

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?

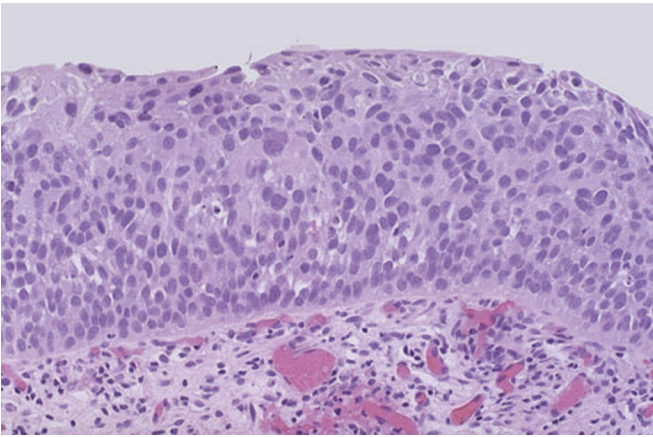
- A Congenital diverticulum
- B Exstrophy
- C Persistent urachus
- D Vesicoureteral reflux
- E Vitelline duct remnant

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*

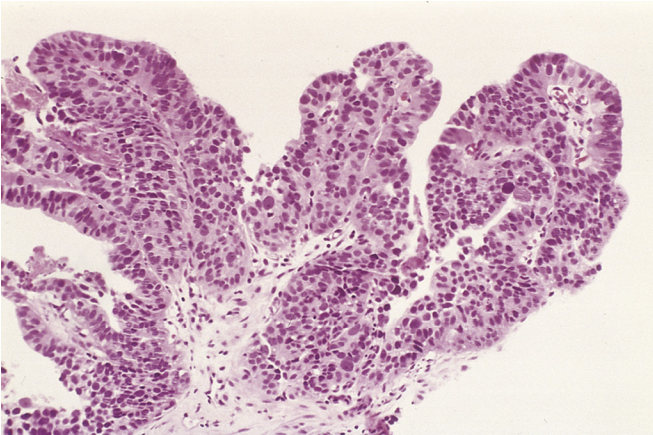
6 A study of patients with urothelial carcinoma of the urinary bladder is performed. Gross, microscopic, and molecular characteristics of these malignancies are analyzed. Survival is correlated with treatment. Which of the following findings in these malignancies is most likely to require radical cystectomy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



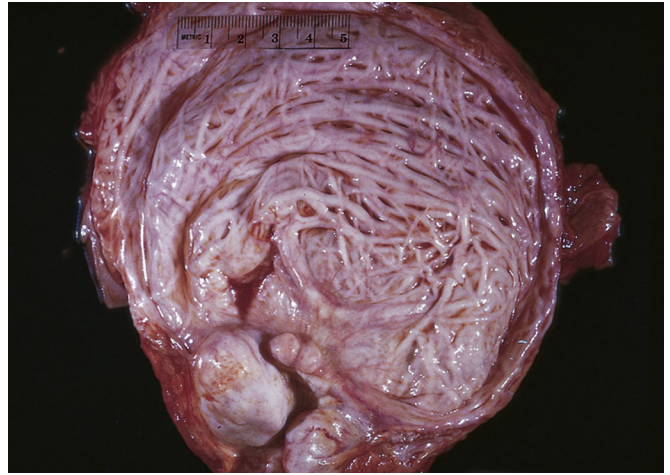
7 A 58-year-old man from Shanghai has noted passing darker urine within the past 3 weeks. On physical examination, there are no abnormalities. Urinalysis shows blood is present. Cystoscopy is performed and there is a 0.5 × 1.7 cm reddish area on the dome of the bladder. Biopsies are obtained and have 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

12 A 5-year-old boy has a history of recurrent urinary tract infections. Urine cultures have grown *Escherichia coli*, *Proteus mirabilis*, and *Enterococcus*. Physical examination now shows an abnormal constricted opening of the urethra on the ventral aspect of the penis, 1.5 cm from the tip of the glans penis. There also is a cryptorchid testis on the right and an inguinal hernia on the left. What term best describes the child's penile abnormality?

- A Balanitis
- B Bowen disease
- C Epispadias
- D Hypospadias
- E Phimosis

13 A 19-year-old man has worsening local pain and irritation with difficult urination over the past 3 years. He has become more sexually active during the past year and describes his erections as painful. Physical examination shows that he is not circumcised. The prepuce (foreskin) cannot be easily retracted over the glans penis. What is the most likely diagnosis?

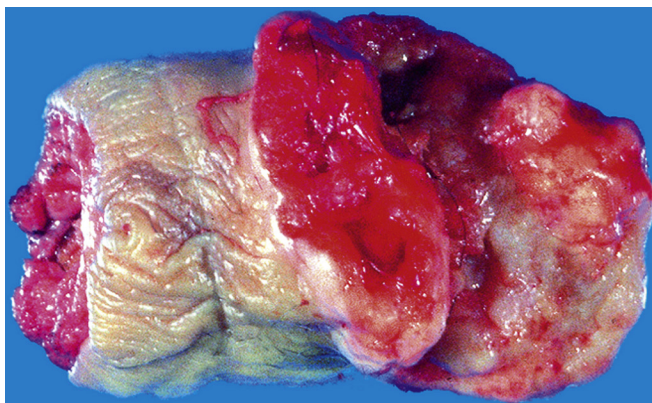
- A Bowenoid papulosis
- B Epispadias
- C Genital candidiasis
- D Paraphimosis
- E Phimosis

14 A 46-year-old man with a history of poorly controlled diabetes mellitus has had painful, erosive, markedly pruritic lesions on the glans penis, scrotum, and inguinal regions of the skin for the past 2 months. Physical examination shows irregular, shallow, 1- to 4-cm erythematous ulcerations. Scrapings of the lesions are examined under the microscope. Which of the following microscopic findings in the scrapings is most likely to be reported?

- A Atypical cells with hyperchromatic nuclei
- B Budding cells with pseudohyphae
- C Eggs and excrement of mites
- D Enlarged cells with intranuclear inclusions
- E Spirochetes under dark-field examination

15 A 23-year-old, sexually active man has been treated for *Neisseria gonorrhoeae* infection 6 times during the past 5 years. He now comes to the physician because of the increasing number and size of warty lesions slowly enlarging on his external genitalia during the past year. On physical examination, there are multiple 1- to 3-mm sessile, nonulcerated, papillary excrescences over the inner surface of the penile prepuce. These lesions are excised, but 2 years later, similar lesions appear. Which of the following conditions most likely predisposed him to development of these recurrent lesions?

