, with neutrophils present. By immunofluorescence there is granular deposition of IgG and C3 in glomerular capillary basement membranes. By electron microscopy there are electron dense subepithelial "humps". Infection with which of the following most likely preceded development of her renal disease?

- a) Hepatitis B
- b) Schistosoma hematobium
- c) Group A streptococcus
- d) Mycobacterium tuberculosis
- e) Candida albicans

PBD9 Chapter 20 and PBD8 Chapter 20: The Kidney

BP9 Chapter 13 and BP8 Chapter 14: The Kidney and Its Collecting System

1 A 71-year-old man has had decreased urine output <500 mL per day for the past 3 days. Physical examination shows vital signs with temperature 37° C, pulse 88/min, respiratory rate 18/min, and blood pressure 85/60 mm Hg. He has peripheral edema and diffuse rales on auscultation of the chest. Urinalysis shows specific gravity 1.019 and no protein, blood, glucose, ketones, WBCs, RBCs, or casts. His serum creatinine is 3.3 mg/dL, and urea nitrogen is 62 mg/dL. The fractional excretion of sodium (FE_{Na}) is <1%. Which of the following underlying conditions is he most likely to have?

- A Dilated cardiomyopathy
- B Membranous nephropathy
- C Prostatic hyperplasia
- D Systemic lupus erythematosus
- E Urothelial carcinoma

2 A 36-year-old woman has had increased malaise for 3 weeks and urine output <500 mL/day for the past 4 days. On examination, she has blood pressure 170/112 mm Hg and peripheral edema. Urinalysis shows protein 1+ and blood 3+, but no glucose or ketones. Urine microscopic analysis shows RBCs and RBC casts. Her serum urea nitrogen is 39 mg/dL, and creatinine is 4.3 mg/dL. Her serum complement C1q, C3, and C4 are decreased. A renal biopsy is performed, and immunofluorescence microscopy shows a granular pattern of staining with antibody to C3. Which of the following types of hypersensitivity reactions is most likely causing her renal disease?

- A I (IgE-mediated systemic anaphylaxis)
- B II (Antibody-dependent cell-mediated cytotoxicity)
- C III (Immune complex formation)
- D IV (Delayed-type hypersensitivity)

3 A 29-year-old man with chronic hepatitis C virus infection has noted dark urine for the past 2 weeks. On examination he is hypertensive but afebrile. Laboratory studies show serum creatinine of 3.8 mg/dL and urea nitrogen of 35 mg/dL.

Cryoglobulins are detected. Urinalysis shows RBCs and RBC casts. A renal biopsy is performed and microscopically shows hypercellular glomeruli with lobulation and a double-contour appearance to split basement membranes adjacent to sub-endothelial immune complexes. Which of the following cell types has most likely proliferated in his glomeruli?

- A Juxtaglomerular cells
- B Mesangial cells
- C Parietal epithelial cells
- D Podocytes
- E Endothelial cells

4 A study of renal disease identifies patients with greater than 3.5 g of protein in a 24-hour urine collection, but no RBCs or WBCs. Dysfunction involving which of the following cells is most likely to be responsible for proteinuria?

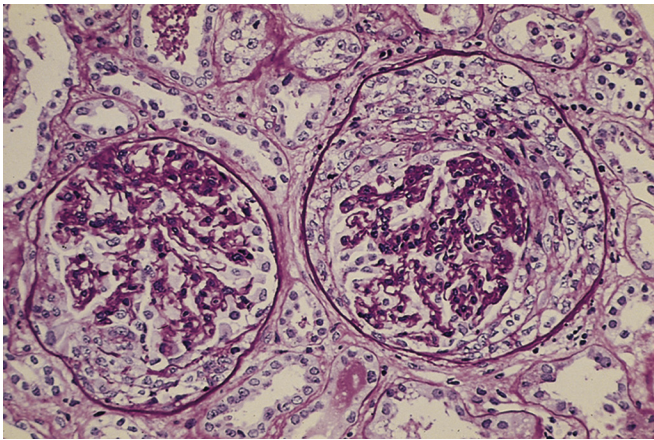
- A Endothelium
- B Macula densa
- C Mesangium
- D Parietal epithelium
- E Podocytes

5 A 7-year-old boy is recovering from impetigo. Physical examination shows five honey-colored crusts on his face. The crusts are removed, and a culture of the lesions grows *Streptococcus pyogenes*. He is treated with antibiotics. One week later, he develops malaise with nausea and a slight fever and passes dark brown urine. Laboratory studies show a serum anti-streptolysin O titer of 1:1024. Which of the following is the most likely outcome of his renal disease?

- A Chronic renal failure
- B Complete recovery
- C Crescentic glomerulonephritis
- D Rheumatic heart disease
- E Streptococcal urinary tract infection

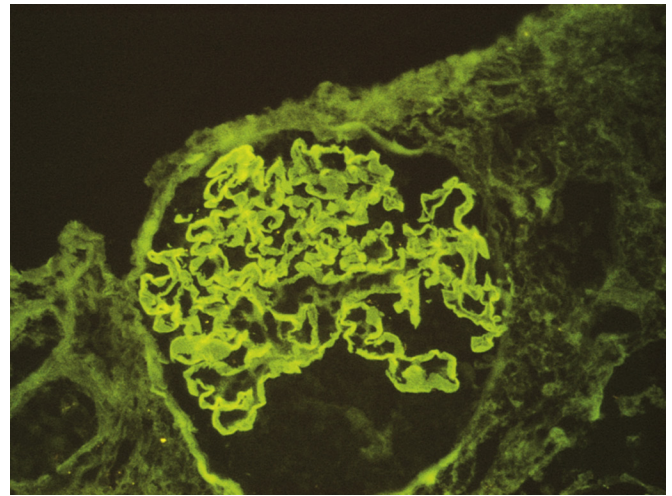
6 A 17-year-old girl living in the Congo has had a chronic febrile illness for 2 years. In the past 2 days she notes her urine is smoky brown. On physical examination her blood pressure is 145/95 mm Hg. Laboratory studies show her serum creatinine is 3.7 mg/dL, and urea nitrogen is 35 mg/dL. Urinalysis shows 4+ blood with 1+ protein, but no glucose, ketones, or leukocytes. The serum haptoglobin is decreased and Coombs test is negative. Her Hgb is 8.5 g/dL. A peripheral blood smear shows rare ring stage trophozoites. Immunofluorescence microscopy performed on renal biopsy shows granular deposition of IgG and C3 in glomerular capillary basement membranes. Electron microscopy shows electron-dense sub-epithelial "humps." Which of the following renal diseases is she most likely to have?

- A Focal segmental glomerulosclerosis
- B Hereditary nephritis
- C IgA nephropathy
- D Lupus nephritis
- E Membranous nephropathy
- F Acute proliferative glomerulonephritis**



7 A 45-year-old man has experienced increasing malaise, nausea, and reduced urine output for the past 3 days. On physical examination, he is afebrile and normotensive. Laboratory findings show a serum creatinine level of 7.5 mg/dL. Urinalysis shows hematuria, but no pyuria or glucosuria. A renal biopsy is done; the light microscopic picture is shown in the figure. Which of the following additional studies is most useful for classification and treatment of this disease?

- A Antinuclear antibody
- B Anti-glomerular basement membrane antibody**
- C HIV-1 RNA copy level
- D Quantitative serum immunoglobulins
- E Rheumatoid factor
- F Urine immunoelectrophoresis



8 A 21-year-old previously healthy man has noticed blood in his urine for the past 2 days. He reports no dysuria, frequency, or hesitancy of urination. On physical examination, there are no abnormal findings. Laboratory findings show a serum urea nitrogen level of 39 mg/dL and creatinine level of 4.1 mg/dL. A renal biopsy specimen is obtained; the immunofluorescence pattern of staining with antibody against human IgG is shown in the figure. Which of the following serologic findings is most likely to be present in this patient?

- A Anti-glomerular basement membrane antibody**
- B Anti-streptolysin O antibody
- C C3 nephritic factor
- D Hepatitis B surface antibody
- E HIV antibody

9 A 46-year-old woman has had worsening malaise for the past 36 hours. Her urine output is markedly diminished, and it has a cloudy brown appearance. On examination she has periorbital edema. Laboratory findings include serum creatinine of 2.8 mg/dL and urea nitrogen of 30 mg/dL. A renal biopsy is performed and on microscopic examination shows focal necrosis in glomeruli with glomerular basement membrane breaks and crescent formation. No immune deposits are identified with immunofluorescence. Which of the following autoantibodies is most likely detectable in her serum?

- A Anti-DNA topoisomerase antibody
- B Anti-glomerular basement membrane antibody
- C Anti-neutrophil cytoplasmic autoantibody**
- D Antinuclear antibody
- E Anti-HBs Ag

10 A 44-year-old woman has developed a fever, nonproductive cough, and decreased urine output over the past 3 days. On physical examination, her temperature is 37.7° C, and blood pressure is 145/95 mm Hg. She has sinusitis. On auscultation, crackles are heard over all lung fields. A chest radiograph shows bilateral patchy infiltrates and nodules. The serum creatinine level is 4.1 mg/dL, and the urea nitrogen level is 43 mg/dL. The results of serologic testing are negative for ANA, but positive for C-ANCA. A renal biopsy specimen shows glomerular crescents and damage to small arteries. The result of immunofluorescence staining with anti-IgG and anti-C3 antibodies is negative. Which of the following additional microscopic findings is most likely to be seen in this biopsy?

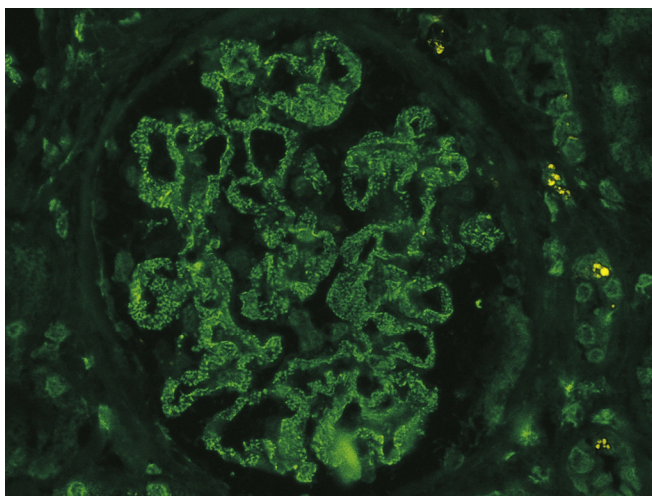
- A Focal segmental glomerulosclerosis
- B Glomerular basement membrane thickening
- C Hyperplastic arteriosclerosis
- D Infiltrations by neutrophils
- E Mesangial proliferation
- F Necrotizing granulomatous vasculitis

11 A 48-year-old man has had increased swelling in the extremities for 2 months. Physical examination showed generalized edema. A 24-hour urine collection yielded 4.1 g of protein (albumin and globulins). He did not respond to a course of corticosteroid therapy. A renal biopsy was done, and microscopic examination showed diffuse thickening of the basement membrane. Immunofluorescence staining with antibody to the C3 component of complement was positive in a granular pattern in the glomerular capillary loops. Two years later, he experiences increasing malaise. Laboratory studies now show serum creatinine level of 4.5 mg/dL and urea nitrogen level of 44 mg/dL. Which of the following immunologic mechanisms was most likely responsible for the glomerular changes observed in the biopsy specimen?

- A Antibodies that react with basement membrane collagen
- B Antibodies against streptococci that cross-react with the basement membrane
- C Cytotoxic T cells directed against renal antigens
- D Deposition of immune complexes on the basement membrane
- E Release of cytokines by inflammatory cells

12 A 7-year-old boy has become less active over the past 10 days. On physical examination, the boy has facial puffiness. Urinalysis shows no blood, glucose, or ketones, and microscopic examination shows no casts or crystals. The serum creatinine level is normal. A 24-hour urine collection yields 3.8 g of protein. He improves after corticosteroid therapy. He has two more episodes of proteinuria over the next 4 years, both of which respond to corticosteroid therapy. What is the most likely mechanism causing his disease?

- A Cytokine-mediated visceral epithelial cell injury
- B Cytotoxic T cell-mediated tubular epithelial cell injury
- C IgA-mediated mesangial cell injury
- D Immune complex-mediated glomerular injury
- E Verocytotoxin-induced endothelial cell injury

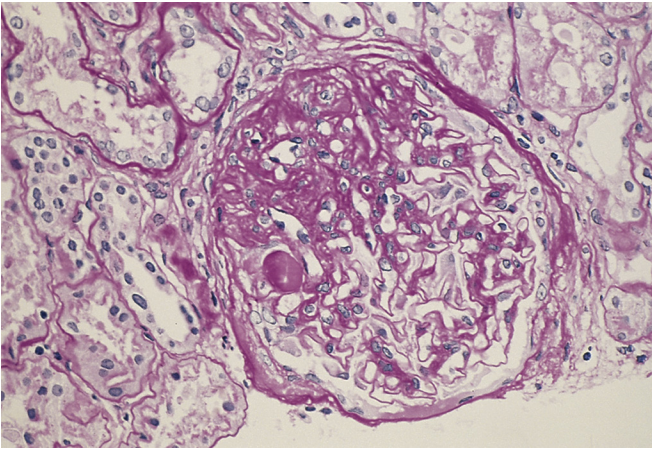


13 A 44-year-old man with increasing malaise for the past month now is bothered by increasing swelling in the hands and legs. On physical examination, there is generalized edema. He is afebrile, and his blood pressure is 140/90 mm Hg. Urinalysis shows a pH of 6.5; specific gravity 1.017; 4+ proteinuria; and no blood, glucose, or ketones. Microscopic examination of the urine shows no casts or RBCs and 2 WBCs per high-power field. The 24-hour urine protein level is 4.2 g. A renal biopsy specimen is obtained, and immunofluorescence staining with antibody to the C3 component of complement produces the pattern shown in the figure. Which of the following underlying disease processes is most likely to be present in this man?

- A Chronic hepatitis B virus infection
- B HIV infection
- C Multiple myeloma
- D Recurrent urinary tract infection
- E Nephrolithiasis

14 A 6-year-old girl has become increasingly lethargic over the past 2 weeks. On examination she has puffiness around the eyes. Her temperature is 36.9° C, and blood pressure is 100/60 mm Hg. Laboratory findings show serum creatinine, 0.7 mg/dL; urea nitrogen, 12 mg/dL; and cholesterol, 217 mg/dL. Urinalysis shows pH, 6.5; specific gravity, 1.011; 4+ proteinuria; lipiduria; and no blood or glucose. The 24-hour urine protein level is 3.8 g. The child's condition improves after glucocorticoid therapy. Which of the following findings by electron microscopy is most likely to characterize this disease process?

- A Areas of thickened and thinned basement membrane
- B Effacement of podocyte foot processes
- C Increased mesangial matrix
- D Reduplication of glomerular basement membrane
- E Subepithelial electron-dense humps



15 A 12-year-old girl has experienced increasing malaise for the past 2 weeks. On physical examination, she has periorbital edema. The child is afebrile. Laboratory findings show proteinuria on dipstick urinalysis, but no hematuria or glucosuria. Microscopic examination of the urine shows numerous oval fat bodies. The serum creatinine level is 2.3 mg/dL. She receives a course of corticosteroid therapy, but does not improve. A renal biopsy is performed and microscopic examination shows that approximately 50% of the glomeruli in the specimen are affected by the lesion shown in the figure. What is the most likely diagnosis?

- A Dense deposit disease
- B Focal segmental glomerulosclerosis**
- C Minimal change disease
- D Nodular glomerulosclerosis
- E Postinfectious glomerulonephritis
- F Rapidly progressive glomerulonephritis

16 A 46-year-old Hispanic man has had increasing malaise with headaches and easy fatigability for the past 3 months. Physical examination reveals his blood pressure is 200/100 mm Hg. There are no palpable abdominal masses and no costovertebral tenderness. Laboratory studies show hemoglobin, 9.5 g/dL; hematocrit, 28.3%; MCV, 92 μm^3 ; creatinine, 4.5 mg/dL; and urea nitrogen, 42 mg/dL. Urinalysis reveals 3+ hematuria and 3+ proteinuria, but no glucose or leukocytes. A renal biopsy is done; light microscopic examination of the biopsy specimen shows that approximately 50% of the glomeruli appear normal, but the rest show that a portion of the capillary tuft is sclerotic. Immunofluorescence staining shows IgM and C3 deposition in these sclerotic areas. His history is significant for repeated episodes of passing dark brown urine, which failed to respond to corticosteroid therapy. Which of the following mechanisms is most likely responsible for his disease?

