GROSS ANATOMY EXAMINATION
February 16, 2001

For the following questions, indicate the letter that corresponds to the SINGLE MOST APPROPRIATE ANSWER.

1. After a surgical procedure, a patient had paresthesia (tingling) of the skin around the umbilicus. This could be due to irritation of the
   
   A. 8th intercostal nerve.  
   B. 10th intercostal nerve.  
   C. subcostal nerve.  
   D. iliohypogastric nerve.  
   E. ilioinguinal nerve.

2. Which of the following describes the typical position of the uterus?
   
   A. Anteflexed and anteverted  
   B. Retroflexed and anteverted  
   C. Anteflexed and retroverted  
   D. Retroflexed and retroverted

3. A 47-year-old woman had an infection in her peritoneal cavity. Easy access for drainage of pus from the cavity could be gained through the
   
   A. ischiorectal fossa.  
   B. vesicouterine pouch.  
   C. rectovesical space.  
   D. posterior fornix of the vagina.  
   E. retropubic space.

4. A 27-year-old man was brought to the Emergency Department with a deep stab wound to the left side of his trunk. The 4-inch knife entered the left 9th intercostal space at the midaxillary line and traveled horizontally. He was immediately examined for likely injury to the
   
   A. liver.  
   B. aorta.  
   C. spleen.  
   D. descending colon.  
   E. duodenum.
5. A clinical examination testing normal development of the central nervous system in male children involves eliciting the cremasteric reflex. A correct statement which characterizes the cremasteric reflex is that it

A. is a reflex involving sympathetic fibers.
B. involves sensory stimulation of dermatomes L3 and L4.
C. involves elevation of the scrotum through contraction of the dartos muscle.
D. involves fibers of the internal oblique muscle.
E. is a reflex involving parasympathetic fibers.

6. A 40-year-old woman had a tumor that compressed an artery as it traveled posterior to the body of the pancreas before passing anterior to the third (horizontal) part of the duodenum. Compression of this vessel could result in diminished blood supply to the

A. liver.
B. lesser curvature of the stomach.
C. ascending colon.
D. sigmoid colon.
E. first (superior) part of the duodenum.

7. In preparation for the removal of a diseased liver, the physician reviewed the various ligaments and/or grooves associated with this organ. All of the following statements are correct EXCEPT that the

A. coronary ligaments define the limits of the bare area.
B. ligamentum teres hepatis is a remnant of the umbilical vein.
C. ligamentum venosum separates the left lobe from the quadrate lobe.
D. falciform ligament attaches the liver to the anterior abdominal wall.
E. groove for the inferior vena cava lies to the right of the caudate lobe.

8. A 56-year-old woman with metastatic cancer of the colon underwent resection of the right lobe of the liver to remove a single large metastasis. During the surgery, it was necessary to ligate the right hepatic artery, portal vein, and common bile duct. These structures could be approached as they passed

A. through the epiploic foramen.
B. posterior to the pylorus of the stomach.
C. within the hepatoduodenal ligament.
D. posterior to the descending part of the duodenum.
E. within the falciform ligament.
9. In a 45-year-old man with portal hypertension, which of the following veins would most likely have increased intraluminal pressure?

A. Right testicular vein  
B. Right colic vein  
C. Left renal vein  
D. Left inferior epigastric vein  
E. Right suprarenal (adrenal) vein

10. A 32-year-old man donated a kidney to his ailing sister. His kidney was removed via an incision posterior to this organ. During the surgery, a nerve was cut as it passed posterior to the kidney. After the procedure, the patient might experience

A. weakness of the right internal and external abdominal oblique muscles above the level of the umbilicus.  
B. decreased sensation on the anterior surface of the right side of the scrotum.  
C. paralysis of the right cremaster muscle.  
D. decreased sensation along the T-11 dermatome on the right side.  
E. weakness of the right rectus abdominis muscle at the level of the transtubercular line.