- A *Candida albicans* infection
- B Circumcision
- C Human papillomavirus infection
- D *Neisseria gonorrhoeae* infection
- E Paraphimosis
- F Phimosis



16 A 56-year-old man from Fortaleza, Brazil, has noted increasing size of a penile lesion for the past 18 months. Physical examination reveals the appearance shown in the figure, following resection. What is most likely to be seen on microscopic examination?

- A Acute and chronic inflammation with budding cells and pseudohyphae
- B Dysplastic urothelium above the basement membrane
- C Hyperkeratotic, acanthotic, squamous epithelium overlying ectatic blood vessels
- D Infiltrating, pleomorphic, poorly differentiated squamous cells
- E Invasive glands with tall columnar mucinous epithelium

17 A 48-year-old man has noticed a reddish area on the penis for the past 3 months. On physical examination, there is a solitary 0.8-cm, plaque-like, erythematous area on the distal shaft of the penis. A routine microbiologic culture with a Gram-stained smear of the lesion shows normal skin flora. Microscopic examination of a biopsy specimen of the lesion shows dysplasia involving the full thickness of the epithelium. What is the most likely diagnosis?

- A Balanitis
- B Bowen disease
- C Condyloma acuminatum
- D Primary syphilis
- E Soft chancre

18 An 18-year-old man comes to his physician for a routine health maintenance examination. On physical examination, there is no left testis palpable in the scrotum. The patient is healthy, has had no major illnesses, and has normal sexual function. Which of the following complications will you tell this man is most likely to occur?

- A Carcinoma
- B Heritability
- C Infection
- D Infertility
- E No sequelae

19 A 64-year-old man noted pain with burning on urination a week ago. He has had discomfort in his scrotum for the past 2 days. On examination, the right testis is swollen and tender. Which of the following organisms is most likely to cause this man's illness?

- A *Escherichia coli*
- B Human papillomavirus
- C Mumps virus
- D *Mycobacterium tuberculosis*
- E *Treponema pallidum*

20 A 36-year-old man and his 33-year-old wife have tried to conceive a child for 12 years, and now they are undergoing an infertility work-up. On physical examination, neither spouse has any remarkable findings. Laboratory studies show that the man has a sperm count in the low-normal range. On microscopic examination of the seminal fluid, the sperm have a normal morphologic appearance. A testicular biopsy is done. The biopsy specimen shows patchy atrophy of seminiferous tubules, but the remaining tubules show active spermatogenesis. Which of the following disorders is the most likely cause of his findings?

- A Failure of normal testicular descent
- B Hydrocele formation with compression
- C Klinefelter syndrome
- D Past mumps virus infection
- E Prior radiation exposure



21 A 23-year-old, previously healthy man suddenly develops severe pain in the scrotum. The pain continues unabated for 6 hours, and he goes to the emergency department. On physical examination, he is afebrile. There is exquisite tenderness of a slightly enlarged right testis, but there are no other remarkable findings. The gross appearance of the right testis is shown in the figure. Which of the following conditions is most likely to cause these findings?

- A Hemorrhagic choriocarcinoma
- B Lymphatic obstruction
- C Mycobacterial infection
- D Obstruction of blood flow
- E Previous vasectomy

22 A 33-year-old man has noted asymmetric enlargement of the scrotum over the past 4 months. On physical examination, the right testis is twice its normal size and has increased tenderness to palpation. The right testis is biopsied. The epididymis and the upper aspect of the right testis have extensive granulomatous inflammation with epithelioid cells, Langhans giant cells, and caseous necrosis. Which of the following infections is the most likely cause of these findings?

- A Chancroid
- B Gonorrhea
- C Mumps
- D Syphilis
- E Tuberculosis

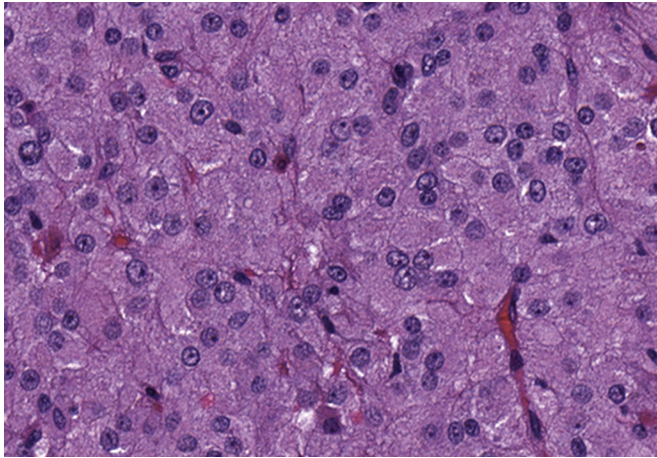
23 A study of testicular carcinomas in adults is performed. These neoplasms have a high frequency of karyotypic abnormalities, particularly i(12p). Pathologic findings include focal intratubular germ cell neoplasia adjacent to the malignancies. Which of the following is the most likely risk factor for these carcinomas?

- A Gonadal dysgenesis
- B Human papillomavirus infection
- C Hydrocele
- D Syphilis
- E Torsion



24 A 29-year-old man complains of a vague feeling of painless heaviness in the scrotum for the past 5 months. He is otherwise healthy. Physical examination shows that the right testis is slightly larger than the left testis. An ultrasound scan shows a solid, circumscribed, 1.5-cm mass in the body of the right testis. The representative gross appearance of the mass is shown in the figure. A biopsy is done, and microscopic examination of the mass shows uniform nests of cells with distinct cell borders, glycogen-rich cytoplasm, and round nuclei with prominent nucleoli. There are aggregates of lymphocytes between these nests of cells. Which of the following features is most characteristic of this lesion?

- A Association with 46,X(fra)Y karyotype
- B Association with 46,XXY karyotype
- C Response to radiation therapy
- D Extensive pulmonary metastases
- E Elevation of human chorionic gonadotropin level
- F Elevation of α -fetoprotein level



25 A 37-year-old man has noticed bilateral breast enlargement over the past 6 months. On physical examination, both breasts are enlarged without masses. His right testis is firm and 1.5 times larger than his left testis. His serum estrogen is increased. An ultrasound scan shows a circumscribed 2-cm mass in the body of the right testis. A right orchiectomy is performed, and grossly the mass has a uniform, brown cut surface. The microscopic appearance is shown in the figure. With electron microscopy the cells have rod-shaped crystalloids of Reinke. What is the most likely diagnosis?

- A Choriocarcinoma
- B Embryonal carcinoma
- C Gonadoblastoma
- D Leydig cell tumor
- E Seminoma
- F Teratoma
- G Yolk sac tumor

26 A 28-year-old man has noticed increasing enlargement and a feeling of heaviness in his scrotum for the past year. On physical examination, the right testis is twice its normal size, and it is firm and slightly tender. An ultrasound examination shows a 3.5-cm solid right testicular mass. Abdominal CT scan shows enlargement of the para-aortic lymph nodes. Multiple lung nodules are seen on a chest radiograph. Laboratory findings include markedly increased serum levels of chorionic gonadotropin and α -fetoprotein. Which of the following neoplasms is the most likely diagnosis?