- A Attachment of anti-glomerular basement membrane antibodies
- B Deposition of immune complexes containing microbial antigens
- C Deposition of C3 nephritic factor (C3NeF)
- D Dysfunction of the podocyte slit diaphragm apparatus**
- E Inherited defect in the basement membrane collagen

17 A 38-year-old woman has been feeling lethargic for 4 months. On physical examination, she is afebrile, and her blood pressure is 140/90 mm Hg. Laboratory findings show the serum creatinine level is 5.8 mg/dL. C3 nephritic factor is present in serum, resulting in hypocomplementemia, and the ANA test result is negative. Urinalysis shows 2+ blood and 1+ protein. A renal biopsy is done; microscopic examination shows hypercellular glomeruli and prominent ribbonlike deposits along the lamina densa of the glomerular basement membrane. Which of the following forms of glomerulonephritis is most likely to be present in this patient?

- A Chronic glomerulonephritis
- B Dense deposit disease**
- C Membranous nephropathy
- D Postinfectious glomerulonephritis
- E Rapidly progressive glomerulonephritis

18 A 25-year-old man has a 5-year history of celiac sprue. Four days after a mild upper respiratory infection, he begins passing dark red-brown urine. The dark urine persists for the next 3 days and then becomes clear and yellow, only to become red-brown again 1 month later. There are no remarkable findings on physical examination. Urinalysis shows a pH of 6.5; specific gravity, 1.018; 3+ hematuria; 1+ proteinuria; and no glucose or ketones. Microscopic examination of the urine shows RBCs, but no WBCs, casts, or crystals. A 24-hour urine protein level is 200 mg. A renal biopsy specimen from the glomeruli of this patient is most likely to show which of the following alterations?

- A Diffuse cellular proliferation and basement membrane thickening
- B Granular staining of the basement membrane by anti-IgG antibodies
- C Mesangial IgA staining by immunofluorescence**
- D Subepithelial electron-dense deposits
- E Thrombosis within the glomerular capillaries

19 One week after a mild flulike illness, a 9-year-old boy has an episode of hematuria that subsides within 2 days. One month later, he tells his parents that his urine is red again. On physical examination, there are no significant findings. Urinalysis shows a pH of 7; specific gravity, 1.015; 1+ proteinuria; 1+ hematuria; and no ketones, glucose, or urobilinogen. The serum urea nitrogen level is 36 mg/dL, and the creatinine level is 3.2 mg/dL. Serum electrophoresis shows increased IgA1. Which of the following glomerular structures is most likely to show structural alterations in this boy?

- A Basement membranes
- B Capillaries
- C Mesangium**
- D Parietal epithelium
- E Podocytes

20 A 15-year-old boy has been passing dark-colored urine for the past month. On physical examination, he has bilateral sensorineural hearing loss and corneal erosions. Urinalysis shows a pH of 6.5; specific gravity, 1.015; 1+ hematuria; 1+ proteinuria; and no ketones, glucose, or leukocytes. The serum creatinine level is 2.5 mg/dL, and the urea nitrogen level is 24 mg/dL. A renal biopsy specimen shows tubular epithelial foam cells by light microscopy. By electron microscopy, the glomerular basement membrane shows areas of attenuation, with splitting and lamination of lamina densa in other thickened areas. What is the most likely diagnosis?

- A Mutation in a gene encoding type IV collagen
- B Increased synthesis of abnormal IgA
- C Autoimmune destruction of pancreatic beta cells
- D Acquired deficiency of ADAMTS13 metalloprotease
- E Toxic injury to slit diaphragm proteins

21 A 56-year-old woman is found on health screening to have a blood pressure of 168/109 mm Hg. No other physical examination findings are noted. Urinalysis shows a pH of 7.0; specific gravity, 1.020; 1+ proteinuria; and no blood, glucose, or ketones. The ANA and ANCA test results are negative. The serum urea nitrogen level is 51 mg/dL, and the creatinine level is 4.7 mg/dL. The hemoglobin A_{1c} concentration is within the reference range. An abdominal ultrasound scan shows bilaterally and symmetrically small kidneys with no masses. What is her most likely diagnosis?

- A Amyloidosis
- B Autosomal dominant polycystic kidney disease
- C Chronic glomerulonephritis
- D Microscopic polyangiitis
- E Nodular glomerulosclerosis

22 An autopsy study is performed involving persons with gross pathologic findings of bilaterally small kidneys (<100 g) that have a coarsely granular surface appearance. Microscopic examination shows sclerotic glomeruli, a fibrotic interstitium, tubular atrophy, arterial thickening, and scattered lymphocytic infiltrates. Which of the following clinical findings was most likely reported in these patients' medical histories?

- A Hemoptysis
- B Hypertension
- C Lens dislocation
- D Pharyngitis
- E Skin rash

23 A 33-year-old woman has had fever and increasing fatigue for the past 2 months. Over the past year, she has noticed soreness of her muscles and joints and has had a 4-kg weight loss. On physical examination, her temperature is 37.5° C, pulse is 80/min, respirations are 15/min, and blood pressure is 145/95 mm Hg. She has pain on deep inspiration, and a friction rub is heard on auscultation of the chest. Laboratory findings show glucose, 73 mg/dL; total protein, 5.2 g/dL; albumin, 2.9 g/dL; and creatinine, 2.4 mg/dL. Serum complement levels are decreased. CBC shows hemoglobin of 9.7 g/dL, platelet count of 85,000/mm³, and WBC count of 3560/mm³. A renal bi-

opsy specimen shows a diffuse proliferative glomerulonephritis with extensive granular immune deposits of IgG and C1q in capillary loops and mesangium. After being treated with immunosuppressive therapy consisting of prednisone and cyclophosphamide, her condition improves. Which of the following serologic studies is most likely to be positive in this patient?

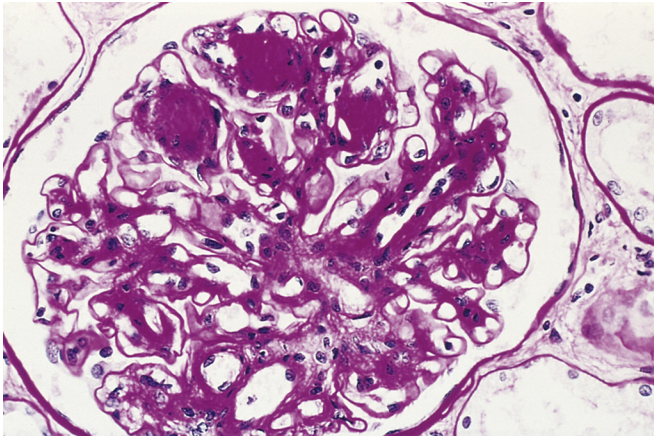
- A Anticentromere antibody
- B Anti-DNA topoisomerase I antibody
- C Anti-double-stranded DNA antibody
- D Anti-glomerular basement membrane antibody
- E Antihistone antibody
- F Antineutrophil cytoplasmic autoantibody
- G Antiribonucleoprotein

24 A 33-year-old woman with a history of intravenous drug use comes to the emergency department because she has had a high fever for the past 2 days. On physical examination, her temperature is 38.4° C. She has a palpable spleen tip, bilateral costovertebral angle tenderness, and diastolic cardiac murmur. Laboratory findings show a serum urea nitrogen level of 15 mg/dL. Urinalysis shows 2+ hematuria, and no glucose, protein, or ketones. A blood culture is positive for *Staphylococcus aureus*. Which of the following best describes the likely gross appearance of the kidneys in this patient?

- A Enlarged, and replaced by 1- to 4-cm, fluid-filled cysts
- B Marked pelvic and calyceal dilation with thinning of the cortices
- C Normal size, with smooth cortical surfaces
- D Shrunken, with uniformly finely granular cortical surfaces
- E Slightly swollen, with scattered petechial hemorrhages
- F Small and asymmetric, with irregular cortical scars and marked calyceal dilation
- G Wedge-shaped regions of yellow-white cortical necrosis

25 A 55-year-old woman with poorly controlled hyperglycemia for many years now has had burning pain on urination for the past 3 days. Physical examination shows a 2-cm ulceration on the skin of the heel and reduced sensation in the lower extremities. Her visual acuity is 20/100 bilaterally. Urinalysis shows 1+ proteinuria; 2+ glucosuria; and no blood, ketones, or urobilinogen. A urine culture contains more than 100,000 colony-forming units/mL of *Klebsiella pneumoniae*. Which of the following pathologic findings is most likely to be present in both her kidneys?

- A Deposits of IgG and C3 in the glomerular basement membrane
- B Effacement of podocyte foot processes
- C Formation of glomerular crescents
- D Mesangial deposits of IgA
- E Necrotizing granulomatous vasculitis
- F Nodular hyaline mesangial deposits



26 A 58-year-old man is found to have mild hypertension. Laboratory findings show a serum creatinine level of 2.2 mg/dL and urea nitrogen level of 25 mg/dL. Microalbuminuria is present, with excretion of 250 mg/day of albumin. Two years later, he remains hypertensive and has a serum creatinine level of 3.8 mg/dL, urea nitrogen level of 38 mg/dL, and 24-hour urine protein level of 2.8 g. A renal biopsy is done; the light microscopic appearance of a PAS-stained specimen is shown in the figure. Blood/serum test for which of the following is most likely to be abnormal in this patient?

- A Anti-glomerular basement membrane antibody
- B Antinuclear antibody
- C Anti-neutrophil cytoplasmic autoantibody
- D Anti-streptolysin O
- E C3 nephritic factor
- F Hemoglobin A_{1c}
- G Hepatitis B surface antigen

27 A 17-year-old boy is involved in a motor vehicle accident in which he sustains severe blunt trauma to the extremities and abdomen. Over the next 3 days, he develops oliguria and dark brown urine. The urine dipstick analysis is positive for myoglobin and for blood, but microscopic examination of the urine shows no RBCs. His serum urea nitrogen level increases to 38 mg/dL, and he undergoes hemodialysis for 3 weeks. His condition improves, but the urine output remains greater than 3 L/day for 1 week before the urea nitrogen returns to normal. Which of the following renal lesions was most likely present in this patient?

- A Acute pyelonephritis
- B Acute tubular injury
- C Malignant nephrosclerosis
- D Membranous nephropathy
- E Renal vein thrombosis

28 A 63-year-old man is in stable condition after an acute myocardial infarction when he became hypotensive for 3 hours before paramedical personnel arrived. Over the next week, the serum urea nitrogen level increases to 48 mg/dL, the serum creatinine level increases to 5 mg/dL, and the urine output decreases. He undergoes hemodialysis for the next 2 weeks and then develops marked polyuria, with urine output

of 2 to 3 L/day. His renal function gradually returns to normal. Release of which of the following substances most likely participated in the elevation of BUN, creatinine, and reduced urinary output?

- A Aldosterone
- B Endothelin
- C Erythropoietin
- D Natriuretic peptide
- E Vasopressin

29 A 19-year-old woman has had a fever and chills accompanied by right flank pain for the past 3 days. She has had two similar episodes during the past year. On physical examination, her temperature is 38.3° C, her blood pressure is 152/94 mm Hg, and there is right costovertebral angle tenderness. Laboratory findings show a serum glucose level of 77 mg/dL and creatinine level of 1 mg/dL. Urinalysis shows a pH of 6.5; specific gravity, 1.018; and no protein, blood, glucose, or ketones. Microscopic examination of the urine shows many WBCs and WBC casts. Which of the following is the most useful test to obtain on this patient?

- A Antinuclear antibody
- B Plasma renin
- C Renal biopsy
- D Urine culture
- E Abdominal CT scan

30 A 51-year-old woman has had dysuria and urinary frequency for the past week. On physical examination, her temperature is 38° C, and she has pain on palpation over the left costovertebral angle. Laboratory findings show glucose, 177 mg/dL; hemoglobin A_{1c}, 9.8%; hemoglobin, 13.1 g/dL; platelet count, 232,200/mm³; and WBC count, 11,320/mm³. Urinalysis shows a pH of 6.5; specific gravity, 1.016; 2+ glucosuria; and no blood, protein, or ketones. Microscopic examination of the urine shows numerous neutrophils, and a urine culture is positive for *Escherichia coli*. Which of the following complications is most likely to develop in this patient?

- A Acute tubular necrosis
- B Crescentic glomerulonephritis
- C Hydronephrosis
- D Necrotizing papillitis
- E Renal calculi

31 A 53-year-old woman has had fever and flank pain for the past 2 days. On physical examination, her temperature is 38.2° C, pulse is 81/min, respirations are 16/min, and blood pressure is 130/80 mm Hg. Urinalysis shows no protein, glucose, or ketones. The leukocyte esterase test is positive. Microscopic examination of the urine shows numerous polymorphonuclear leukocytes and occasional WBC casts. Which of the following organisms is most likely to be found in the urine culture?

- A *Cryptococcus neoformans*
- B *Escherichia coli*
- C Group A streptococcus
- D *Mycobacterium tuberculosis*
- E *Mycoplasma hominis*

32 A 30-year-old woman has had increasing malaise with nocturia and polyuria for the past year. She has had a high fever for the past 3 days. On physical examination, her blood pressure is 170/95 mm Hg. Urinalysis shows a pH of 7.5; specific gravity, 1.010; 1+ proteinuria; positive leukocyte esterase and nitrite; and no glucose, blood, or ketones. A renal ultrasound scan shows an enlarged right kidney with pelvic and calyceal enlargement and cortical thinning; the left kidney appears normal. A right-sided nephrectomy is performed, and grossly there are large U-shaped scars at the poles with underlying blunted calyces. Microscopic examination shows inflammatory infiltrates extending from the medulla to the cortex, with tubular destruction and extensive interstitial fibrosis. Lymphocytes, plasma cells, and neutrophils are abundant. Which of the following underlying conditions is most likely to produce these findings?

- A Polycystic kidney disease
- B Essential hypertension
- C Congestive heart failure
- D Systemic lupus erythematosus
- E Systemic amyloidosis
- F Vesicoureteral reflux

33 A 29-year-old woman has had a fever and sore throat for the past 3 days. On physical examination, her temperature is 38° C. The pharynx is erythematous, with yellowish tonsillar exudate. She is treated with ampicillin and recovers fully in 7 days. Two weeks later, she develops fever and a rash, and notices a slight decrease in urinary output. Her temperature is 37.7° C, and there is a diffuse erythematous rash on the trunk and extremities. Urinalysis shows a pH of 6; specific gravity, 1.022; 1+ proteinuria; 1+ hematuria; and no glucose or ketones. Microscopic examination of the urine shows RBCs and WBCs, including eosinophils, but no casts or crystals. What is the most likely cause of her disease?

- A Deposition of immune complexes with streptococcal antigens
- B Formation of antibodies against glomerular basement membrane
- C Hematogenous dissemination of septic emboli
- D Hypersensitivity reaction to ampicillin
- E Renal tubular cell necrosis caused by bacterial toxins

34 A 32-year-old man developed a fever and rash over 3 days. Five days later, he has increasing malaise. On physical examination, the maculopapular erythematous rash on his trunk has nearly faded away. His temperature is 37.1° C, and blood pressure is 135/85 mm Hg. Laboratory studies show a serum creatinine level of 2.8 mg/dL and blood urea nitrogen level of 29 mg/dL. Urinalysis shows 2+ proteinuria; 1+ hematuria; and no glucose, ketones, or nitrite. The leukocyte esterase result is positive. Microscopic examination of urine shows RBCs and WBCs, some of which are eosinophils. Which of the following most likely precipitated his renal disease?