11. The superior hypogastric plexus contains all of the following EXCEPT

A. visceral afferent fibers.  
B. parasympathetic fibers from the vagus nerve.  
C. fibers from the lumbar splanchnic nerves.  
D. preganglionic sympathetic fibers.

12. A 35-year-old woman complains of excruciating pain in the epigastric region. Radiographs showed a perforation in the posterior wall of her stomach, resulting in leakage of gastric contents into the lesser sac. The surgeon accessed the lesser sac by opening the gastrosplenic (lienogastric) ligament and in doing so accidentally cut an artery. Which of the following arteries was most likely injured?

A. Left gastric artery  
B. Left inferior phrenic artery  
C. Gastroduodenal artery  
D. Left gastroepiploic artery  
E. Left renal artery
13. A stab wound in the anterior abdominal wall cut through the umbilical peritoneal folds. One of these folds, the medial umbilical fold, contains an artery that embryologically was a branch of the

A. inferior epigastric artery.
B. common iliac artery.
C. internal iliac artery.
D. superficial epigastric artery.
E. abdominal aorta.

14. In order to anesthetize the genitalia and anus of a female patient, the anesthesiologist directs his needle toward the

A. inferior edge of the pubic symphysis.
B. midpoint between the vagina and anus.
C. ischial spine.
D. midpoint of the ischiopubic ramus.
E. inferior edge of the coccyx.

15. A 60-year-old man is diagnosed with cancer of the rectum. Surgery is scheduled to remove the tumor and the entire rectum. During the procedure you are asked to describe the blood supply to the rectum. Your response is that the rectum is supplied by branches of all of the following arteries EXCEPT the

A. internal pudendal.
B. inferior mesenteric.
C. internal iliac.
D. inferior rectal.
E. external iliac.

16. When drawing excess fluid from the peritoneal cavity, a needle inserted through the anterior abdominal wall in the midline, immediately superior to the umbilicus, would pass through all of the following structures EXCEPT the

A. superficial fascia.
B. linea alba.
C. rectus abdominis muscle.
D. transversalis fascia.
E. parietal peritoneum.
17. During removal of the uterus the surgeon would need to ligate and/or cut all of the following structures EXCEPT the
   A. uterine tubes.
   B. ovarian ligament.
   C. suspensory ligament of the ovary.
   D. round ligament of the uterus.
   E. uterine artery.

18. You visit a 45-year-old man in the hospital who has lost the ability to control his anal sphincters. In discussing his problem with the other students and faculty, you are asked to identify the correct association of anal sphincters with their nerve supply from the following list. Which association is correct?
   A. Internal and external anal sphincters - both involuntary control
   B. Internal anal sphincter - voluntary; external anal sphincter - involuntary
   C. Internal and external anal sphincters - both voluntary control
   D. Internal anal sphincter - involuntary; external anal sphincter - voluntary

19. In performing a vasectomy in a normal adult male, the physician would encounter all of the following structures EXCEPT
   A. cremasteric muscle fibers.
   B. the pampiniform plexus of veins.
   C. the artery to the vas deferens.
   D. the gubernaculum.
   E. the testicular artery.

20. All of the following statements regarding referred pain are correct EXCEPT that a/an
   A. ruptured spleen can result in referred pain to the left shoulder.
   B. inflamed gall bladder can result in referred pain to an area between the xiphoid process and the umbilicus.
   C. large tumor in the descending colon can result in referred pain to the suprapubic region.
   D. inflamed Meckel’s diverticulum can result in referred pain to the umbilical region.
   E. inflamed sigmoid colon can result in referred pain to the epigastric region.
21. An uncircumcised and sexually promiscuous 56-year-old man visited his physician because of a “sore that was getting bigger” on the prepuce (foreskin) of his penis. The lesion was a cancer (carcinoma) of the prepuce. During surgery to remove the lesion, lymph nodes that directly drain the skin in the area of the tumor were removed and examined for spread of cancer cells. The lymph node specimens came from the

A. external iliac nodes.
B. lumbar nodes.
C. superficial inguinal nodes.
D. internal iliac nodes.
E. common iliac nodes.

22. During surgery restricted to structures in the superficial pouch of the female perineum, the surgeon must be careful not to damage the

A. greater vestibular glands.
B. sphincter urethrae muscle.
C. deep transverse perineus muscles.
D. iliococcygeus muscles.
E. external anal sphincter.