- A Choriocarcinoma
- B Large diffuse B-cell lymphoma
- C Leydig cell tumor
- D Metastatic prostatic adenocarcinoma
- E Mixed germ cell tumor
- F Pure spermatocytic seminoma

27 A 32-year-old man has noticed an increased feeling of heaviness in his scrotum for the past 10 months. On physical examination, the left testis is three times the size of the right testis and is firm on palpation. An ultrasound scan shows a 6-cm solid mass within the body of the left testis. Laboratory studies include an elevated serum α -fetoprotein level. Which of the following cellular components is most likely to be present in this mass?

- A Cytotrophoblasts
- B Embryonal carcinoma cells
- C Leydig cells

- D Lymphoblasts
- E Seminoma cells
- F Yolk sac cells

28 A 26-year-old man has occasionally felt pain in the scrotum for the past 3 months. On physical examination, the right testis is more tender than the left, but does not appear to be enlarged. An ultrasound scan shows a 1.5-cm mass within the right testis. A right orchiectomy is performed, and gross examination shows the mass to be hemorrhagic and soft. A retroperitoneal lymph node dissection is done. In sections of the lymph nodes, a neoplasm is found with extensive necrosis and hemorrhage. Microscopic examination shows that areas of viable tumor are composed of cuboidal cells intermingled with large eosinophilic syncytial cells containing multiple dark, pleomorphic nuclei. Immunohistochemical staining of syncytial cells is most likely to be positive for which of the following?

- A α -Fetoprotein
- B Carcinoembryonic antigen
- C CD20
- D Human chorionic gonadotropin
- E Testosterone
- F Vimentin

29 The mother of a 2-year-old boy notices that he has had increasing asymmetric enlargement of the scrotum over the past 6 months. On physical examination, there is a well-circumscribed, 2.5-cm mass in the left testis. A left orchiectomy is performed, and histologic examination of this mass shows sheets of cells and ill-defined glands composed of cuboidal cells, some of which contain eosinophilic hyaline globules. Microcysts and primitive glomeruloid structures also are seen. Immunohistochemical staining shows α -fetoprotein (AFP) in the cytoplasm of the neoplastic cells. What is the most likely diagnosis?

- A Choriocarcinoma
- B Leydig cell tumor
- C Seminoma
- D Teratoma
- E Yolk sac tumor

30 A 32-year-old man has noticed increased heaviness with enlargement of the scrotum over the past 9 months. On physical examination, there is an enlarged, firm left testis, but no other remarkable findings. An ultrasound scan shows a 5-cm solid mass within the body of the left testis. An orchiectomy of the left testis is performed. Microscopic examination of the mass shows areas of mature cartilage, keratinizing squamous epithelium, and colonic glandular epithelium. Laboratory findings include elevated levels of serum human chorionic gonadotropin (hCG) and α -fetoprotein (AFP). Despite the appearance of the cells in the tumor, the surgeon tells the patient that he probably has a malignant testicular tumor. The surgeon's conclusion is most likely based on which of the following factors?

- A Age of the patient at diagnosis
- B Elevation of hCG and AFP levels
- C Location of the mass in the left testis
- D Presence of colonic glandular epithelium
- E Size of the tumor

31 A 59-year-old man notices gradual enlargement of the scrotum over the course of 1 year. The growth is not painful, but produces a sensation of heaviness. He has no problems with sexual function. Physical examination shows no lesions of the overlying scrotal skin and no obvious masses, but the scrotum is enlarged, boggy, and soft bilaterally. The transillumination test result is positive. What is the most likely diagnosis?

- A Elephantiasis
- B Hydrocele
- C Orchitis
- D Seminoma
- E Varicocele

32 A 54-year-old man has had dysuria with increased frequency and urgency of urination for the past 6 months. He has sometimes experienced mild lower back pain. On physical examination, he is afebrile. There is no costovertebral angle tenderness. The prostate gland feels normal in size; no nodules are palpable. Laboratory studies show that expressed prostatic secretions contain 30 leukocytes per high-power field. What is the most likely diagnosis?

- A Acute bacterial prostatitis
- B Chronic abacterial prostatitis
- C Prostatic adenocarcinoma
- D Prostatic hyperplasia
- E Syphilitic prostatitis

33 A 65-year-old man has had multiple, recurrent urinary tract infections for the past year. *Escherichia coli* and streptococcal organisms have been cultured from his urine during these episodes, with bacterial counts of more than 10^5 /mL. He has difficulty with urination, including starting and stopping the urinary stream. Over the past week, he has again developed burning pain with urination. Urinalysis now shows a pH of 6.5, and specific gravity of 1.020. No blood or protein is present in the urine. Tests for leukocyte esterase and nitrite are positive. Microscopic examination of the urine shows numerous WBCs and a few WBC casts. Which of the following is the most likely condition predisposing him to recurrent infections?

- A Epispadias
- B Nodular prostatic hyperplasia
- C Phimosi
- D Posterior urethral valves
- E Prostatic adenocarcinoma
- F Vesicoureteral reflux

34 A clinical trial of two pharmacologic agents compares one agent that inhibits 5α -reductase and diminishes dihydrotestosterone (DHT) synthesis in the prostate with another agent that acts as an α_1 -adrenergic receptor blocker. The subjects are 40 to 80 years old. The study will determine whether symptoms of prostate disease are ameliorated in the individuals who take these drugs. Which of the following diseases of the prostate is most likely to benefit from one or both of these drugs?

- A Acute prostatitis
- B Adenocarcinoma
- D Chronic prostatitis
- C Leiomyoma
- E Nodular hyperplasia

35 A 72-year-old man has had increasing difficulty with urination for the past 10 years. He now has to get up several times each night because of a feeling of urgency, but each time the urine volume is not great. He has difficulty starting and stopping urination. On physical examination, the prostate is enlarged to twice its normal size, but is not tender to palpation. One year ago, his serum prostate-specific antigen (PSA) level was 6 ng/mL, and it is still at that level when retested. Which of the following drugs is most likely to be effective in treatment of this man?