- A Antibiotic ingestion
- B Congestive heart failure
- C Eating poorly cooked ground beef
- D Streptococcal pharyngitis
- E Urinary tract infection

35 A 72-year-old man with chronic arthritis has taken more than 3 g of analgesics per day, including phenacetin, aspirin,

and acetaminophen, for the past 20 years. He now has increasing malaise, nausea, and diminished mentation. On physical examination, his blood pressure is 156/92 mm Hg. Laboratory findings show serum urea nitrogen level of 68 mg/dL and creatinine level of 7.1 mg/dL. Which of the following renal diseases is he most likely to develop?

- A Acute tubular injury
- B Chronic glomerulonephritis
- C Hydronephrosis
- D Renal cell carcinoma
- E Renal papillary necrosis

36 A 49-year-old man is found on physical examination to have a blood pressure of 160/110 mm Hg, but no other abnormalities. Laboratory studies show serum glucose of 75 mg/dL, creatinine of 1.3 mg/dL, and urea nitrogen of 20 mg/dL. His plasma renin is elevated. CT angiography shows marked stenosis of his renal arteries. He is treated with an angiotensin-converting enzyme inhibitor. A week later, he has a headache for which he takes ibuprofen. Over the next day, his urine output decreases. This effect on urinary output is most likely mediated by the unopposed action of which of the following chemicals?

- A Aldosterone
- B Histamine
- C Nitric oxide
- D Prostaglandin
- E Tumor necrosis factor

37 A 28-year-old man is diagnosed with acute myelogenous leukemia (M2), with a total leukocyte count of 45,000/mm³, including 60% blasts. After induction with a multiagent chemotherapy protocol, he has an episode of lower abdominal pain accompanied by passage of red urine. He has no fever, dysuria, or urinary frequency. On physical examination, there are no remarkable findings. Urinalysis shows a pH of 5.5; specific gravity, 1.021; 2+ hematuria; and no protein, ketones, or glucose. There are no remarkable findings on an abdominal radiograph. Which of the following additional urinalysis findings is most likely to be reported for this patient?

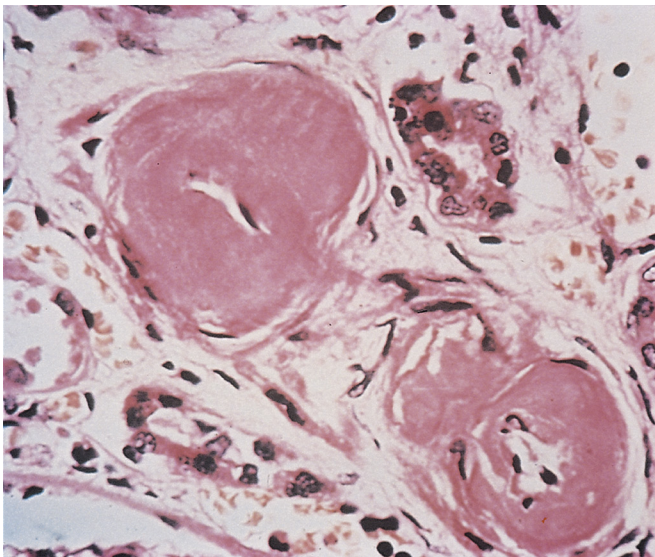
- A Bence Jones protein
- B Eosinophils
- C Myoglobin
- D Oval fat bodies
- E RBC casts
- F Uric acid crystals

38 A 49-year-old woman had a mastectomy of the right breast 2 years ago to remove a carcinoma. She now has bone pain, and a radionuclide scan shows multiple areas of increased uptake in the vertebrae, ribs, pelvis, and right femur. Urinalysis shows a specific gravity of 1.010, which remains unchanged after water deprivation for 12 hours. She undergoes multiple courses of chemotherapy over the next year. During this time, the serum urea nitrogen level progressively increases. Which of the following abnormal laboratory findings is most likely to be reported for this patient?

- A Hypercalcemia
- B Hypercholesterolemia
- C Hypergammaglobulinemia
- D Hyperglycemia
- E Hyperuricemia

39 A 63-year-old man has noted increasing back pain for 7 months. He has had three respiratory tract infections with *Streptococcus pneumoniae* during the past year. On examination, he has pitting edema to his thighs. Laboratory studies show total serum protein, 9.6 g/dL; albumin, 3.5 g/dL; creatinine, 3 mg/dL; urea nitrogen, 28 mg/dL; and glucose, 79 mg/dL. Urinalysis shows proteinuria of 4 g/24 hr, but no glucosuria or hematuria. Abdominal CT scan shows enlarged kidneys without cysts or masses. A renal biopsy specimen stained with H&E shows deposits of amorphous pink material within glomeruli, interstitium, and arteries. Which of the following diseases is he most likely to have?

- A Analgesic nephropathy
- B ANCA-associated granulomatous vasculitis
- C Type 2 diabetes mellitus
- D Membranous nephropathy
- E Multiple myeloma**
- F Systemic lupus erythematosus



40 A 66-year-old woman has experienced five transient ischemic attacks within a week. On physical examination, the only abnormal finding is a blood pressure of 150/95 mm Hg. Urinalysis shows 1+ proteinuria, and no glucose, blood, or ketones. Microscopic examination of the urine shows no RBCs or WBCs and few oxalate crystals. On abdominal ultrasound, the kidneys are slightly decreased in size. The representative high magnification microscopic appearance of the kidneys is shown in the figure. Which of the following renal lesions is most likely to be present in this patient?

- A Acute tubular necrosis
- B Fibromuscular dysplasia
- C Hyaline arteriosclerosis**
- D Interstitial nephritis
- E Necrotizing vasculitis

41 A 45-year-old man has had headaches, nausea, and vomiting that have worsened over the past 5 days. He has started "seeing spots" before his eyes and experienced periods of mental confusion. On physical examination, his blood pressure is 270/150 mm Hg. Urinalysis shows 1+ proteinuria; 2+ hematuria; and no glucose, ketones, or leukocytes. The serum urea nitrogen and creatinine levels are elevated. He dies 2 weeks later from a cerebral bleed. Which of the following histologic findings is most likely to be seen in this patient's kidneys at autopsy?

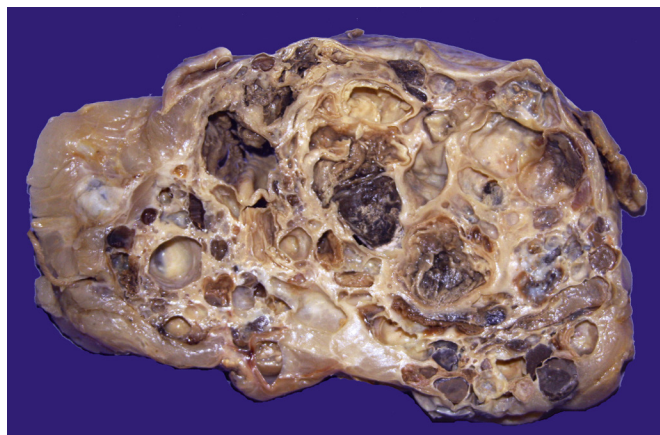
- A Glomerular crescents
- B Hyperplastic arteriosclerosis**
- C Mesangial IgA deposition
- D Nodular glomerulosclerosis
- E Segmental tubular necrosis

42 A 5-year-old girl develops cramping abdominal pain and diarrhea 4 days after eating a hamburger, chili, and ice cream at a home barbecue. The next day, she has decreased urine output. On physical examination, there are petechial hemorrhages on the skin. Her temperature is 37° C, pulse is 90/min, respirations are 18/min, and blood pressure is 90/50 mm Hg. A stool sample is positive for occult blood. Laboratory findings show a serum creatinine level of 2.2 mg/dL and urea nitrogen level of 20 mg/dL. CBC shows hemoglobin, 10.8 g/dL; hematocrit, 32.4%; platelet count, 64,300/mm³; and WBC count, 6480/mm³. The peripheral blood smear shows schistocytes, and the serum D-dimer level is elevated. Urinalysis shows a pH of 6; specific gravity, 1.016; 2+ hematuria; and no protein or glucose. A renal biopsy specimen shows small thrombi within glomerular capillary loops. This complication develops most commonly after infection with which of the following organisms?

- A *Candida albicans*
- B *Clostridium difficile*
- C *Escherichia coli***
- D *Proteus mirabilis*
- E *Staphylococcus aureus*

43 Adult patients with bilateral renal cystic disease are found to have defects in renal tubular function. Their kidneys are markedly increased in size. They have ciliopathy, with reduced mechanosensing of tubular fluid flow. Mutations are found in a gene encoding for a protein component of these cilia. What is this protein most likely to be?

- A Elongin
- B Fibrocystin
- C Nephrocystin
- D Polycystin**
- E Tuberin



44 A 61-year-old woman has experienced increasing malaise and bouts of abdominal pain for the past 5 years. On physical examination, she has a blood pressure of 150/95 mm Hg. On auscultation, a midsystolic click is heard over the mitral area. Bilateral abdominal masses are palpable. An abdominal ultrasound shows enlarged kidneys with the representative gross appearance shown in the figure. Which of the following extrarenal conditions is she most likely to have?

- A Berry aneurysm
- B Coagulopathy
- C Hepatic cirrhosis
- D Ischemic cardiomyopathy
- E Pulmonary fibrosis

45 A 20-year-old primigravid woman is in the third trimester and has felt minimal fetal movement. An ultrasound scan shows bilaterally enlarged echogenic kidneys and a markedly decreased amniotic fluid index. She gives birth to a stillborn male fetus at 33 weeks' gestation. At autopsy, there are deformations resulting from marked oligohydramnios, including flattening of the facies, varus deformities of the feet, and marked pulmonary hypoplasia. Microscopic examination of the liver shows multiple epithelium-lined cysts and a proliferation of bile ducts. Which of the following is the most likely renal disease in this fetus?

- A Autosomal dominant polycystic kidney disease
- B Autosomal recessive polycystic kidney disease
- C Medullary sponge kidney
- D Multicystic renal dysplasia
- E Urethral atresia

46 A 31-year-old woman experiences abdominal pain 1 week after noticing blood in her urine. She has had three episodes of urinary tract infection during the past year. There are no remarkable findings on physical examination. Urinalysis shows 2+ hematuria, 1+ proteinuria, hypercalciuria, and no glucose or ketones. Serum creatinine is 1.0 g/dL. Microscopic examination of the urine shows numerous RBCs and oxalate crystals. An abdominal CT scan with contrast shows linear striations radiating into the renal papillae, along with small cystic collections of contrast material in dilated collecting ducts. She is advised to increase her daily intake of fluids, and her condition improves. Which of the following renal cystic diseases is most likely to be associated with these findings?

- A Autosomal dominant polycystic kidney disease
- B Autosomal recessive polycystic kidney disease
- C Medullary sponge kidney
- D Multicystic renal dysplasia

47 A 6-year-old child has been drinking more water, with more frequent urination, for the past 7 months. On physical examination dehydration is noted. Urinalysis findings include pH of 6.5; specific gravity, 1.010; and no protein, blood, glucose, or ketones. There are no WBCs, RBCs, or casts. Serum electrolytes show Na^+ , 152 mmol/L; K^+ , 4.6 mmol/L; Cl^- , 120 mmol/L; HCO_3^- , 21 mmol/L; urea nitrogen, 29 mg/dL; and creatinine, 3.2 mg/dL. An ultrasound scan shows bilaterally small kidneys with barely visible medullary cysts concentrated at the corticomedullary junction. Which of the following genes is most likely mutated in this child?

- A *MCKD1*
- B *NPHP1*
- C *PKD1*
- D *PKHD1*



48 An 83-year-old man has experienced difficulty with urination for the past 15 years. On physical examination, he has a 2-cm nonhealing ulceration on the ball of his right foot. He has decreased sensation to light touch over his lower extremities. The representative gross appearance of his right kidney is shown in the figure. The left kidney has a similar appearance. Which of the following conditions is he most likely to have?

- A Analgesic abuse
- B Benign nephrosclerosis
- C Chronic pyelonephritis
- D Diabetes mellitus
- E Prostatic adenocarcinoma

49 A 42-year-old man has had right flank pain for the past 2 days. On physical examination, his temperature is 37.1° C, pulse is 70/min, respirations are 14/min, and blood pressure is 130/85 mm Hg. Laboratory studies show a serum creatinine level of 1.1 mg/dL. Urinalysis shows no blood, protein, or glucose, and microscopic examination of the urine shows no WBCs or RBCs. Abdominal CT scan shows a 7-cm eccentric lesion of the upper pole of the right kidney. The lesion is well circumscribed and cystic with a thin wall and focal hemorrhage. What is the most likely diagnosis?

- A Acute pyelonephritis
- B Acute tubular injury
- C Diabetic nephropathy
- D Hydronephrosis
- E Simple renal cyst**
- F Renal cell carcinoma
- G Urothelial carcinoma

50 A 24-year-old man has severe lower abdominal pain that radiates to the groin. On a scale of 1 to 10, the pain is at 10 and comes in waves. He then notes blood in his urine. He has no underlying illnesses and has been healthy all his life. On physical examination, he is afebrile and has a blood pressure of 110/70 mm Hg. Laboratory studies show serum Na⁺, 142 mmol/L; K⁺, 4 mmol/L; Cl⁻, 96 mmol/L; CO₂, 25 mmol/L; glucose, 74 mg/dL; creatinine, 1.1 mg/dL; calcium, 9.1 mg/dL; and phosphorus, 2.9 mg/dL. Urinalysis shows a pH of 7; specific gravity of 1.020; and no protein, glucose, ketones, or nitrite. He is advised to drink more water. He likes iced tea and consumes large quantities over the course of a hot summer. He continues to have similar episodes. Which of the following substances is most likely to be increased in his urine?

- A Calcium oxalate**
- B Cystine
- C Magnesium ammonium phosphate
- D Mucoprotein
- E Uric acid

51 A 28-year-old, previously healthy man suddenly develops severe abdominal pain and begins passing red urine. There are no abnormalities on physical examination. Urinalysis shows a pH of 7; specific gravity, 1.015; 1+ hematuria; and no protein, glucose, or ketones. The patient is given a device to use in straining the urine for calculi. The next day, he recovers a 0.3-cm stone that is sent for analysis. The chemical composition is found to be calcium oxalate. What underlying condition is most likely to be present in this man?

- A Acute bacterial cystitis
- B Diabetes mellitus
- C Idiopathic hypercalciuria**
- D Primary hyperparathyroidism
- E Secondary gout

52 A 54-year-old woman has had recurrent urinary tract infections for the past 15 years. On many of these occasions, *Proteus mirabilis* was cultured from her urine. For the past 4 days, she has had a burning pain on urination and urinary frequency. On physical examination, her temperature is 37.9° C, pulse is 70/min, respirations are 15/min, and blood pressure is 135/85 mm Hg. There is marked tenderness on deep pressure over the right costovertebral angle and on deep ab-

dominal palpation. Urinalysis shows a pH of 7.5; specific gravity, 1.020; 1+ hematuria; and no protein, glucose, or ketones. Microscopic examination of the urine shows many RBCs, WBCs, and triple phosphate crystals. Which of the following renal lesions is most likely to be present?

- A Acute tubular injury
- B Malignant nephrosclerosis
- C Papillary necrosis
- D Renal cell carcinoma
- E Staghorn calculus**



53 A 55-year-old man has had back pain and has passed dark-colored urine for the past month. On physical examination, there is tenderness over the right costovertebral angle. Urinalysis shows a pH of 6; specific gravity, 1.015; 2+ hematuria; and no protein, glucose, or ketones. Microscopic examination of the urine shows numerous RBCs, few WBCs, and no casts or crystals. The figure shows the representative gross appearance of the renal lesion. Which of the following substances is most likely to be increased in the blood of this man?

- A Cortisol
- B Globulins
- C Erythropoietin**
- D Renin
- E Vasopressin

54 A 60-year-old man has a feeling of fullness in his abdomen and a 5-kg weight loss over the past 6 months. He has a 50 pack-year smoking history. Physical examination is normal. Laboratory studies show hemoglobin of 8.3 g/dL, hematocrit of 24%, and MCV of 70 μm^3 . Urinalysis shows 3+ hematuria, but no protein, glucose, or leukocytes. Abdominal CT scan shows an 11-cm mass in the upper pole of the right kidney. A right-sided nephrectomy is performed, and gross examination reveals that the mass has invaded the renal vein. Microscopic examination of the mass shows cells with abundant clear cytoplasm. Which of the following molecular abnormalities is most likely to be found in tumor cell DNA?

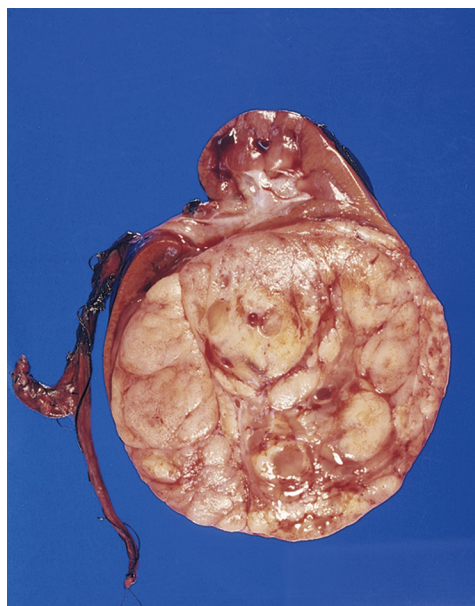
- A Homozygous loss of the von Hippel-Lind (VHL) gene**
- B Integration of human papillomavirus type 16 (HPV-16)
- C Microsatellite instability
- D Mutational activation of the *MET* proto-oncogene
- E Trisomy of genes on chromosome 7

55 Members of a family with a history of renal cancers undergo ultrasound screening. Two adults are found to have multifocal and bilateral renal mass lesions. Biopsies are obtained, and microscopic examination shows a papillary pattern. A mutation involving which of the following genes is most likely to be found in this family?

- A **MET**
- B *PKD1*
- C *RAS*
- D *TSC1*
- E *WT1*

56 A 60-year-old man has noted a nonproductive cough along with back pain for 4 months. He has passed darker urine for 1 month. He has a 50 pack/year history of smoking. On examination, his blood pressure is 175/110 mm Hg. He has tenderness to percussion of the upper back. Urinalysis shows 3+ blood but no casts or crystals. Chest CT imaging shows a 4-cm solid nodule in the right lower lobe of his lung, as well as 1- to 2-cm lytic lesions in thoracic vertebrae. A neoplasm is most likely to have arisen in which of the following urinary tract locations in this man?

- A Bladder dome
- B Calyx
- C Penile urethra
- D **Renal cortex**
- E Urachus
- F Ureter



57 A 4-year-old girl has complained of abdominal pain for the past month. On physical examination, she is febrile, and palpation of the abdomen shows a tender mass on the right side. Bowel sounds are present. Laboratory studies show hematuria without proteinuria. Abdominal CT scan shows a 12-cm, circumscribed, solid mass in the right kidney. A right-sided nephrectomy is performed; the gross appearance of the mass is shown in the figure. What is the most likely diagnosis?

- A Angiomyolipoma
- B Interstitial cell tumor
- C Renal cell carcinoma
- D Transitional cell carcinoma
- E **Wilms tumor**

ANSWERS

1 A He has azotemia, and the BUN-to-Cr ratio is >20:1, the low FE_{Na} , high urine specific gravity, and hypotension suggest prerenal azotemia, and cardiac failure is the most likely cause. Membranous nephropathy is a renal cause with BUN-to-Cr ratio of 10:1 or less and likely proteinuria at nephrotic levels. Prostatic hyperplasia with urinary tract obstruction may produce postrenal azotemia with BUN-to-Cr ratio between 10:1 and 20:1. Systemic lupus erythematosus is likely to produce nephritic syndrome with RBCs and RBC casts, and BUN-to-Cr ratio of 10:1 or less. Urothelial carcinoma is likely to be unilateral, with sufficient reserve renal function in the remaining kidney to prevent azotemia.

PBD9 898–899 BP9 517–518 PBD8 906–907 BP8 542

2 C The findings fit with immune-mediated glomerular injury with antigen-antibody complex deposition, typical of an underlying disease such as SLE, and nephritic picture. Type I hypersensitivity may play a role in drug-induced acute interstitial nephritis. Type II hypersensitivity is present

with anti-glomerular basement membrane diseases, such as Goodpasture syndrome. Type IV hypersensitivity plays a role in renal transplant rejection and some cases of drug-induced interstitial nephritis.

PBD9 904–906 BP9 519–522 PBD8 912–915 BP8 546–548

3 B The appearance of membranoproliferative glomerulonephritis, a cause for nephritic syndrome in adults, is described. Mesangial cells have a phagocytic function, but they also can elaborate inflammatory mediators, cytokines, and matrix. Proliferation of mesangial cells may be induced by injury, particularly immune complex deposition. Juxtaglomerular cells secrete renin. Parietal epithelial cells line the Bowman capsule and may proliferate with severe glomerular injury to produce crescents. Podocytes are visceral epithelial cells that form the filtration barrier. Endothelial cells are most likely to be damaged with thrombotic microangiopathies.

PBD9 900–902 BP9 527–528 PBD8 909–911 BP8 548–549

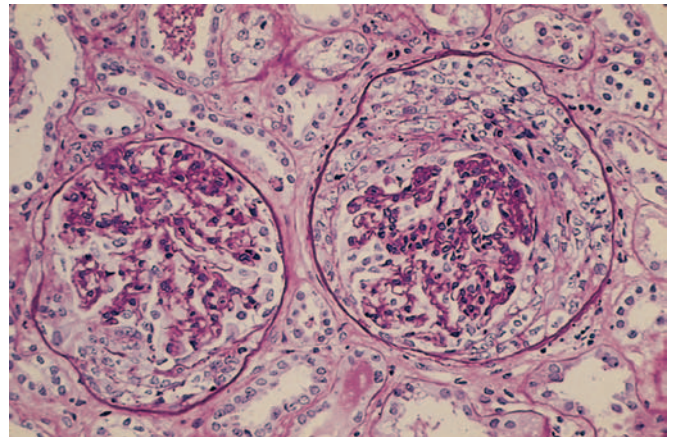
The Kidney

PBD7 and PBD8 Chapter 20: The Kidney

BP7 and BP8 Chapter 14: The Kidney and Its Collecting System

1 A 24-year-old man is awakened at night because of severe lower abdominal pain that radiates to the groin. The pain is very intense and comes in waves. The next morning, he notices blood in his urine. He has no underlying illnesses and has been healthy all his life. On physical examination, he is afebrile and has a blood pressure of 110/70 mm Hg. Laboratory studies show serum Na^+ , 142 mmol/L; K^+ , 4 mmol/L; Cl^- , 96 mmol/L; CO_2 , 25 mmol/L; glucose, 74 mg/dL; creatinine, 1.1 mg/dL; calcium, 9.1 mg/dL; and phosphorus, 2.9 mg/dL. Urinalysis shows a pH of 7; specific gravity of 1.020; and no protein, glucose, ketones, or nitrite. The patient is advised to drink more water. He likes iced tea and consumes large quantities over the course of a hot summer. He continues to have similar episodes. Which of the following substances is most likely to be increased in his urine?

- ☒ (A) Calcium oxalate
- ☐ (B) Cystine
- ☐ (C) Magnesium ammonium phosphate
- ☐ (D) Mucoprotein
- ☐ (E) Uric acid



Courtesy of Dr. M. A. Ventkatachalam, Department of Pathology, University of Texas Health Sciences Center, San Antonio, TX.

2 A 47-year-old man has had a decreased urine output over the past 10 days. On physical examination, he is afebrile. Urinalysis shows 1+ proteinuria, 4+ hematuria, urobilinogen, and no glucose or ketones. Microscopic examination of the urine shows few WBCs and some RBCs with RBC casts. A renal biopsy is done, and the light microscopic appearance of a PAS-stained specimen is shown in the figure. What is the most likely clinical course in this patient?

- ☐ (A) Acute renal failure that is reversible with supportive therapy
- ☐ (B) Slowly developing renal failure that is unresponsive to corticosteroid treatment
- ☒ (C) Rapidly progressive renal failure accompanied by hemoptysis
- ☐ (D) Stable clinical course with intermittent hematuria
- ☐ (E) Fever, leukocytosis, and endotoxic shock

3 A 63-year-old man has noted increasing back pain for 7 months. He has had three respiratory tract infections with *Streptococcus pneumoniae* within the past year. On examination, he has pitting edema to his thighs. Laboratory studies show total serum protein, 9.6 g/dL; albumin, 3.5 g/dL; creatinine, 3 mg/dL; urea nitrogen, 28 mg/dL; and glucose, 79 mg/dL. Urinalysis shows proteinuria of 4 g/24 hr, but no glucosuria or hematuria. Abdominal CT scan shows enlarged kidneys without cysts or masses. A renal biopsy specimen shows deposits of amorphous pink material within glomeruli, interstitium, and arteries with H&E stain. Which of the following diseases is he most likely to have?

- ☐ (A) Analgesic nephropathy
- ☐ (B) Diabetes mellitus
- ☐ (C) Membranous glomerulonephritis
- ☒ (D) Multiple myeloma
- ☐ (E) Systemic lupus erythematosus
- ☐ (F) Wegener granulomatosis

4 A 58-year-old woman dies of a cerebral infarction. Laboratory findings before death included serum urea nitrogen level of 110 mg/dL and creatinine level of 9.8 mg/dL. At autopsy, the kidneys are small (75 g) and have a coarsely granular surface appearance. Microscopic examination shows sclerotic glomeruli, a fibrotic interstitium, tubular atrophy, arterial thickening, and scattered lymphocytic infiltrates. Which of the following clinical findings was most likely reported on the patient's medical history?

- ☐ (A) Rash
- ☒ (B) Hypertension
- ☐ (C) Hemoptysis
- ☐ (D) Lens dislocation
- ☐ (E) Pharyngitis

5 For the past 6 months, a 72-year-old woman has noticed a slowly enlarging mass on the urethra. The mass causes local pain and irritation and is now bleeding. Physical examination shows a 2.5-cm warty, ulcerated mass protruding from the external urethral meatus. There are no lesions on the labia or vagina. A biopsy specimen of the lesion is most likely to identify which of the following?

- ☐ (A) Embryonal rhabdomyosarcoma
- ☐ (B) Leiomyoma
- ☐ (C) Papilloma
- ☒ (D) Squamous cell carcinoma
- ☐ (E) Syphilitic chancre



6 A 72-year-old man with Alzheimer disease dies of pneumonia. The gross appearance of the right kidney at autopsy is shown in the figure. The left kidney is normal in size, with a smooth cortical surface and a single 0.6-cm, fluid-filled cyst. The appearance of the right kidney is most suggestive of renal injury from which of the following?

- ☒ (A) Ureteral obstruction
- ☐ (B) Benign nephrosclerosis
- ☐ (C) Analgesic abuse
- ☐ (D) Chronic pyelonephritis
- ☐ (E) Diabetes mellitus

7 A 25-year-old man has a 5-year history of celiac sprue. Several days after a mild upper respiratory infection, he begins passing dark red-brown urine. The dark urine persists for the next 3 days and then becomes clear and yellow, only to become red-brown again 1 month later. There are no remarkable findings on physical examination. Urinalysis shows a pH of 6.5; specific gravity 1.018; 3+ hematuria; 1+ proteinuria; and no glucose or ketones. Microscopic examination of the urine shows RBCs and no WBCs, casts, or crystals. A 24-hour urine protein level is 200 mg. A renal biopsy specimen from the glomeruli of this patient is most likely to show which of the following alterations?

- ☐ (A) Subepithelial electron-dense deposits
- ☐ (B) Granular staining of the basement membrane by anti-IgG antibodies
- ☒ (C) Mesangial IgA staining by immunofluorescence
- ☐ (D) Diffuse proliferation and basement membrane thickening
- ☐ (E) Thrombosis in the glomerular capillaries

8 A 7-year-old boy is recovering from impetigo. Physical examination shows a few honey-colored crusts on his face. The crusts are removed, and a culture of the lesions grows group A *Streptococcus pyogenes*. He is treated with antibiotics. One week later, he develops malaise with nausea and a slight fever and passes dark brown urine. Laboratory studies show a serum antistreptolysin O titer of 1:1024. Which of the following is the most likely outcome?

- ☐ (A) Development of rheumatic heart disease
- ☐ (B) Chronic renal failure
- ☐ (C) Lower urinary tract infection
- ☒ (D) Complete recovery without treatment
- ☐ (E) Progression to crescentic glomerulonephritis

9 A 28-year-old, previously healthy man suddenly develops severe abdominal pain and begins passing red urine. There are no abnormalities on physical examination. Urinalysis shows a pH of 7; specific gravity 1.015; 1+ hematuria; and no protein, glucose, or ketones. The patient is given a device to use in straining the urine for calculi. The next day, the patient recovers a 0.3-cm stone that is sent for analysis. The chemical composition is found to be calcium oxalate. What underlying condition is most likely to be present?

- ☐ (A) Gout
- ☐ (B) Acute cystitis
- ☐ (C) Diabetes mellitus
- ☐ (D) Primary hyperparathyroidism
- ☒ (E) Idiopathic hypercalciuria



10 A 56-year-old man has had back pain and has passed dark-colored urine for the past month. On physical examination, there is right costovertebral angle tenderness. Urinalysis shows a pH of 6; specific gravity 1.015; 2+ hematuria; and no protein, glucose, or ketones. Microscopic examination of the urine shows numerous RBCs, few WBCs, and no casts or crystals. The figure shows the representative gross appearance of the renal lesion. Which of the following laboratory findings is most likely to be reported?

- ☐ (A) Elevated serum cortisol level
- ☒ (B) Elevated hematocrit
- ☐ (C) Ketonuria
- ☐ (D) Decreased creatinine clearance
- ☐ (E) Increased plasma renin activity

11 A 15-year-old boy has been passing dark-colored urine for the past month. On physical examination, he has bilateral sensorineural hearing loss and corneal erosions. Urinalysis shows a pH of 6.5; specific gravity 1.015; 1+ hematuria; 1+ proteinuria; and no ketones, glucose, or leukocytes. The serum creatinine level is 2.5 mg/dL, and the urea nitrogen level is 24 mg/dL. A renal biopsy specimen shows tubular epithelial foam cells by light microscopy. By electron microscopy, the glomerular basement membrane shows areas of attenuation, with splitting and lamination of lamina densa in other thickened areas. What is the most likely diagnosis?

- ☐ (A) Acute tubular necrosis
- ☐ (B) Berger disease
- ☐ (C) Membranous glomerulonephritis
- ☐ (D) Diabetic nephropathy
- ☒ (E) Alport syndrome

12 A 32-year-old man has developed a fever and skin rash over the past 3 days. Five days later, he has increasing malaise and visits his physician. On physical examination, the maculopapular erythematous rash on his trunk has nearly faded away. His temperature is 37.1°C, and blood pressure is 135/85 mm Hg. Laboratory studies show a serum creatinine level of 2.8 mg/dL and blood urea nitrogen level of 29 mg/dL. Urinalysis shows 2+ proteinuria; 1+ hematuria; and no glucose, ketones, or nitrite. The leukocyte esterase result is positive. Microscopic examination of urine shows RBCs and WBCs, some of which are eosinophils. What is the most likely cause of this patient's condition?

- ☐ (A) Urinary tract infection
- ☐ (B) Congestive heart failure
- ☒ (C) Antibiotic use
- ☐ (D) Streptococcal pharyngitis
- ☐ (E) Poorly cooked ground beef

13 After eating a cheeseburger, French fries, and ice cream for dinner one night, a 6-year-old girl develops nausea, mild abdominal cramping, and a slight fever. Three days later, her parents notice that she is passing dark stools and dark urine and appears fatigued and weak. On physical examination, she has a temperature of 37.9°C, pulse of 88/min, respirations of 18/min, and blood pressure of 140/90 mm Hg. Scattered petechiae are present on the extremities. Laboratory findings show a serum creatinine level of 2.2 mg/dL and urea nitrogen level of 20 mg/dL. Urinalysis shows a pH of 6; specific gravity 1.016; 2+ hematuria; and no protein or glucose. A renal biopsy specimen shows small thrombi within glomerular capillary loops. Which of the following diseases is most likely to produce these findings?