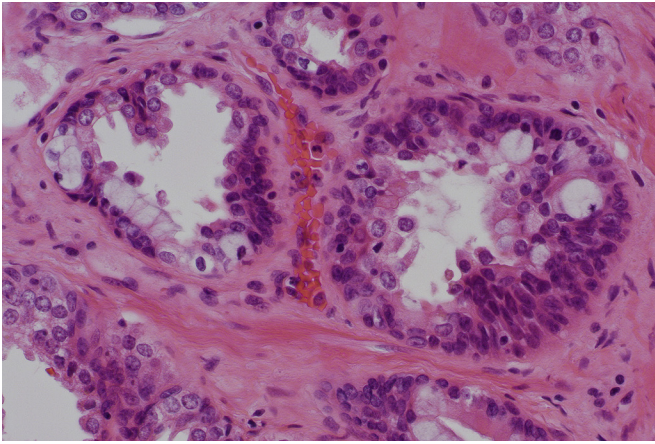
- A Estrogen (hormone)
- B Finasteride (5α -reductase inhibitor)
- C Mitoxantrone (chemotherapy agent)
- D Nitrofurantoin (antibiotic)
- E Prednisone (corticosteroid)

36 A 71-year-old, previously healthy man comes to his physician for a routine health examination. On palpation, there is a nodule in his normal-sized prostate. Laboratory studies show a serum prostate-specific antigen (PSA) level of 17 ng/mL. A routine urinalysis shows no abnormalities. Which of the following histologic findings is most likely to be found in a subsequent biopsy specimen of his prostate?

- A Acute prostatitis
- B Adenocarcinoma
- C Chronic abacterial prostatitis
- D Nodular hyperplasia
- E Prostatic intraepithelial neoplasia

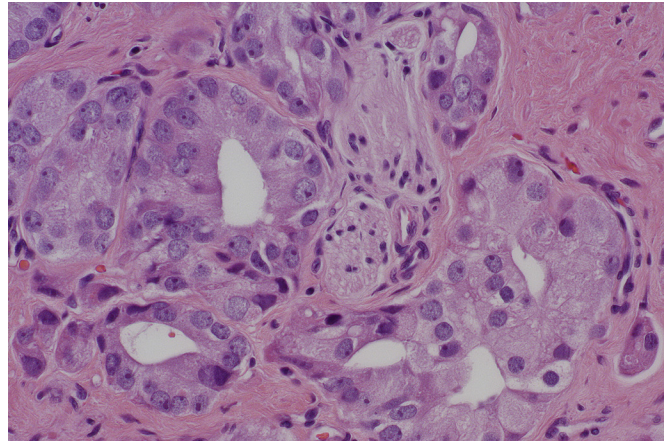
37 An 85-year-old man has experienced urinary hesitancy and nocturia for the past year. He has had increasing back pain for the past 6 months. On digital rectal examination, there is a hard, irregular prostate gland. A bone scan shows increased areas of uptake in the thoracic and lumbar vertebrae. Laboratory studies show a serum alkaline phosphatase level of 300 U/L, and serum prostate-specific antigen (PSA) level of 72 ng/mL. The blood urea nitrogen concentration is 44 mg/dL, and the serum creatinine level is 3.8 mg/dL. Transrectal biopsy specimens of all lobes of the prostate are obtained. Microscopic examination shows that more than 90% of the tissue has a pattern of cords and sheets of cells with hyperchromatic pleomorphic nuclei, prominent nuclei, and scant cytoplasm. Which of the following is the best classification for this patient's disease?

	Stage	Gleason Grade
A	A	1, 1
B	B	2, 2
C	B	3, 3
D	C	4, 4
E	D	5, 5



38 A 71-year-old African American man visits his physician for a checkup because he is worried about his family history of prostate cancer. Physical examination does not indicate any abnormalities. Because of the patient's age and family history, his prostate-specific antigen (PSA) level is measured and is 8 ng/mL. Six months later, the PSA level is 10 ng/mL. A urologist obtains transrectal biopsy specimens, and microscopic examination shows multifocal areas of glandular hyperplasia and the appearance shown in the figure. Which of the following statements applies best to this clinical and pathologic scenario?

- A Associated with increased risk for invasive cancer
- B Chronic inflammation from urinary tract obstruction
- C Normal microscopic finding of the peripheral zone
- D Related to an inherited tumor suppressor gene mutation
- E Responsive to 5 α -reductase inhibitor therapy



39 A 45-year-old man comes to the physician for a routine health maintenance examination. On physical examination, there are no remarkable findings. Laboratory findings include serum creatinine, 1.1 mg/dL; urea nitrogen, 17 mg/dL; glucose, 76 mg/dL; alkaline phosphatase, 89 U/L; and prostate-specific antigen (PSA), 16 ng/mL. Prostate biopsies are performed and the high power microscopic appearance of a biopsy specimen is shown in the figure. Which of the following is the most likely risk factor for his disease?

- A Epigenetic hypermethylation of *GSTP1* gene
- B Exposure to naphthylamine compounds
- C Overproduction of dihydrotestosterone
- D Prolonged use of smoking tobacco
- E Recurrent bacterial urinary tract infections

ANSWERS

1 D The features of vesicoureteral reflex from ureteropelvic junction (UPJ) obstruction are described. This is the most common cause for hydronephrosis in infants and children. Obstructed tubules do not reabsorb β_2 -microglobulin. Other anomalies, such as contralateral renal agenesis, may be present. Surgical correction of the abnormal UPJ restores proper peristaltic urine flow. Bladder exstrophy is an open abdominal wall defect. Urinary diverticula may predispose to infection, but not obstruction. All or part of one or both ureters may be duplicated, but this is usually an incidental finding; granulomatous inflammation in the urinary tract is uncommon. Urachal remnants (embryologic allantois) may predispose to infection but not hydronephrosis; adenocarcinoma may arise in a urachal cyst.

PBD9 961 BP9 668 PBD8 940 BP8 561

2 A He has findings consistent with nodular prostatic hyperplasia with bladder outlet obstruction. Diverticula may develop in the setting of obstruction and bladder wall

hypertrophy, and predispose to urinary stasis with infection; they are not true diverticula. Interstitial cystitis is a complication of recurrent bladder infection, most often in women, and characterized by chronic pain. Malakoplakia is a rare response to bacterial infection in which collections of macrophages filled with degraded bacterial products elicit formation of intracellular laminated, calcified concretions called *Michaelis-Gutmann bodies*. True papillomas are uncommon urothelial proliferations and asymptomatic. Schistosomiasis leads to hematuria and inflammation with bladder wall fibrosis.

PBD9 969,982 BP9 668–669 BPD8 981,994 BP8 696

3 C Bilateral hydronephrosis, without hydroureter or bladder dilation, suggests that the problem involves both ureters. Obstructive uropathy has led to chronic renal failure with uremia. The elevated IgG4 suggests a fibroinflammatory process with IgG4-secreting plasma cells in the retroperitoneum; this process is part of autoimmune pancreatitis and

may also involve biliary tract, salivary glands, and lungs, but is not associated with the other listed choices. Nephrolithiasis could cause ureteropelvic junction obstruction, but bilaterality would be uncommon. Polypoid cystitis results from inflammation but may mimic a tumor mass, and could obstruct one or both ureteral orifices with hydroureter. Renal cell carcinoma is likely to be unilateral, but may cause only focal obstruction. Urothelial carcinomas may be multifocal, but are unlikely to obstruct both ureters simultaneously.