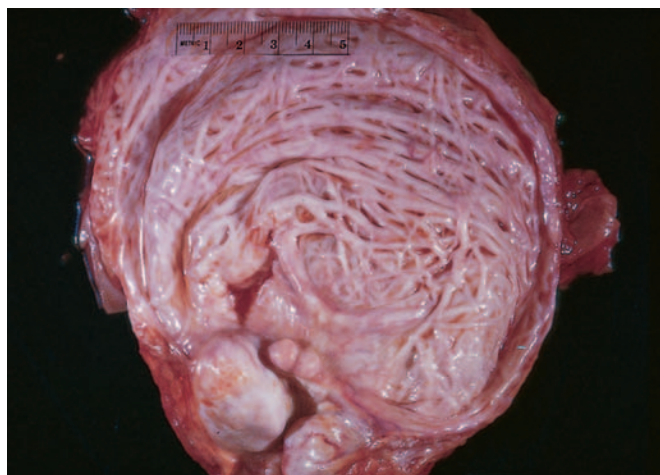
- ☐ (A) Postinfectious glomerulonephritis
- ☐ (B) Wegener granulomatosis
- ☐ (C) Hereditary nephritis
- ☒ (D) Hemolytic-uremic syndrome
- ☐ (E) IgA nephropathy

14 The parents of a 6-year-old girl notice that she has become increasingly lethargic over the past 2 weeks. On examination by the physician, she has puffiness around the eyes. Her temperature is 36.9°C, and blood pressure is 100/60 mm Hg. Laboratory findings show a serum creatinine level of 0.7 mg/dL and urea nitrogen level of 12 mg/dL. Urinalysis shows a pH of 6.5; specific gravity 1.011; 4+ proteinuria; and no blood or glucose. The 24-hour urine protein level is 3.8 g. The child's condition improves after glucocorticoid therapy. Which of the following findings by electron microscopy is most likely to characterize this disease process?

- ☐ (A) Subepithelial electron-dense humps
- ☐ (B) Reduplication of glomerular basement membrane
- ☐ (C) Areas of thickened and thinned basement membrane
- ☐ (D) Increased mesangial matrix
- ☒ (E) Effacement of podocyte foot processes

15 A 25-year-old woman experiences sudden onset of fever, malaise, and nausea. On physical examination, her temperature is 38.2°C, pulse is 85/min, respirations are 18/min, and blood pressure is 140/90 mm Hg. A routine urinalysis shows 1+ proteinuria, 4+ hematuria, and no ketones or glucose. RBC casts are seen on microscopic examination of the urine. A renal biopsy is performed, and light microscopic examination shows marked glomerular hypercellularity with neutrophils in glomerular capillary loops. Immunofluorescence microscopy shows granular deposition of IgG and C3 in glomerular capillary basement membranes. Electron microscopy shows electron-dense subepithelial "humps." What is the most likely diagnosis?

- ☐ (A) Goodpasture syndrome
- ☐ (B) Systemic amyloidosis
- ☐ (C) Membranous glomerulonephritis
- ☐ (D) Diabetes mellitus
- ☒ (E) Postinfectious glomerulonephritis



16 A 77-year-old man has had increasing difficulties with urination for the past 2 years. He has difficulty starting and stopping the urine stream. On physical examination, his temperature is 37°C, and blood pressure is 130/85 mm Hg. The figure shows the representative gross appearance of the bladder. Which of the following laboratory findings is most likely to be reported in this patient?

- ☐ (A) Positive ANA test result
- ☐ (B) Urine culture positive for *Mycobacterium tuberculosis*
- ☐ (C) Hemoglobin concentration of 22.5 g/dL
- ☐ (D) *Schistosoma haematobium* eggs in urine
- ☒ (E) Prostate-specific antigen level of 5 ng/mL

17 A 50-year-old woman with diabetic nephropathy receives a renal allograft. An episode of acute cellular rejection requires an increase in immunosuppressive therapy. She develops dysuria. On examination, she has suprapubic pain on palpation. A urinalysis shows hematuria. Cystoscopy is performed, and 3- to 4-cm soft, yellow, slightly raised mucosal plaques are seen. Biopsy specimens of these lesions are taken and microscopically show mucosal infiltration by foamy macrophages with abundant PAS-positive cytoplasmic granules and small, laminated mineralized concretions. Which of the following organisms is most likely to be found in her urine?

- ☐ (A) Adenovirus
- ☐ (B) *Candida albicans*
- ☐ (C) *Chlamydia trachomatis*
- ☒ (D) *Escherichia coli*
- ☐ (E) *Schistosoma haematobium*

18 A 26-year-old man is involved in a motor vehicle accident and sustains acute blood loss. He is hypotensive for several hours before paramedical personnel arrive. They stabilize the bleeding and transport him to a hospital, where he receives a transfusion of 3 U of packed RBCs. Over the next week, the serum urea nitrogen level increases to 48 mg/dL, the serum creatinine level increases to 5 mg/dL, and the urine output decreases. He undergoes hemodialysis for the next 2 weeks and then develops marked polyuria, with urine output of 2 to 3 L/day. His recovery is complicated by bronchopneumonia, but renal function gradually returns to normal. The patient's transient renal disease is best characterized by which of the following histologic features?

- ☐ (A) Glomerular crescents in Bowman space
- ☐ (B) Interstitial lymphocytic infiltrates
- ☐ (C) Arteriolar fibrinoid necrosis
- ☐ (D) Nodular glomerulosclerosis
- ☒ (E) Rupture of tubular basement membrane

19 A 60-year-old, previously healthy man sees his physician because he feels feverish and weak. He reports passing dark-colored urine on several occasions during the past month, but has no urinary frequency, dysuria, or nocturia. On physical examination, his temperature is 37.8°C, and blood pressure is 125/85 mm Hg. A dipstick urinalysis shows 4+ hematuria; 1+ proteinuria; and no glucose or ketones. Which of the following procedures is the most appropriate in management of this patient?

- ☐ (A) Straining of urine for calculi
- ☐ (B) Urine microbiologic culture
- ☒ (C) Abdominal CT scan for renal mass
- ☐ (D) Collection of a 24-hour urine specimen for protein
- ☐ (E) Percutaneous renal biopsy

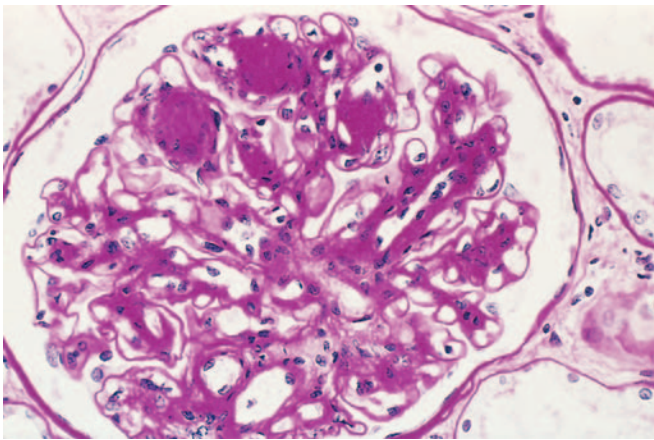
20 A 49-year-old man goes to his physician for a checkup and is found on physical examination to have a blood pressure of 160/110 mm Hg, but no other abnormalities. Laboratory

studies show serum glucose of 75 mg/dL, creatinine of 1.3 mg/dL, and urea nitrogen of 20 mg/dL. His plasma renin is elevated. CT angiography shows marked stenosis of his renal arteries. He is treated with an angiotensin-converting enzyme inhibitor. A week later, he has a headache for which he takes ibuprofen. Over the next day, his urine output decreases. A reduction in which of the following chemical mediators most likely caused his reduced urine output?

- ☐ (A) Aldosterone
- ☐ (B) Histamine
- ☐ (C) Nitric oxide
- ☒ (D) Prostaglandin
- ☐ (E) Tumor necrosis factor

21 A 50-year-old woman has had fever and flank pain for the past 2 days. On physical examination, her temperature is 38.2°C, pulse is 81/min, respirations are 16/min, and blood pressure is 130/80 mm Hg. Urinalysis shows no protein, glucose, or ketones. The leukocyte esterase test is positive. Microscopic examination of the urine shows numerous polymorphonuclear leukocytes and occasional WBC casts. Which of the following organisms is most likely to be found in the urine culture?

- ☐ (A) *Mycobacterium tuberculosis*
- ☐ (B) *Mycoplasma hominis*
- ☒ (C) *Escherichia coli*
- ☐ (D) Group A streptococcus
- ☐ (E) *Cryptococcus neoformans*



22 A 58-year-old, relatively healthy man sees his physician for a routine health maintenance examination. Physical examination shows mild hypertension. Laboratory findings show a serum creatinine level of 2.2 mg/dL and urea nitrogen level of 25 mg/dL. Microalbuminuria is present, with excretion of 250 mg/day of albumin. Two years later, he returns for a follow-up visit. He is now hypertensive and has a serum creatinine level of 3.8 mg/dL, urea nitrogen level of 38 mg/dL, and 24-hour urine protein level of 2.8 g. A renal biopsy is done; the light microscopic appearance of a PAS-stained specimen is shown in the figure. Which of the following laboratory findings is most likely to be abnormal in this patient?

- ☐ (A) Anti-glomerular basement membrane antibody
- ☐ (B) ANA
- ☐ (C) ANCA
- ☐ (D) Antistreptolysin O
- ☐ (E) C3 nephritic factor
- ☒ (F) Hemoglobin A_{1c}
- ☐ (G) Hepatitis B surface antigen

23 A 20-year-old woman, G1, P0, who is in the third trimester, has felt minimal fetal movement. An ultrasound scan shows a markedly decreased amniotic fluid index characteristic of oligohydramnios. She gives birth to a stillborn male fetus at 33 weeks' gestation. At autopsy, there are deformations resulting from marked oligohydramnios, including flattening of the facies, varus deformities of the feet, and marked pulmonary hypoplasia. Microscopic examination of the liver shows multiple epithelium-lined cysts and a proliferation of bile ducts. Which of the following best describes the appearance of the kidneys in this fetus?

- ☐ (A) Bilaterally enlarged kidneys replaced by 1- to 4-cm, fluid-filled cysts
- ☐ (B) Bilaterally shrunken kidneys with uniformly finely granular cortical surfaces
- ☐ (C) Decreased overall size of the right kidney and normal-sized left kidney
- ☐ (D) Irregular cortical scars in asymmetrically shrunken kidneys with marked calyceal dilation
- ☐ (E) Marked bilateral renal pelvic and calyceal dilation with thinning of the cortices
- ☐ (F) Normal-sized kidneys with smooth cortical surfaces
- ☒ (G) Symmetrically enlarged kidneys composed of small, radially arranged cysts

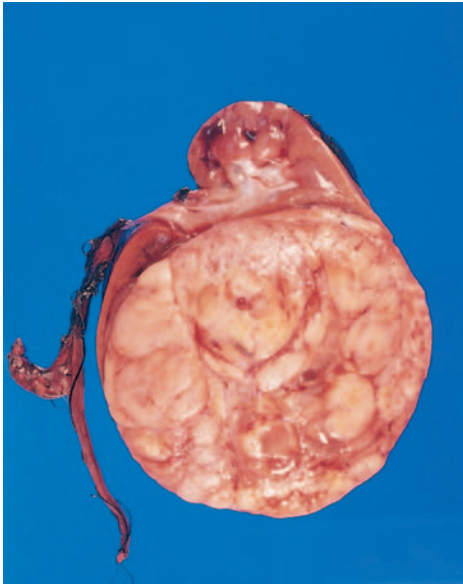
24 A 65-year-old woman has experienced increasing malaise with nocturia and polyuria for the past year. On physical examination, her blood pressure is 170/95 mm Hg. Urinalysis shows a pH of 7.5; specific gravity 1.010; 1+ proteinuria; and no glucose, blood, or ketones. The tests for leukocyte esterase and nitrite yield positive results, and levels of serum urea nitrogen and serum creatinine are elevated. Her clinical course is characterized by worsening renal failure, and she dies of bronchopneumonia. At autopsy, the kidneys are shrunken but unequal in size, and have deep, irregular surface scars. On sectioning, the calyces underlying the cortical scars are blunted and deformed. What is the most likely cause of renal failure in this patient?

- ☐ (A) Chronic glomerulonephritis
- ☐ (B) Essential hypertension
- ☒ (C) Reflux nephropathy
- ☐ (D) Autosomal-dominant polycystic kidney disease
- ☐ (E) Systemic lupus erythematosus

25 A 29-year-old woman sees her physician because she has had a fever and sore throat for the past 3 days. On physical examination, her temperature is 38°C. The pharynx is erythematous, with yellowish tonsillar exudate. Group A *Streptococcus pyogenes* is cultured. She is treated with ampicillin and recovers fully in 7 days. Two weeks later, she develops fever and a rash, and notices a slight decrease in urinary output. Her temperature is 37.7°C, and there is a diffuse erythematous rash on the trunk and extremities. Urinalysis shows a pH of

6; specific gravity 1.022; 1+ proteinuria; 1+ hematuria; and no glucose or ketones. Microscopic examination of the urine shows RBCs and WBCs, including eosinophils, but no casts or crystals. What is the most likely cause of her disease?

- ☐ (A) Deposition of immune complexes with streptococcal antigens
- ☐ (B) Hematogenous dissemination of septic emboli
- ☐ (C) Renal tubular cell necrosis caused by bacterial toxins
- ☒ (D) Hypersensitivity reaction to ampicillin
- ☐ (E) Formation of antibodies against glomerular basement membrane



26 A 4-year-old girl has complained of abdominal pain for the past month. On physical examination, she is febrile, and palpation of the abdomen shows a tender mass on the right. Bowel sounds are present. Laboratory studies show hematuria without proteinuria. Abdominal CT scan shows a 12-cm, circumscribed, solid mass in the right kidney. A right nephrectomy is done; the gross appearance of the mass is shown in the figure. What is the most likely diagnosis?

- ☐ (A) Angiomyolipoma
- ☐ (B) Interstitial cell tumor
- ☐ (C) Renal cell carcinoma
- ☐ (D) Transitional cell carcinoma
- ☒ (E) Wilms tumor

27 One week after a mild flulike illness, a 9-year-old boy has an episode of hematuria that subsides within 2 days. One month later, he tells his parents that his urine is red again. On physical examination, there are no significant findings. Urinalysis shows a pH of 7; specific gravity 1.015; 1+ proteinuria; 1+ hematuria; and no ketones, glucose, or urobilinogen. The serum urea nitrogen level is 36 mg/dL, and the creatinine level is 3.2 mg/dL. A renal biopsy specimen shows diffuse mesangial proliferation and electron-dense deposits in the mesangium. Which of the following mechanisms is most likely to produce these findings?

- ☒ (A) Deposition of immune complexes containing IgA
- ☐ (B) Formation of antibodies against type IV collagen
- ☐ (C) Virus-mediated injury to the glomeruli
- ☐ (D) Cytokine-mediated injury to the glomerular capillaries
- ☐ (E) Congenital defects in the structure of glomerular basement membranes

28 The top of the diaper is often noted to be damp on a girl infant. Radiologic imaging with contrast enhancement shows that there is a connection from the bladder to umbilicus. What is the most likely diagnosis?