PBD9 960–961 BP9 668 BPD8 973 BP8 572–573

4 C The embryologic urachus may not become obliterated, leaving a fistulous tract or a cyst between the bladder and abdominal wall at the umbilicus. Congenital diverticula result from either focal failure in formation of bladder musculature or bladder outlet obstruction, and there is no fistulous tract. Exstrophy refers to failure in development of the lower abdominal wall, leaving an open defect to the bladder. Abnormal reflux of bladder contents into the ureter defines vesico-ureteral reflux, which may be due to congenital abnormalities of bladder development, but there is no fistulous tract. A viteline duct remnant may account for a Meckel diverticulum, or rarely a fistulous tract from small intestine to umbilicus.

PBD9 962 BP9 668 PBD8 974

5 D This woman has a peculiar form of cystitis known as *malakoplakia*, when macrophages have reduced phagocytic function, and the concretions within macrophages are known as *Michaelis-Gutmann bodies*. Malakoplakia is a reaction to chronic bacterial infections, usually *Escherichia coli* and *Proteus* species, and often in the setting of immunosuppression. The most common organism associated with cases of acute cystitis is *E. coli*. The other organisms listed are uncommon causes for cystitis and for malakoplakia.

PBD9 963 BP9 668 PBD8 975–976

6 B Local resection may suffice for lower grade urothelial carcinomas that are minimally invasive and localized. The risk for recurrence may be reduced with BCG installation into the bladder. Once the muscular wall is invaded, radical cystectomy is needed. Chemical carcinogens such as aniline dyes increase the risk for developing urothelial carcinoma, but do not dictate therapy. An inverted urothelial papilloma is benign, but a papillary urothelial neoplasm of low malignant potential (PUNLAP) is a precursor to urothelial carcinomas, which can have *TP53* mutations regardless of stage.

PBD9 964–967 BP9 669–671 PBD8 976–979 BP8 576

7 E Urothelial carcinoma in situ is shown in the figure. Smokers are at increased risk, and China has a third of the world's smokers. Urothelial malignancies can be recurrent and multifocal; they are far more likely to be sporadic than familial, although gene mutations such those in *TP53* may be the same. Familial malignancies often present much earlier in life. The embryologic allantois extends from the developing bladder and may persist as a urachal remnant forming a diverticulum, cyst, or fistula to the umbilicus, and there

is a low risk for adenocarcinoma. Obesity increases the risk for malignancy, but correlation with a specific malignancy is difficult to draw. Schistosomiasis can lead to squamous metaplasia and increased risk for squamous carcinoma of the bladder.

PBD9 964–967 BP9 669–670 PBD8 976–979 BP8 576

8 E Exposure to arylamines markedly increases the risk of urothelial carcinoma shown in the figure, which can occur decades after the initial exposure. After absorption, aromatic amines are hydroxylated into an active form, which is detoxified by conjugation with glucuronic acid and then excreted. Urinary glucuronidase splits the nontoxic conjugated form into the active carcinogenic form. Adenocarcinoma is a complication of the congenital condition known as *exstrophy of the bladder*. Rhabdomyosarcoma of the pelvis is typically a pediatric neoplasm, and not associated with chemical exposures. Renal cell carcinomas also may manifest as painless hematuria, but exposure to aniline dyes is not a risk factor. Squamous cell carcinoma is the most common malignancy of the urethra, but it is rare and has no relation to carcinogens.

PBD9 964–965 BP9 669–670 PBD8 979–980 BP8 575–576

9 C Bladder hypertrophy can result from outlet obstruction. In an older man, this type of obstruction is most often caused by prostatic enlargement caused by hyperplasia or carcinoma. Mild elevations in the prostate-specific antigen (PSA) level may occur in patients with prostatic hyperplasia, and greater increases in PSA suggest carcinoma. Autoimmune conditions may be associated with interstitial cystitis, but cystitis does not cause bladder neck obstruction. Polycythemia can be the result of a paraneoplastic syndrome, but urothelial malignancies are unlikely to produce this finding; renal cell carcinoma is a more likely cause. Schistosomiasis leads to chronic inflammation and scarring. Bladder outlet obstruction can increase the risk of infection, typically with bacterial organisms such as *Escherichia coli*, not *Mycobacterium tuberculosis*.

PBD9 969,982 BP9 668 PBD8 981 BP8 571–573

10 A She has a urethral caruncle, which is most common in postmenopausal women as a result of urethral prolapse with atrophy from decreased estrogen. Topical estrogen creams and anti-inflammatory agents may shrink the lesion. It is not an infectious process, so multinucleated cells (herpes simplex virus) or plasma cell infiltrates (syphilis) are unlikely. It is not malignant or premalignant. Lichen sclerosis occurs at this age, but not produce a mass lesion.

PBD9 969 BP9 668 PBD8 981

11 E Carcinoma of the urethra is uncommon. It tends to occur in older women and is locally aggressive. A clear cell carcinoma occurs on the cervix and may be related to in utero exposure to diethylstilbestrol. An embryonal rhabdomyosarcoma (sarcoma botryoides) is a rare tumor that occurs in children. Benign tumors, such as a leiomyoma, are typically

well circumscribed and do not ulcerate. Condyloma lata may appear in association with secondary syphilis, but are flat and typically do not ulcerate. Condyloma acuminata are papillary lesions with acanthosis, related to HPV infection, and usually do not ulcerate.

PBD9 969 BP9 668 PBD8 982 BP8 575–577

12 D Hypospadias is a congenital condition seen in about 1 in 300 male infants. The inguinal hernia and the cryptorchidism are abnormalities that may accompany this condition. Epispadias is a congenital condition in which the urethra opens abnormally on the dorsal aspect of the penis. Bowen disease, which is squamous cell carcinoma in situ of the penis, occurs in adults. Phimosis is a constriction preventing retraction of the prepuce. It can be congenital, but more likely is the result of inflammation of the foreskin of the penis (e.g., balanitis, a form of local inflammation of the glans penis).

PBD9 970 BP9 658 PBD8 982 BP8 687–688

13 E Phimosis can be congenital, but is more often a consequence of multiple episodes of balanitis (inflammation of the glans penis or foreskin). Balanitis leads to scarring that prevents retraction of the foreskin. Forcible retraction may result in vascular compromise, with further inflammation and swelling (paraphimosis). Bowenoid papulosis is a premalignant lesion of the penile shaft resulting from viral infection. Epispadias is a congenital condition in which the penile urethra opens onto the dorsal surface of the penis. Candidiasis is most likely to produce shallow ulcerations that are intensely pruritic.