- ☐ (A) Congenital diverticulum
- ☐ (B) Exstrophy
- ☒ (C) Persistent urachus
- ☐ (D) Vesicoureteral reflux
- ☐ (E) Vitelline duct remnant

29 A 7-year-old boy is brought to the physician by his mother, who is concerned because he has become less active over the past 10 days. On physical examination, the boy has facial puffiness. Urinalysis shows no blood, glucose, or ketones, and microscopic examination shows no casts or crystals. The serum creatinine level is normal. A 24-hour urine collection yields 3.8 g of protein. He improves after corticosteroid therapy. He has two more episodes of proteinuria over the next few years, both of which respond to corticosteroid therapy. A renal biopsy is done. What is the most likely mechanism causing his disease?

- ☐ (A) Immune complex-mediated glomerular injury
- ☐ (B) Verocytotoxin-induced endothelial cell injury
- ☐ (C) Cytotoxic T cell-mediated tubular epithelial cell injury
- ☒ (D) Cytokine-mediated visceral epithelial cell injury
- ☐ (E) IgA-mediated mesangial cell injury

30 A 49-year-old man saw his physician because he had increased swelling in the extremities for 2 months. Physical examination showed generalized edema. A 24-hour urine collection yielded 4.1 g of protein and albumin and globulins. Extensive testing did not indicate the presence of a systemic disease, such as diabetes mellitus or systemic lupus erythematosus. He did not respond to a course of corticosteroid therapy. A renal biopsy was done, and microscopic examination showed diffuse thickening of the basement membrane. Immunofluorescence staining with antibody to the C3 component of complement was positive in a granular pattern in the glomerular capillary loops. Two years later, he experiences increasing malaise. Laboratory studies now show serum creatinine level of 4.5 mg/dL and urea nitrogen level of 44 mg/dL. Which of the following immunological mechanisms was most likely responsible for the glomerular changes observed in the biopsy specimen?

- ☐ (A) Antibodies that react with basement membrane collagen
- ☐ (B) Antibodies against streptococci that cross-react with the basement membrane
- ☐ (C) Release of cytokines by inflammatory cells
- ☐ (D) Cytotoxic T cells directed against renal antigens
- ☒ (E) Deposition of immune complexes on the basement membrane

31 A 31-year-old woman experiences abdominal pain and sees her physician 1 week later after noticing blood in her urine. She has had three episodes of urinary tract infection during the past year. There are no remarkable findings on physical examination. Urinalysis shows 2+ hematuria; 1+ proteinuria; hypercalciuria; and no glucose or ketones. Microscopic examination of the urine shows numerous RBCs and oxalate crystals. An intravenous pyelogram shows linear striations radiating into the renal papillae, along with small cystic collections of contrast material in dilated collecting ducts. She is advised to increase her daily intake of fluids, and her condition improves. Which of the following conditions is most likely to be associated with these findings?

- ☐ (A) Autosomal-dominant polycystic kidney disease
- ☐ (B) Gout
- ☒ (C) Medullary sponge kidney
- ☐ (D) Multicystic renal dysplasia
- ☐ (E) Autosomal-recessive polycystic kidney disease
- ☐ (F) Urothelial carcinoma
- ☐ (G) Vesicoureteral reflux

32 A 42-year-old man has had right flank pain for the past 2 days. On physical examination, his temperature is 37.4°C, pulse is 70/min, respirations are 14/min, and blood pressure is 130/85 mm Hg. Laboratory studies show a serum creatinine level of 1.1 mg/dL. Urinalysis shows no blood, protein, or glucose, and microscopic examination of the urine shows no WBCs or RBCs. Abdominal CT scan shows a 7-cm eccentric lesion of the upper pole of the right kidney. The lesion is well circumscribed and cystic with a thin wall and focal hemorrhage. What is the most likely diagnosis?

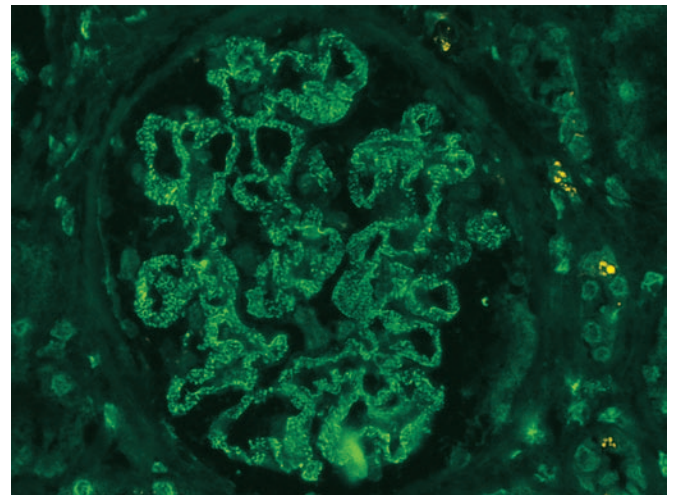
- ☐ (A) Acute pyelonephritis
- ☐ (B) Acute tubular necrosis
- ☐ (C) Diabetic nephropathy
- ☐ (D) Hydronephrosis
- ☒ (E) Simple renal cyst
- ☐ (F) Rapidly progressive glomerulonephritis
- ☐ (G) Renal cell carcinoma
- ☐ (H) Urothelial carcinoma

33 A 51-year-old woman has had recurrent urinary tract infections for the past 15 years. On many of these occasions, *Proteus mirabilis* was cultured from her urine. For the past 4 days, she has had a burning pain on urination and urinary frequency. On physical examination, her temperature is 37.9°C, pulse is 70/min, respirations are 15/min, and blood pressure is 135/85 mm Hg. There is marked tenderness on deep pressure over the right costovertebral angle and on deep abdominal palpation. Urinalysis shows a pH of 7.5; specific gravity 1.020; 1+ hematuria; and no protein, glucose, or ketones. Microscopic examination of the urine shows many RBCs, WBCs, and triple-phosphate crystals. Which of the following renal lesions is most likely to be present?

- ☐ (A) Renal cell carcinoma
- ☐ (B) Acute tubular necrosis
- ☐ (C) Malignant nephrosclerosis
- ☒ (D) Staghorn calculus
- ☐ (E) Papillary necrosis

34 A 53-year-old woman has had dysuria and urinary frequency for the past week. On physical examination, her temperature is 38°C, and she has pain on palpation over the left costovertebral angle. Laboratory findings show glucose, 177 mg/dL; hemoglobin A_{1c}, 9.8%; hemoglobin, 13.1 g/dL; platelet count, 232,200/mm³; and WBC count, 11,320/mm³. Urinalysis shows a pH of 6.5; specific gravity 1.016; 2+ glucosuria; and no blood, protein, or ketones. Microscopic examination of the urine shows numerous neutrophils, and a urine culture is positive for *Escherichia coli*. Which of the following complications is most likely to develop in this patient?

- ☐ (A) Acute tubular necrosis
- ☒ (B) Necrotizing papillitis
- ☐ (C) Crescentic glomerulonephritis
- ☐ (D) Hydronephrosis
- ☐ (E) Renal calculi



35 A 42-year-old man has experienced increasing malaise for the past month. He is bothered by increasing swelling in the hands and legs. On physical examination, there is generalized edema. He is afebrile, and his blood pressure is 140/90 mm Hg. Urinalysis shows a pH of 6.5; specific gravity 1.017; 4+ proteinuria; and no blood, glucose, or ketones. Microscopic examination of the urine shows no casts or RBCs and 2 WBCs per high-power field. The 24-hour urine protein level is 4.2 g. A renal biopsy specimen is obtained, and immunofluorescence staining with antibody to the C3 component of complement produces the pattern shown in the figure. Which of the following underlying disease processes is most likely to be present?

- ☒ (A) Chronic hepatitis B
- ☐ (B) AIDS
- ☐ (C) Multiple myeloma
- ☐ (D) Recurrent urinary tract infection
- ☐ (E) Nephrolithiasis

36 A 58-year-old man is in stable condition after an acute myocardial infarction. Two days later, his urine output decreases, and the serum urea nitrogen level increases to 3.3 mg/dL. Oliguria persists for 5 days, followed by polyuria for 2 days. He is discharged from the hospital. Which of the following renal lesions best explains these renal abnormalities?

- ☒ (A) Acute tubular necrosis
- ☐ (B) Benign nephrosclerosis
- ☐ (C) Acute renal infarction
- ☐ (D) Hemolytic-uremic syndrome
- ☐ (E) Rapidly progressive glomerulonephritis

37 Several members of a family developed chronic renal failure by age 50 years. Most are males. The affected individuals also developed visual problems. Some younger family members have proteinuria and hematuria on urinalysis. A renal biopsy specimen from a 20-year-old man shows prominent tubular foam cells and glomerular basement membrane thickening and thinning. Family members with this disease are most likely to have which of the following additional manifestations?

- ☐ (A) Watery diarrhea
- ☒ (B) Nerve deafness
- ☐ (C) Presenile dementia
- ☐ (D) Dilated cardiomyopathy
- ☐ (E) Infertility

38 A 65-year-old man recently retired after many years in a job that involved exposure to aniline dyes, including β -naphthylamine. One month ago, he had an episode of hematuria that was not accompanied by abdominal pain. On physical examination, there are no abnormal findings. Urinalysis shows 4+ hematuria, and no ketones, glucose, or protein. Microscopic examination of the urine shows RBCs that are too numerous to count, 5 to 10 WBCs per high-power field, and no crystals or casts. The result of a urine culture is negative. What is the most likely diagnosis?

- ☐ (A) Renal cell carcinoma
- ☐ (B) Hemorrhagic cystitis
- ☐ (C) Tubercular cystitis
- ☒ (D) Urothelial carcinoma
- ☐ (E) Squamous cell carcinoma of the urethra

39 A 55-year-old woman has had poorly controlled hyperglycemia for many years. She sees her physician after experiencing burning pain on urination for 3 days. Physical examination shows a 2-cm ulceration on the skin of the heel and reduced sensation in the lower extremities. Her visual acuity is 20/100 bilaterally. Urinalysis shows 1+ proteinuria; 2+ glucosuria; and no blood, ketones, or urobilinogen. A urine culture contains more than 100,000 colony-forming units/mL of *Klebsiella pneumoniae*. Which of the following pathologic findings is most likely to be present in both kidneys?

- ☐ (A) Deposits of IgG and C3 in the glomerular basement membrane
- ☐ (B) Effacement of podocyte foot processes
- ☐ (C) Glomerular crescents
- ☐ (D) Mesangial deposits of IgA
- ☐ (E) Necrotizing granulomatous vasculitis
- ☒ (F) Nodular hyaline mesangial masses
- ☐ (G) Thickening and thinning of the glomerular basement membrane

40 A 17-year-old girl has had arthralgias and myalgias for several months. During the past week, she has noticed a decreased output of urine, which is reddish brown. On physical examination, her blood pressure is 160/100 mm Hg, and she has an erythematous malar skin rash. The ANA and anti-double-stranded DNA test results are positive. The serum urea nitrogen level is 52 mg/dL. Which of the following urinalysis findings is most likely to be reported for this patient?

- ☐ (A) Eosinophils
- ☐ (B) Glucose
- ☐ (C) Ketones
- ☐ (D) Myoglobin
- ☐ (E) Oval fat bodies
- ☒ (F) RBC casts
- ☐ (G) Triple phosphate crystals
- ☐ (H) Uric acid crystals
- ☐ (I) Waxy casts

41 A 28-year-old woman has had dysuria, frequency, and urgency for the past 2 days. On physical examination, her temperature is 37.6°C. A urine culture grows greater than 100,000 colonies/mL of *Escherichia coli*. She is treated with antibiotic therapy. If the problem continues to recur, the patient is likely to be at greatest risk for development of which of the following renal diseases?

- ☐ (A) Diffuse glomerulosclerosis
- ☐ (B) Chronic glomerulonephritis
- ☐ (C) Amyloidosis
- ☐ (D) Membranous glomerulonephritis
- ☒ (E) Chronic pyelonephritis

42 A sexually active, 26-year-old man has had pain on urination for the past 4 days. On physical examination, there are no lesions on the penis. He is afebrile. Urinalysis shows no blood, ketones, protein, or glucose. Microscopic examination of the urine shows few WBCs and no casts or crystals. What infectious agent is most likely to produce these findings?

- ☒ (A) *Chlamydia trachomatis*
- ☐ (B) *Mycobacterium tuberculosis*
- ☐ (C) Herpes simplex virus
- ☐ (D) *Candida albicans*
- ☐ (E) *Treponema pallidum*



43 A 61-year-old woman sees the physician because she has experienced increasing malaise for the past 5 years. On physical examination, there are no abnormalities other than a blood pressure of 150/95 mm Hg. One week later, she dies suddenly. At autopsy, both kidneys have the external (left panel) and bisected (right panel) appearance as shown in the figure. Which of the following conditions was the most probable cause of death?

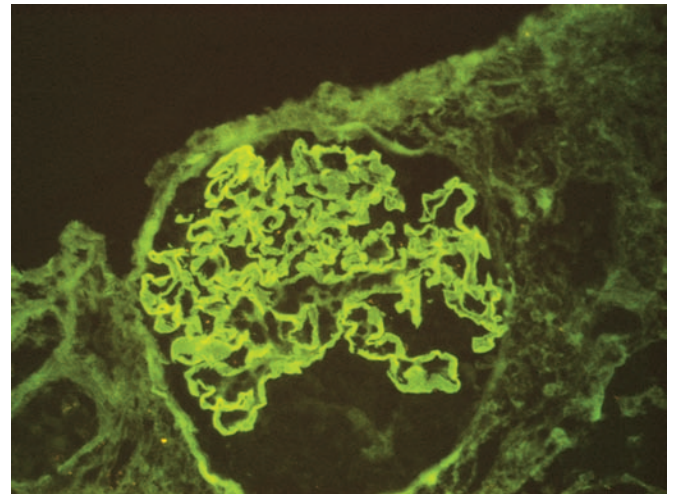
- ☐ (A) Metastatic Wilms tumor
- ☒ (B) Ruptured berry aneurysm
- ☐ (C) Acute tubular necrosis
- ☐ (D) Disseminated intravascular coagulation
- ☐ (E) Pneumothorax

44 For the past 20 years, a 69-year-old man with chronic arthritis has taken more than 3 g of analgesics per day, including phenacetin, aspirin, and acetaminophen. He sees his physician because of increasing malaise, nausea, and diminished mentation. On physical examination, his blood pressure is 156/92 mm Hg. Laboratory findings show serum urea nitrogen level of 68 mg/dL and creatinine level of 7.1 mg/dL. CBC shows hemoglobin, 11.7 g/dL; hematocrit, 35.1%; platelet count, 188,500/mm³; and WBC count, 5385/mm³. Which of the following renal diseases is this patient most likely to develop?

- ☐ (A) Hydronephrosis
- ☐ (B) Chronic glomerulonephritis
- ☒ (C) Renal papillary necrosis
- ☐ (D) Renal cell carcinoma
- ☐ (E) Acute tubular necrosis

45 A 58-year-old woman sees her physician for a routine health maintenance examination. The only abnormality on physical examination is a blood pressure of 168/109 mm Hg. Urinalysis shows a pH of 7.0; specific gravity 1.020; 1+ proteinuria; and no blood, glucose, or ketones. An abdominal ultrasound scan shows bilaterally and symmetrically small kidneys with no masses. The ANA test result is negative. The serum urea nitrogen level is 51 mg/dL, and the creatinine level is 4.7 mg/dL. The hemoglobin A_{1c} concentration is within the reference range. What is the most likely diagnosis?