PBD9 970 BP9 657 PBD8 982 BP8 688

14 B Genital candidiasis can occur in individuals without underlying illnesses, but it is far more common in individuals with diabetes mellitus. Warm, moist conditions at these sites favor fungal growth. Scabies mites are more likely to be found in linear burrows in epidermis scraped from the extremities. Neoplasms with atypical cells may ulcerate, but such lesions are unlikely to be shallow or multiple without a mass lesion present. Intranuclear inclusions suggest a viral infection; however, diabetes is not a risk factor for genital viral infections. These lesions are too large and numerous to be syphilitic chancres.

PBD9 970 BP9 657 PBD8 982 BP8 688

15 C Condyloma acuminatum is a benign, recurrent squamous epithelial proliferation resulting from infection with human papillomavirus (HPV) infection, one of many sexually transmitted diseases that can occur in sexually active individuals. Koilocytosis is particularly characteristic of HPV infection. Candidiasis can be associated with inflammation, such as balanoposthitis, but not condylomata. Recurrent gonococcal infection indicates that the patient is sexually active and at risk for additional infections, but is not the cause for the condylomata. Gonococcal infection causes suppurative lesions in which there may be liquefactive necrosis and a neutrophilic exudate or mixed inflammatory

infiltrate. Circumcision generally reduces risks for infections. Phimosis is a nonretractile prepuce, and paraphimosis refers to forcible retraction of the prepuce that produces pain and urinary obstruction.

PBD9 970–971 BP9 678 PBD8 982–983 BP8 709

16 D Penile squamous carcinomas such as this large ulcerated mass are likely invasive, and this lowers the 5-year survival to less than 70%; if there is nodal involvement, 5-year survival is less than 30%. Prior phimosis and human papillomavirus infection, more likely in uncircumcised men, are risk factors. Candidiasis is not a risk factor. Angiokeratomas appear as localized, benign, red or blue papules. Urothelium extends to the urethral orifice and development of urothelial carcinoma is theoretically possible at this site, but is far less common than squamous carcinomas. Adenocarcinomas are rare at this site.

PBD9 971–972 BP9 657–658 PBD8 983–984 BP8 688–689

17 B Bowen disease is the in situ form of squamous cell carcinoma of the penis. Similar to carcinoma in situ elsewhere, it has a natural history of progression to invasive cancer if untreated. Poor hygiene and infection with human papillomavirus (particularly types 16 and 18) are factors that favor development of dysplasias and cancer of the genital epithelia. Balanitis is an inflammatory condition without dysplasia. Condylomas are raised, whitish lesions. Syphilis is a sexually transmitted disease that produces a hard chancre, which heals in a matter of weeks. A soft chancre may be seen with *Haemophilus ducreyi* infections.

PBD9 971 BP9 658 PBD8 983–984 BP8 688–689

18 A Cryptorchidism results from failure of the testis to descend from the abdominal cavity into the scrotum during fetal development. One or both testes may be involved. It is associated with an increased risk of testicular cancer. An undescended testis eventually atrophies during childhood. Unilateral cryptorchidism may lead to infertility, because it may be associated with atrophy of the contralateral descended testis. Isolated cryptorchidism is a developmental defect that is usually sporadic and is not inherited in the germline. Mumps infection tends to produce patchy bilateral testicular atrophy, usually without infertility.

PBD9 972–973 BP9 658–659 PBD8 984–984 BP8 689–690

19 A This is acute epididymitis/orchitis, and most of these infections are secondary to ascending infections from the urinary tract. The time course suggests bacterial infection. Human papillomavirus affects squamous epithelium. Mumps orchitis is likely to be bilateral, and not associated with urinary tract infection. Tuberculosis can produce testicular infection, but the time course is likely to be weeks to months, and with preceding respiratory disease. Syphilis can lead to orchitis, but is unlikely to be preceded by urinary tract infection.

PBD9 973–974 BP9 658 PBD8 986 BP8 690

20 D Mumps is a common childhood infection that can produce orchitis as well as parotitis. Adults who have this infection more often develop orchitis. The orchitis in children is usually not severe, and its involvement of the testis is patchy or unilateral so that infertility is not a common outcome. Mumps orchitis may be more severe in adults. Cryptorchidism results from failure of the testis to descend into the scrotum normally; the abnormally positioned testis becomes atrophic throughout. A hydrocele is a fluid collection outside the body of the testis that does not interfere with spermatogenesis. Klinefelter syndrome and estrogen therapy can cause tubular atrophy, although it is generalized in both cases. Patchy loss of seminiferous tubules indicates a local inflammatory process. Radiation as well as many chemotherapeutic agents are particularly harmful to rapidly and continuously proliferating testicular germ cells, but the effect would be diffuse within the testicular parenchyma. Radiotherapy is typically targeted to malignancies to prevent damage to normal surrounding tissues. Patients who wish to father children may want to store sperm in a sperm bank before undergoing radiation or chemotherapy.

PBD9 972–973 BP9 659 PBD8 986 BP8 690

21 D The markedly hemorrhagic appearance in the figure results from testicular torsion that obstructs venous outflow to a greater extent than the arterial supply. Doppler ultrasound shows reduced or no vascular flow in the affected testis. An abnormally positioned or anchored testis in the scrotum is a risk factor for this condition. Testicular carcinomas do not obstruct the blood flow, and are not likely to produce an acute event. Parasitic infestation, typically filariasis, obstructs the flow of lymph, leading to gradual enlargement of the scrotum with thickening of the overlying skin. Tuberculosis can spread from the lung through the bloodstream, producing miliary tuberculosis, seen as multiple pale, millet-sized lesions, most often involving the epididymis. A previous vasectomy may lead to a small leakage of fluid and sperm, producing a localized sperm granuloma.

PBD9 974–975 BP9 659 PBD8 987

22 E Tuberculosis with mycobacterial infection is uncommon in the testes, but it can occur with disseminated disease. The infection typically starts in the epididymis and spreads to the body of the testis. Chancroid caused by *Haemophilus ducreyi* leads to ulcerated nodules of the external genitalia. Mumps produces patchy orchitis with minimal inflammation, which heals with patchy fibrosis. Syphilis involves the body of the testis, and there can be gummatous inflammation with neutrophils, necrosis, and some mononuclear cells. Gonococcal infections produce acute inflammation.

PBD9 974 BP9 659 PBD8 986 BP8 690

23 A Mutations involving *SRY* or other genes involved in testicular differentiation may increase the risk for testicular cancer. Another risk factor is cryptorchidism. Infections of the testis are not generally known to be associated with neoplasia. Mechanical problems, such as torsion with ischemia,

tend not to be antecedents for neoplasia. Hydrocele is a benign fluid collection.