- ☐ (A) Lupus nephritis
- ☐ (B) Autosomal-dominant polycystic kidney disease
- ☒ (C) Chronic glomerulonephritis
- ☐ (D) Nodular glomerulosclerosis
- ☐ (E) Amyloidosis

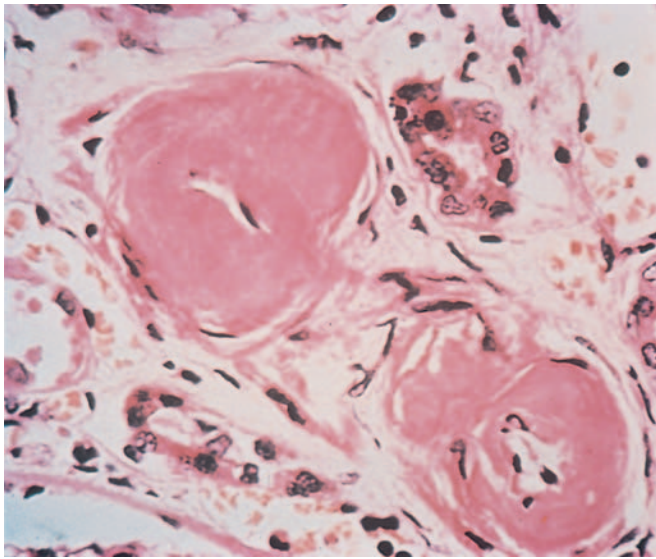


46 A previously healthy, 21-year-old man sees his physician because he notices blood in his urine. He reports no dysuria, frequency, or hesitancy of urination. On physical examination, there are no abnormal findings. Laboratory findings show a serum urea nitrogen level of 39 mg/dL and creatinine level of 4.1 mg/dL. A renal biopsy specimen is obtained; the immunofluorescence pattern of staining with antibody against human IgG is shown in the figure. Which of the following serum laboratory studies is most likely to be positive in this patient?

- ☐ (A) Antistreptolysin O antibody
- ☐ (B) HIV antibody
- ☒ (C) Anti-glomerular basement membrane antibody
- ☐ (D) Hepatitis B surface antibody
- ☐ (E) C3 nephritic factor

47 A 33-year-old woman has had fever and increasing fatigue for the past 2 months. Over the past year, she has noticed soreness of her muscles and joints and has had a 4-kg weight loss. On physical examination, her temperature is 37.5°C, pulse is 80/min, respirations are 15/min, and blood pressure is 145/95 mm Hg. She has pain on deep inspiration, and a friction rub is heard on auscultation of the chest. Laboratory findings show glucose, 73 mg/dL; total cholesterol, 160 mg/dL; total protein, 5.2 g/dL; albumin, 2.9 g/dL; total bilirubin, 0.9 mg/dL; and creatinine, 2.4 mg/dL. Serum complement levels are decreased. CBC shows hemoglobin of 9.7 g/dL, platelet count of 85,000/mm³, and WBC count of 3560/mm³. A renal biopsy specimen shows a diffuse proliferative glomerulonephritis with extensive granular immune deposits of IgG and C1q in capillary loops and mesangium. After being treated with immunosuppressive therapy consisting of prednisone and cyclophosphamide, her condition improves. Which of the following serologic studies is most likely to be positive in this patient?

- ☐ (A) Anticentromere antibody
- ☒ (B) Anti-double-stranded DNA antibody
- ☐ (C) Anti-DNA topoisomerase I antibody
- ☐ (D) Anti-glomerular basement membrane antibody
- ☐ (E) Antihistone antibody
- ☐ (F) ANCA
- ☐ (G) Antiribonucleoprotein



Courtesy of Dr. M. A. Ventkatachalam, Department of Pathology, University of Texas Health Sciences Center, San Antonio, TX.

48 A 66-year-old woman died of an acute myocardial infarction. At autopsy, both kidneys were decreased in size (about 120 g each) with a finely granular cortical surface. The representative appearance of the kidney under high magnification is shown in the figure. Which of the following clinical abnormalities most likely accompanied this lesion?

- ☐ (A) Oliguria
- ☒ (B) Benign hypertension
- ☐ (C) Malignant hypertension
- ☐ (D) Hematuria
- ☐ (E) Flank pain

49 A 79-year-old man has had increasing back pain and fatigue for the past 6 months. On physical examination, there are no remarkable findings. Laboratory studies include a CBC with hemoglobin of 9.6 g/dL, platelet count of 241,600/mm³, and WBC count of 7160/mm³. The serum total protein is 9.8 g/dL, albumin is 3.6 g/dL, glucose is 72 mg/dL, creatinine is 3.3 mg/dL, and urea nitrogen is 30 mg/dL. A dipstick urinalysis shows a pH of 7; specific gravity 1.011; and no blood, protein, or glucose. One month later, he develops a cough with fever, and *Streptococcus pneumoniae* is cultured from his sputum. Despite antibiotic therapy, he develops sepsis and dies. At autopsy, the kidneys are normal in size, but microscopic examination shows dilated tubules filled with amorphous blue-to-pink casts and occasional multinucleated giant cells. What is the most likely underlying cause of this patient's death?

- ☐ (A) Cystinuria
- ☐ (B) Diabetes mellitus
- ☐ (C) Gout
- ☒ (D) Multiple myeloma
- ☐ (E) Parathyroid adenoma
- ☐ (F) Systemic lupus erythematosus

50 A 30-year-old woman with a history of recurrent urinary tract infections has had a high fever for the past 3 days. On physical examination, her temperature is 38.4°C. There is marked abdominal tenderness on deep palpation. A renal ultrasound scan shows an enlarged right kidney with pelvic and calyceal enlargement and cortical thinning; the left kidney appears normal. A right nephrectomy is done, and microscopic examination shows inflammatory infiltrates extending from the medulla to the cortex, with tubular destruction and extensive interstitial fibrosis. Lymphocytes, plasma cells, and neutrophils are abundant. Which of the following is most likely to produce these findings?

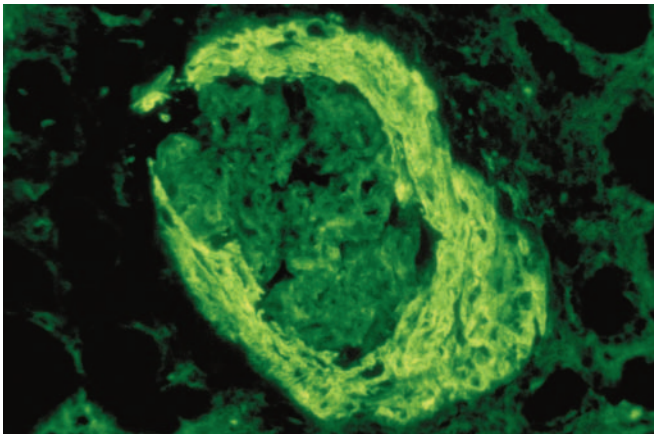
- ☐ (A) Benign nephrosclerosis
- ☒ (B) Vesicoureteral reflux
- ☐ (C) Lupus nephritis
- ☐ (D) Systemic amyloidosis
- ☐ (E) Congestive heart failure
- ☐ (F) Autosomal-dominant polycystic kidney disease

51 A 32-year-old man with a history of intravenous drug use comes to the emergency department because he has had a high fever for the past 2 days. On physical examination, his temperature is 38.4°C. He has a palpable spleen tip, bilateral costovertebral angle tenderness, and diastolic cardiac murmur. Laboratory findings show a serum urea nitrogen level of 15 mg/dL. Urinalysis shows 2+ hematuria, and no glucose, protein, or ketones. A blood culture is positive for *Staphylococcus aureus*. Which of the following best describes the kidneys in this patient?

- ☐ (A) Bilaterally enlarged kidneys replaced by 1- to 4-cm, fluid-filled cysts
- ☐ (B) Bilaterally shrunken kidneys with uniformly finely granular cortical surfaces
- ☐ (C) Irregular cortical scars in asymmetrically shrunken kidneys with marked calyceal dilation
- ☐ (D) Marked bilateral renal pelvic and calyceal dilation with thinning of the cortices
- ☐ (E) Normal-sized kidneys with smooth cortical surfaces
- ☐ (F) Scattered petechial hemorrhages in slightly swollen kidneys
- ☒ (G) Wedge-shaped regions of yellow-white cortical necrosis involving both kidneys

52 Three years ago, a 47-year-old woman had a mastectomy of the right breast to remove an infiltrating ductal carcinoma. She now has bone pain, and a radionuclide scan shows multiple areas of increased uptake in the vertebrae, ribs, pelvis, and right femur. Urinalysis shows a specific gravity of 1.010, which remains unchanged after water deprivation for 12 hours. She undergoes several courses of chemotherapy over the next year. During this time, the serum urea nitrogen level progressively increases. Which of the following abnormal laboratory findings is most likely to be reported for this patient?

- ☐ (A) Hepatitis B surface antigenemia
- ☒ (B) Hypercalcemia
- ☐ (C) Hypercholesterolemia
- ☐ (D) Hypergammaglobulinemia
- ☐ (E) Hyperglycemia
- ☐ (F) Hyperuricemia



53 A 45-year-old man has experienced increasing malaise, nausea, and reduced urine output for the past 3 days. On physical examination, he is afebrile and normotensive. Laboratory findings show a serum creatinine level of 2.5 mg/dL. Urinalysis shows hematuria, but no pyuria or glucosuria. A renal biopsy is done; the immunofluorescence pattern with antifibrinogen is shown in the figure. Which of the following additional studies is most useful for classification and treatment of this disease?

- ☐ (A) ANA titer
- ☒ (B) Anti-glomerular basement membrane antibody test
- ☐ (C) HIV titer
- ☐ (D) Quantitative serum immunoglobulins
- ☐ (E) Rheumatoid factor
- ☐ (F) Urine immunoelectrophoresis

54 A 28-year-old man is diagnosed with acute myelogenous leukemia (M2). After induction with a multiagent chemotherapy protocol, he has an episode of lower abdominal pain accompanied by passage of red-colored urine. He has no fever, dysuria, or urinary frequency. On physical examination, there are no remarkable findings. Urinalysis shows a pH of 5.5; specific gravity 1.021; 2+ hematuria; and no protein, ketones, or glucose. There are no remarkable findings on an abdominal radiograph. Which of the following additional urinalysis findings is most likely to be reported for this patient?

- ☐ (A) Bence Jones protein
- ☐ (B) Eosinophils
- ☐ (C) Myoglobin
- ☐ (D) Oval fat bodies
- ☐ (E) RBC casts
- ☐ (F) Triple phosphate crystals
- ☒ (G) Uric acid crystals
- ☐ (H) Waxy casts
- ☐ (I) WBC casts

55 A 44-year-old man has developed a fever, nonproductive cough, and decreased urine output over the past 3 days. On physical examination, his temperature is 37.7°C, and blood pressure is 145/95 mm Hg. He has sinusitis. On auscultation, crackles are heard over all lung fields. A chest radiograph shows bilateral patchy infiltrates and nodules. The serum creatinine level is 4.1 mg/dL, and the urea nitrogen level is 43 mg/dL. The results of serologic testing are negative for ANA, but positive for C-ANCA. A renal biopsy specimen shows glomerular crescents and granulomatous vasculitis. The result of immunofluorescence staining with anti-IgG and anti-C3 antibodies is negative. What is the most likely diagnosis?

- ☐ (A) Focal segmental glomerulosclerosis
- ☐ (B) Goodpasture syndrome
- ☐ (C) Lupus nephritis
- ☐ (D) Membranoproliferative glomerulonephritis type II
- ☐ (E) Membranous glomerulonephritis
- ☐ (F) Postinfectious glomerulonephritis
- ☒ (G) Wegener's granulomatosis

56 A 65-year-old woman has recently experienced several transient ischemic attacks. On physical examination, the only abnormal finding is a blood pressure of 150/95 mm Hg. Urinalysis shows 1+ proteinuria, and no glucose, blood, or ketones. Microscopic examination of the urine shows no RBCs or WBCs and few oxalate crystals. On abdominal ultrasound, the kidneys are slightly decreased in size. Which of the following renal lesions is most likely to be present in this patient?

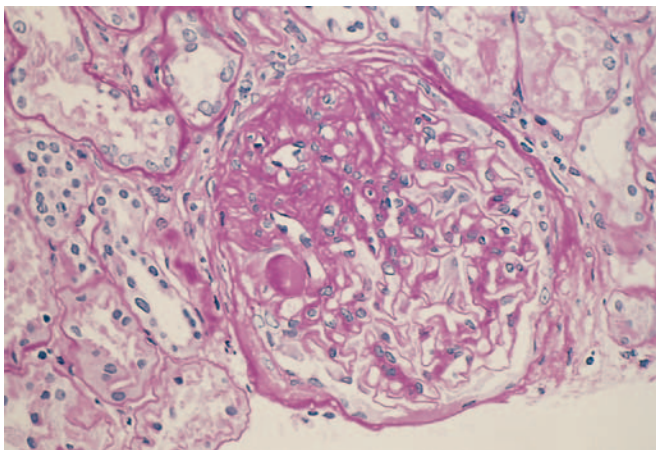
- ☐ (A) Crescentic glomerulonephritis
- ☒ (B) Hyaline arteriosclerosis
- ☐ (C) Mesangial cell proliferation
- ☐ (D) Arteriolar fibrinoid necrosis
- ☐ (E) Acute tubular necrosis
- ☐ (F) Interstitial nephritis

57 Over the past 72 hours, a 44-year-old man has experienced worsening headache, nausea, and vomiting. On physical examination, his blood pressure is 276/158 mm Hg, and there is bilateral papilledema. Urinalysis shows 2+ proteinuria; 1+ hematuria; and no glucose or ketones. Which of the following renal lesions is most likely to be present in this patient?

- ☐ (A) Papillary necrosis
- ☐ (B) Acute infarction
- ☒ (C) Necrotizing arteriolitis
- ☐ (D) Acute tubular necrosis
- ☐ (E) Acute pyelonephritis

58 A 35-year-old, previously healthy man is found dead in his home. At autopsy, the medical examiner notices bilaterally enlarged kidneys that contain multiple, irregularly arranged cysts of different shapes and sizes. There is a 0.5-cm nonruptured intracerebral berry aneurysm of the anterior communicating artery. There are scattered 1- to 2-cm, fluid-filled liver cysts involving 10% of the parenchymal volume. Postmortem laboratory testing of the urine and blood shows markedly elevated levels of cocaine and its metabolite, benzoylecgonine. Which of the following is the most appropriate conclusion to be drawn from these findings?

- ☐ (A) He had lesions related to chronic use of cocaine
- ☐ (B) He had autosomal-recessive polycystic kidney disease, but survived to adulthood
- ☒ (C) His surviving family (children, siblings, and parents) should be evaluated for a similar condition
- ☐ (D) The immediate cause of death is berry aneurysm
- ☐ (E) The underlying cause of death is autosomal-dominant polycystic kidney disease



Courtesy of Dr. Helmut Rennke, Department of Pathology, Brigham and Women's Hospital, Boston, MA.

59 A 12-year-old girl has experienced increasing malaise for the past 2 weeks. On physical examination, she has peri-

orbital edema. The child is afebrile. Laboratory findings show proteinuria on dipstick urinalysis, but no hematuria or glucosuria. Microscopic examination of the urine shows numerous oval fat bodies. The serum creatinine level is 2.3 mg/dL. She receives a course of corticosteroid therapy, but does not improve. A renal biopsy is done; the biopsy specimen shows that approximately 50% of the glomeruli in the specimen are affected by the lesion shown in the figure. What is the most likely diagnosis?

- ☒ (A) Focal segmental glomerulosclerosis
- ☐ (B) Lipoid nephrosis
- ☐ (C) Membranoproliferative glomerulonephritis type I
- ☐ (D) Membranoproliferative glomerulonephritis type II
- ☐ (E) Nodular glomerulosclerosis
- ☐ (F) Postinfectious glomerulonephritis
- ☐ (G) Rapidly progressive glomerulonephritis

60 A 19-year-old woman has had a fever and chills accompanied by right flank pain for the past 3 days. On physical examination, her temperature is 38.3°C, her blood pressure is 150/90 mm Hg, and there is right costovertebral angle tenderness. Laboratory findings show a serum glucose level of 77 mg/dL and creatinine level of 1 mg/dL. Urinalysis shows a pH of 6.5; specific gravity 1.018; and no protein, blood, glucose, or ketones. Microscopic examination of the urine shows many WBCs and WBC casts. Which of the following factors is most important in the pathogenesis of the renal disease affecting this patient?