PBD9 975–976 BP9 659 PBD8 988 BP8 690

24 C Seminoma is the most common form of “pure” testicular germ cell tumor that may remain confined to the testis (stage I). The figure shows a homogenous mass lesion. The prognosis is good in most cases, even with metastases, because seminomas are radiosensitive. Human chorionic gonadotropin (hCG) levels may be slightly elevated in about 15% of patients with seminoma. Elevated hCG levels suggest a component of syncytial cells; very high levels suggest choriocarcinoma. α -Fetoprotein levels are elevated in testicular tumors with a yolk sac component, and many tumors with an embryonal cell component also contain yolk sac cells. Testosterone is a product of Leydig cells, not germ cells. Fragile X syndrome is associated with bilaterally enlarged testes and mental retardation. Klinefelter syndrome is associated with bilaterally decreased testicular size and reduced fertility.

PBD9 976–977 BP9 660–663 PBD8 988–989 BP8 690–695

25 D Leydig cell tumors of the testis are most often small, benign masses that may go unnoticed. Some patients have gynecomastia caused by androgenic or estrogenic hormone production (or both) by the tumor. Most patients are young to middle-aged men; sexual precocity may occur in the few boys who have such tumors. Choriocarcinomas are grossly soft and hemorrhagic masses that have large bizarre syncytiotrophoblast and cytotrophoblast cells and are aggressive. Embryonal carcinomas are large, aggressive tumors that have a variegated gross appearance and primitive cells with large, hyperchromatic nuclei. Gonadoblastomas are rare testicular tumors that arise in the setting of gonadal dysgenesis. A pure seminoma can be uniformly brown on cut surface, but often has a lymphoid stroma, and is not likely to secrete androgens or estrogens. Pure teratomas are rare and contain elements of three germ layers. Yolk sac tumors have cells that organize into primitive endodermal sinuses (Schiller-Duval bodies).

PBD9 980 BP9 659 PBD8 982–983 BP8 690

26 E Although a modest elevation of the human chorionic gonadotropin (hCG) concentration can occur when a seminoma contains some syncytial giant cells, significant elevation of the α -fetoprotein (AFP) level never occurs with pure seminomas. Elevated levels of AFP and hCG effectively exclude the diagnosis of a pure seminoma and indicate the presence of a nonseminomatous tumor of the mixed type. The most common form of testicular neoplasm combines multiple elements; the term *teratocarcinoma* is sometimes used to describe tumors with elements of teratoma, embryonal carcinoma, and yolk sac tumor. The yolk sac element explains the high AFP level. Mixed tumors may include seminoma. Choriocarcinomas secrete high levels of hCG, but no AFP. It is unusual for a tumor to metastasize to the testis; this patient is of an age at which a primary cancer of the testis should be considered when a testicular mass is present. Lymphomas may involve the testis, usually

when there is systemic involvement by a high-grade lesion. Prostatic adenocarcinoma and lymphomas do not elaborate hormones. Leydig cell tumors are non-germ cell tumors derived from the interstitial (Leydig) cells; they may elaborate androgens.

PBD9 979 BP9 660–663 PBD8 992 BP8 690–695

27 F α -Fetoprotein (AFP) is a product of yolk sac cells that can be shown by immunohistochemical testing. Pure yolk sac tumors are rare in adults, but yolk sac components are common in mixed nonseminomatous tumors. Cytotrophoblasts do not produce a serum marker, but they may be present in a choriocarcinoma along with syncytiotrophoblasts, which do produce human chorionic gonadotropin. Embryonal carcinoma cells by themselves do not produce any specific marker. Embryonal carcinoma cells are common in nonseminomatous tumors, however, and are often mixed with other cell types. Leydig cells produce androgens. Lymphoblasts may be seen in high-grade non-Hodgkin lymphomas, which do not produce hormones. Pure seminomas do not produce AFP.

PBD9 977–979 BP9 660–663 PBD8 989–990 BP8 690–695

28 D Choriocarcinoma is the most aggressive testicular carcinoma. It often metastasizes widely. The primitive syncytial cells mimic the syncytiotrophoblast of placental tissue and stain for human chorionic gonadotropin. α -Fetoprotein is a marker that is more likely to be found in mixed tumors with a yolk sac component. Carcinoembryonic antigen (CEA) is found in a variety of epithelial neoplasms, particularly adenocarcinomas. CD20 is a lymphoid marker for B cells. Testosterone is found in Leydig cells. Vimentin is more likely to be seen in sarcomas, which are rare in the testicular region.

PBD9 978 BP9 660–663 PBD8 990 BP8 690–695

29 E Yolk sac tumors are typically seen in boys younger than 3 years. The primitive glomeruloid structures are known as *Schiller-Duval bodies*. The cells are strongly positive for AFP. Embryonal carcinomas with yolk sac cells contain AFP, but they are seen in adults. They are composed of cords and sheets of primitive cells. Choriocarcinomas contain large, hyperchromatic, syncytiotrophoblastic cells. Seminomas have sheets and nests of cells resembling primitive germ cells, often with an intervening lymphoid stroma. Leydig cell tumors act in a benign fashion and may produce androgens or estrogens or both. Teratomas contain elements of mature cartilage; bone; or other endodermal, mesodermal, or ectodermal structures.

PBD9 977 BP9 660–663 PBD8 989–990 BP8 690–695

30 B The tumor has elements of all three germ layers and is a teratoma. It is uncommon for teratomas in men to be completely benign. The most common additional histologic component is embryonal carcinoma. The elevated levels of human chorionic gonadotropin and α -fetoprotein indicate that this is a mixed tumor with elements of choriocarcinoma and yolk sac cells. The size of the tumor, age of the patient, location of the tumor (e.g., right, left, cryptorchid), and

differentiation of the glandular epithelium are not markers of malignancy. On examining more histologic sections from the mass, the pathologist would find the malignant elements.

PBD9 978–979 BP9 660–663 PBD8 990–991 BP8 690–695

31 B Hydrocele is one of the most common causes of scrotal enlargement. It consists of a serous fluid collection within the tunica vaginalis. Most cases are idiopathic, although some may result from local inflammation. Elephantiasis is a complication of parasitic filarial infections involving the inguinal lymphatics; it is typically bilateral. Orchitis involves the body of the testis without marked enlargement, but with tenderness. A seminoma is typically a firm unilateral mass. A varicocele is a collection of dilated veins (pampiniform plexus) that may produce increased warmth, which inhibits spermatogenesis.

PBD9 980 BP9 658 PBD8 993 BP8 689

32 B The patient has more than 10 leukocytes per high-power field, indicating prostatitis. Chronic abacterial prostatitis is the most common form of the disorder. Patients typically do not have a history of recurrent urinary tract infections. Patients with acute bacterial prostatitis, most often caused by *Escherichia coli* infection, have fever, chills, and dysuria; on rectal examination, the prostate is very tender. Prostate carcinomas generally do not have a significant amount of acute inflammation, and metastases are most often associated with pain; most prostatic conditions causing dysuria are benign. Nodular prostatic hyperplasia by itself is not an inflammatory process. Syphilis is a disease of the external genitalia, although the testis may be involved.

PBD9 981–982 BP9 663–664 PBD8 993–994 BP8 695–696

33 B Of the diseases listed, prostatic nodular hyperplasia is the most common in older men. When it causes obstruction of the prostatic urethra, it can predispose to bacterial urinary tract infections. Epispadias is a congenital condition, observed at birth. Phimosis can occur in uncircumcised men. It may be congenital or acquired from inflammation, usually at a much younger age. Posterior urethral valves produce bladder outlet obstruction in utero, with oligohydramnios. Prostatic adenocarcinomas are less likely than hyperplasia to cause obstructive symptoms. Vesicoureteral reflux is more likely to be present at an earlier age, and it does not account for the obstructive symptoms the patient has on urination.

PBD9 982–984 BP9 664–665 PBD8 994–996 BP8 696–697

34 E Androgens are the major hormonal stimuli of glandular and stromal proliferation resulting in nodular prostatic hyperplasia. Although testosterone production decreases with age, prostatic hyperplasia increases, probably because of an increased expression of prostatic hormonal receptors that enhance the effect of any DHT that is present. The 5 α -reductase inhibitors, such as finasteride, diminish the prostate volume, specifically the glandular component, leading to improved urine flow. The α_1 -adrenergic receptor

blockers, such as tamsulosin, cause smooth muscle in the bladder neck and prostate to relax, which relieves symptoms and improves urine flow immediately. The other listed conditions are not amenable to therapy with these drugs.

PBD9 982–983 BP9 664–665 PBD8 994–995 BP8 696–698

35 B The clinical features are typical of nodular prostatic hyperplasia causing a slight elevation of the PSA level. A PSA level that remains unchanged for 1 year, as in this case, is less likely to be found with a prostate cancer. Finasteride is a 5 α -reductase inhibitor that decreases formation of dihydrotestosterone (DHT) that binds to androgen receptors in prostatic stromal and epithelial cells, driving proliferation with prostate gland enlargement. However, α_1 -adrenergic blockers that diminish smooth muscle tone are somewhat more effective in treating nodular hyperplasia. Estrogen therapy has been used as antihormonal therapy in prostate cancer. Mitoxantrone is a chemotherapy agent that, when given with prednisone, has been shown to be effective in treating advanced prostate cancers. Nitrofurantoin is an antibiotic that is often used in treating urinary tract infections.

PBD9 982–983 BP9 664–665 PBD8 994–996 BP8 696–698

36 B The prostate-specific antigen (PSA) level is significantly elevated in this patient. The large increase is likely to be indicative of carcinoma. Typically, prostatic carcinomas are adenocarcinomas that form small glands packed back to back. Many adenocarcinomas of the prostate do not produce obstructive symptoms and may not be palpable on digital rectal examination. Inflammation and nodular hyperplasias can increase the PSA level, although not to a high level that increases significantly over time. Prostatic intraepithelial neoplasia, although an antecedent to adenocarcinoma, is not likely to increase the PSA significantly over time.

PBD9 988–989 BP9 667 PBD8 1001–1002 BP8 698–700

37 E The presence of a hard irregular nodule, along with the extremely high prostate-specific antigen (PSA) level, points most clearly to prostate carcinoma. Modest elevations of the PSA concentration can occur in nodular hyperplasia of the prostate and prostatitis. Symptoms of urinary obstruction are more prominent in nodular hyperplasia because the nodules are in the periurethral region; but this sign is insufficient to distinguish cancer from hyperplasia. Similarly, renal failure owing to obstruction or infiltration is most common with nodular hyperplasia, but can occur with cancer as well. Levels of alkaline phosphatase are elevated when prostate carcinoma gives rise to osteoblastic metastases. Although staging and grading schemes for malignant disease seem daunting, they are applied intuitively. The lowest stage is the smallest, most localized tumor; higher stages represent larger

tumors or spread of the disease inside or outside of the primary organ site. Grading schemes also start with the lowest, most well-differentiated tumor, as seen with the microscope. Higher grade tumors have increasingly abnormal-appearing cells and structures so poorly differentiated that they hardly resemble their site of origin. In this case, the prostate cancer has the highest grade (it does not have glandular structures) and the highest stage (it has metastasized to the spine).

PBD9 987–989 BP9 665–667 PBD8 997–1000 BP8 698–700

38 A Prostatic intraepithelial neoplasia (PIN) shown here has dysplastic features including hyperchromatic cells crowded into a pseudo-multilayer appearance, with preservation of gland architecture. PIN is a potential precursor of prostatic adenocarcinoma. By itself, it does not warrant therapy because only about one third of patients diagnosed with PIN develop invasive cancer within 10 years. Conversely, in about 80% of cases in which prostate cancer is present, PIN can be found in the surrounding tissue. PIN usually does not increase the PSA levels. In this case, the elevation in PSA levels may have been caused in part by the coexistent hyperplasia. Although prostatitis may increase PSA levels, no inflammation is seen here. Although PIN can be found in the peripheral zone, it is not a normal finding. Although there is a family history, specific risk factors are difficult to identify; BRCA2 mutations account for a small number of prostate cancers. Prostatic hyperplasia may respond to inhibition of DHT synthesis, but not PIN or cancer.

PBD9 985–986 BP9 666 PBD8 999 BP8 699

39 A The figure shows prostatic adenocarcinoma with back-to-back glands, prominent nucleoli, and perineural invasion. Alterations of the *glutathione S-transferase (GSTP1)* gene allow damage from carcinogens. *TMPRSS2-ETS* fusion gene and *PTEN* mutations are common. Other genetic abnormalities in prostate cancer include variations in CAG repeats in the *androgen receptor* gene, *BRCA2* mutations, and translocation of *ETS* family transcription genes. His prostate-specific antigen (PSA) level is four times the upper limit of normal. This is worrisome, but not an absolute indication of prostate cancer. Elevated PSA levels can occur with nodular hyperplasia or prostatitis. A higher level, a level that increases over time, or an increased free PSA is more suggestive of carcinoma. Naphthylamine compounds are linked to urothelial carcinomas. Increased dihydrotestosterone output from prostatic stromal cells drives nodular hyperplasia. Tobacco use is associated with many other cancers, including urothelial carcinoma and renal cell carcinoma. Recurrent urinary tract infections and hydronephrosis are complications of obstruction more commonly from nodular prostatic hyperplasia.

PBD9 984–988 BP9 665–667 PBD8 1001–1002 BP8 698–700