- ☐ (A) Age
- ☐ (B) Sex
- ☒ (C) Vesicoureteral reflux
- ☐ (D) Blood pressure
- ☐ (E) Focus of infection in the lungs

61 Several days after eating a hamburger, chili, and ice cream at a home barbecue, a 5-year-old girl develops cramping abdominal pain and diarrhea. The next day, she has decreased urine output. On physical examination, there are petechial hemorrhages on the skin. Her temperature is 37°C, pulse is 90/min, respirations are 18/min, and blood pressure is 90/50 mm Hg. A stool sample is positive for occult blood. Laboratory findings show hemoglobin, 10.8 g/dL; hematocrit, 32.4%; platelet count, 64,300/mm³; and WBC count, 6480/mm³. The peripheral blood smear shows schistocytes, and the serum D-dimer level is elevated. Which of the following is the most likely causative organism?

- ☐ (A) *Candida albicans*
- ☐ (B) *Proteus mirabilis*
- ☐ (C) *Clostridium difficile*
- ☒ (D) *Escherichia coli*
- ☐ (E) *Staphylococcus aureus*

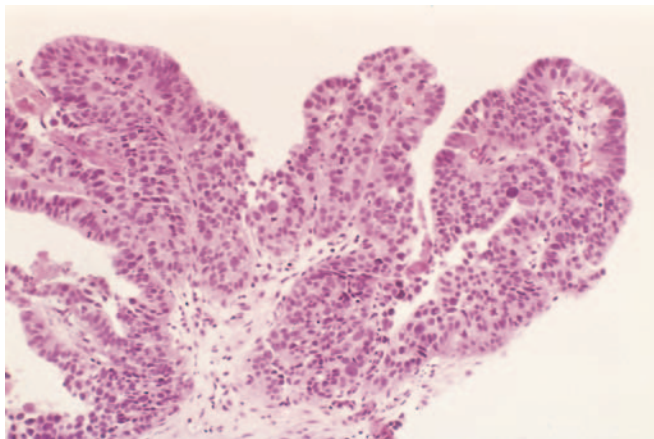
62 A 17-year-old boy is involved in a motor vehicle accident in which he sustains severe blunt trauma to the extremities and abdomen. Over the next 3 days, he develops oliguria and dark brown urine. The urine dipstick analysis is positive for myoglobin and for blood, but microscopic examination of the urine shows no RBCs. His serum urea nitrogen level increases to 38 mg/dL, and he undergoes hemodialysis for 3 weeks. His condition improves, but the urine output remains greater than 3 L/day for 1 week before the urea nitrogen returns to normal. Which of the

following renal lesions was most likely present in this patient?

- ☐ (A) Malignant nephrosclerosis
- ☐ (B) Renal vein thrombosis
- ☐ (C) Membranous glomerulonephritis
- ☐ (D) Acute pyelonephritis
- ☒ (E) Acute tubular necrosis

63 A 45-year-old man has had headaches, nausea, and vomiting that have worsened over the past 5 days. He has started “seeing spots” before his eyes. On physical examination, his blood pressure is 268/150 mm Hg. Urinalysis shows 1+ proteinuria; 2+ hematuria; and no glucose, ketones, or leukocytes. The serum urea nitrogen and creatinine levels are elevated. Which of the following histologic findings is most likely to be seen in this patient’s kidneys?

- ☐ (A) Nodular glomerulosclerosis
- ☐ (B) Segmental tubular necrosis
- ☒ (C) Hyperplastic arteriolosclerosis
- ☐ (D) Mesangial IgA deposition
- ☐ (E) Glomerular crescents



Courtesy of Dr. Christopher Corless, University of Oregon, Eugene, OR.

64 A 62-year-old man has had several episodes of hematuria over the past week. He has not experienced increased urinary frequency or dysuria. On physical examination, there are no remarkable findings. Urinalysis shows 4+ hematuria. The urine culture is negative. A cystoscopy is performed, and a 2-cm sessile, friable mass is seen on the right bladder wall. A biopsy specimen is obtained; the microscopic appearance is shown in the figure. Which of the following risk factors is most important in the pathogenesis of this bladder lesion?

- ☒ (A) Smoking cigarettes
- ☐ (B) Schistosomiasis
- ☐ (C) Diabetes mellitus
- ☐ (D) Chronic bacterial cystitis
- ☐ (E) Nodular prostatic hyperplasia

65 A 38-year-old woman sees her physician because she has been feeling tired and lethargic for several months. On physical examination, she is afebrile, and her blood pressure is 140/90 mm Hg. Laboratory findings show hemoglobin, 10.3 g/

dL; hematocrit, 30.9%; platelet count, 310,700/mm³; and WBC count, 5585/mm³. The serum creatinine level is 5.8 mg/dL. C3 nephritic factor is present in serum, and the ANA test result is negative. Urinalysis shows 2+ proteinuria. A renal biopsy is done; microscopic examination shows hypercellular glomeruli and prominent electron-dense deposits along the lamina densa of the glomerular basement membrane. Which of the following forms of glomerulonephritis is most likely to be present in this patient?

- ☐ (A) Postinfectious glomerulonephritis
- ☐ (B) Rapidly progressive glomerulonephritis
- ☒ (C) Membranoproliferative glomerulonephritis
- ☐ (D) Chronic glomerulonephritis
- ☐ (E) Membranous glomerulonephritis

66 A 60-year-old man presents with a feeling of fullness in his abdomen and a 5-kg weight loss over the past 6 months. Physical examination is normal. Laboratory studies show hemoglobin of 8.2 g/dL, hematocrit of 24%, and MCV of 70 μm³. Urinalysis shows 3+ hematuria, but no protein, glucose, or leukocytes. Abdominal CT scan shows an 11-cm mass in the upper pole of the right kidney. A right nephrectomy is performed, and on gross examination the mass invades the renal vein. Microscopic examination of the mass shows cells with abundant clear cytoplasm. Which of the following molecular abnormalities is most likely to be found in tumor cell DNA?

- ☒ (A) Homozygous loss of the von Hippel–Lindau (*VHL*) gene
- ☐ (B) Mutational activation of the *MET* proto-oncogene
- ☐ (C) Trisomy of chromosome 7 associated genes
- ☐ (D) Integration of human papillomavirus-16 (HPV-16)
- ☐ (E) Microsatellite instability

67 A 45-year-old Hispanic man has had increasing malaise with headaches and easy fatigability for the past 3 months. Physical examination reveals his blood pressure is 200/100 mm Hg. There are no palpable abdominal masses and no costovertebral tenderness. Laboratory studies show hemoglobin, 9.5 g/dL; hematocrit, 28.3%; MCV, 92 μm³; creatinine, 4.5 mg/dL; and urea nitrogen, 42 mg/dL. Urinalysis reveals 3+ hematuria and 3+ proteinuria, but no glucose or leukocytes. A renal biopsy is done; light microscopic examination of the biopsy specimen shows that approximately 50% of the glomeruli appear normal, but the rest show that a portion of the capillary tuft is sclerotic. Immunofluorescence staining shows IgM and C3 deposition in these sclerotic areas. Past history is significant for repeated episodes of passing dark brown urine, which failed to respond to corticosteroid therapy. Which of the following mechanisms is most likely responsible for his disease?

- ☐ (A) Deposition of immune complexes containing microbial antigens
- ☒ (B) Dysfunction of the podocyte slit diaphragm apparatus
- ☐ (C) Deposition of anti-glomerular basement membrane antibodies
- ☐ (D) Inherited defect in the basement membrane collagen
- ☐ (E) Deposition of C3 nephritic factor (C3NeF)

The Lower Urinary Tract and Male Genital System

PBD9 Chapter 21 and PBD8 Chapter 21: The Lower Urinary Tract and Male Genital System

BP9 Chapter 17: Male Genital System and Lower Urinary Tract

BP8 Chapter 18: The Male Genital System

1 An infant boy has had recurrent urinary tract infections since birth. Ultrasonography reveals dilated pelvis and calyces in the left kidney; the right kidney is absent. Surgical repair of an obstruction is performed. Which of the following pathologic findings is most likely present at the site of obstruction?

- A Adenocarcinoma within bladder exstrophy
- B Diverticulum with hemorrhage in the wall of the ureter
- C Granulomatous inflammation within a double ureter
- D Smooth muscle discontinuity at the uteropelvic junction**
- E Urachal remnant at the dome of the bladder

2 A 73-year-old man with urinary frequency and hesitancy has had three urinary tract infections within the past year. On physical examination, his prostate is diffusely enlarged. Which of the following pathologic findings is most likely to be present in his urinary bladder?

- A Diverticulum**
- B Interstitial cystitis
- C Malakoplakia
- D Papilloma
- E Schistosome ova

3 A 69-year-old man with history of recurrent pancreatitis treated with corticosteroids now has increasing fatigue for 2 years. He does not drink alcohol and has no evidence of gallbladder disease. On examination, there are no abnormalities. Laboratory studies show his serum creatinine is 5 mg/dL and urea nitrogen is 48 mg/dL. His serum IgG4 is elevated. Ultrasound imaging shows bilateral hydronephrosis. What is abdominal CT imaging most likely to show in this man?

- A Nephrolithiasis
- B Polypoid cystitis
- C Retroperitoneal fibrosis**
- D Renal cell carcinoma
- E Urothelial carcinoma

4 The top of the diaper is often noted to be damp on a girl infant. Radiologic imaging with contrast enhancement shows that there is a connection from the bladder to umbilicus. What is the most likely diagnosis?

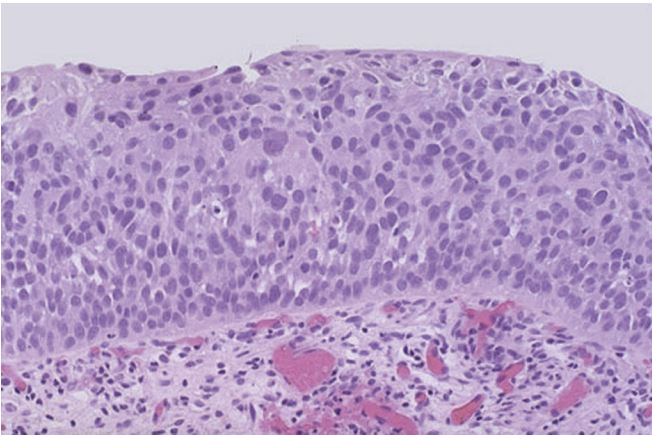
- A Congenital diverticulum
- B Exstrophy
- C Persistent urachus**
- D Vesicoureteral reflux
- E Vitelline duct remnant

5 A 51-year-old woman with diabetic nephropathy receives a renal allograft. An episode of acute cellular rejection requires an increase in immunosuppressive therapy. She develops dysuria. On examination, she has suprapubic pain on palpation. A urinalysis shows hematuria. Cystoscopy is performed, and 3- to 4-cm soft, yellow, slightly raised mucosal plaques are seen. Biopsy specimens of these lesions microscopically show mucosal infiltration by foamy macrophages with abundant PAS-positive cytoplasmic granules and small, laminated mineralized concretions. Which of the following organisms is most likely to be found in her urine?

- A Adenovirus
- B *Candida albicans*
- C *Chlamydia trachomatis*
- D *Escherichia coli***
- E *Schistosoma haematobium*

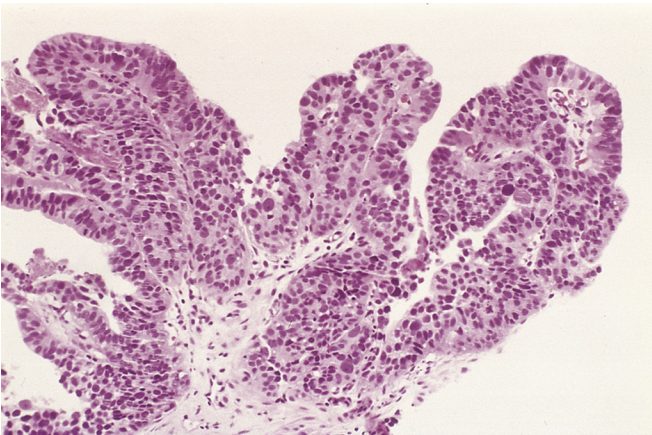
6 A study of patients with urothelial carcinoma of the urinary bladder is performed. Gross, microscopic, and molecular characteristics of these malignancies are analyzed. Survival is correlated with treatment. Which of the following findings in these malignancies is most likely to require radical cystectomy to improve survival?

- A Exposure to chemical carcinogens
- B Invasion of muscularis propria**
- C Lack of response to BCG therapy
- D Origin from inverted urothelial papilloma
- E *TP53* gene mutation



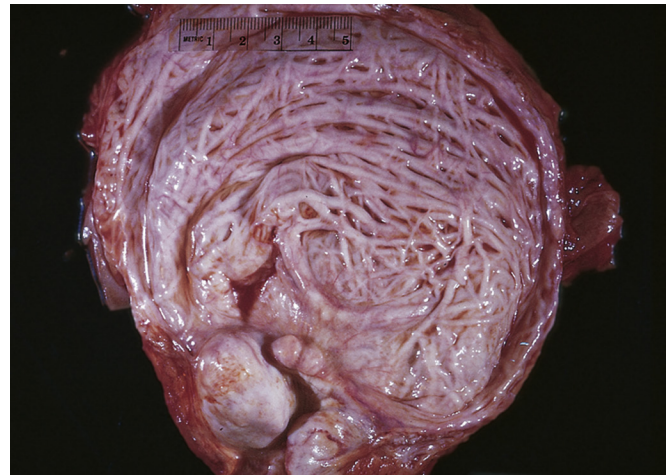
7 A 58-year-old man from Shanghai has noted passing darker urine within the past 3 weeks. On physical examination, there are no abnormalities. Urinalysis shows blood is present. Cystoscopy is performed and there is a 0.5×1.7 cm reddish area on the dome of the bladder. Biopsies are obtained and have the microscopic appearance shown in the figure. What is the most likely risk factor for his disease?

- A Congenital urachal remnant
- B Inherited gene mutation
- C Obesity
- D Schistosomiasis
- E Smoking**



8 A 65-year-old man recently retired after many years in a job that involved exposure to aniline dyes, including β -naphthylamine. One month ago, he had an episode of hematuria that was not accompanied by abdominal pain. On physical examination, there are no abnormal findings. Urinalysis shows 4+ hematuria, and no ketones, glucose, or protein. Microscopic examination of the urine shows RBCs that are too numerous to count, 5 to 10 WBCs per high-power field, and no crystals or casts. The result of a urine culture is negative. Cystoscopy is performed, and biopsy of a lesion reveals the microscopic appearance in the figure. Which of the following neoplasms is he most likely to have?

- A Adenocarcinoma
- B Rhabdomyosarcoma
- C Renal cell carcinoma
- D Squamous cell carcinoma
- E Urothelial carcinoma**



9 A 78-year-old man has had increasing difficulties with urination for the past 6 years. He has difficulty starting and stopping the urine stream. On physical examination, his temperature is 37°C and blood pressure is 130/85 mm Hg. The figure shows the representative gross appearance of the bladder. Which of the following laboratory findings is most likely to be reported in this patient?

- A Positive antinuclear antibody test
- B Hemoglobin concentration of 22.5 g/dL
- C Prostate-specific antigen level of 5 ng/mL**
- D *Schistosoma haematobium* eggs in urine
- E Positive skin test for *Mycobacterium tuberculosis*

10 A 57-year-old woman has had pain on urination for 5 months and yesterday noted blood on her underwear. On examination there is a tender red 1-cm nodule on the posterior lip of the external urethra. It is excised. What pathologic finding is most likely to be present on microscopic examination of her lesion?

- A Granulation tissue**
- B Multinucleated cells
- C Plasma cell infiltrates
- D Rhabdomyosarcoma
- E Squamous carcinoma
- F Urothelial dysplasia

11 A 74-year-old woman has noticed a slowly enlarging mass on her urethra for the past 6 months. The mass causes local pain and irritation and is now bleeding. Physical examination shows a 2.5-cm warty, ulcerated mass protruding from the external urethral meatus. There are no lesions on the labia or vagina. A biopsy specimen of the lesion is most likely to identify which of the following?

- A Clear cell carcinoma
- B Embryonal rhabdomyosarcoma
- C Leiomyoma
- D Condyloma lata
- E Squamous cell carcinoma**