23. A patient has some paralysis and/or sensory loss of the diaphragm. This could be caused by damage to any or all of the following structures EXCEPT

A. nerves from spinal cord levels C3, C4 and C5.
B. branches from lower intercostal nerves.
C. the phrenic nerves.
D. the greater splanchnic nerve.
E. dorsal roots of spinal nerves T10-T12.

24. A catheter was incorrectly inserted into the spongy urethra of a 53-year-old man, rupturing its wall. Urine could leak from the urethra into the superficial perineal space where it could pass into all of the following areas EXCEPT the

A. space deep to the dartos tunic.
B. space deep to Scarpa’s fascia.
C. space superficial to Buck’s fascia.
D. ischioanal (ischiorectal) fossa.
E. space deep to Colles’ fascia.
25. All of the following structures could directly be compressed by a slowly growing tumor in the head of the pancreas EXCEPT for the

A. superior pancreaticoduodenal artery.
B. common bile duct.
C. duodenal-jejunal junction.
D. inferior vena cava.
E. descending part of the duodenum.

26. Destruction of the ventral roots originating from spinal cord level T6 will interrupt autonomic nerve axons which synapse on neurons whose cell bodies are in the

A. celiac ganglia.
B. superior mesenteric ganglion.
C. aortico-renal ganglia.
D. inferior mesenteric ganglion.
E. esophageal plexus.

27. A 57-year-old woman with cancer of the uterus had a primary tumor that ruptured into the recto-uterine pouch. An MRI taken four months later demonstrated a metastasis on the surface of the right lobe of the liver. In this patient, the MOST LIKELY path for spread of tumor cells to the right lobe of the liver is via

A. lymphatic vessels to the superficial inguinal nodes, followed by passage of cells into the iliac and lumbar lymph trunks to the porta hepatis.
B. the gutter to the right of the mesentery to the epiploic foramen, followed by passage of cells into the lesser sac.
C. the right lateral (paracolic) gutter, followed by passage of cells into the hepatorenal pouch.
D. the left lateral (paracolic) gutter, followed by passage of cells posterior to the left colic flexure into the lesser sac.
E. the space posterior to the greater omentum, followed by passage of cells into the lesser sac.

28. A tumor was found on the esophagus of a 71-year-old woman as it passes through its hiatus in the diaphragm. Structures in this hiatus which could be directly compressed by this tumor include the

A. hemiazygos vein.
B. left phrenic nerve.
C. thoracic duct.
D. posterior vagal trunk.
E. greater splanchnic nerve.
29. A 40-year-old man suffering from congenital polycystic disease of the left kidney needs a kidney transplant. During the surgical procedure, the left suprarenal gland was not removed. You know that the suprarenal gland receives its blood supply from direct branches of which of the following groups of vessels?

A. Aorta, hepatic and renal arteries  
B. Superior mesenteric, splenic, and renal arteries  
C. Renal, splenic, and inferior mesenteric arteries  
D. Aorta, inferior phrenic and renal arteries  
E. Superior phrenic, hepatic, and renal arteries

30. The general surgeon, while repairing the anterior abdominal wall of a 61-year-old man with an indirect inguinal hernia, knew that all of the following statements about an indirect hernia are correct EXCEPT that it

A. can pass through the superficial inguinal ring.  
B. is often the consequence of a congenital anomaly.  
C. often passes into the scrotum.  
D. is surrounded by external spermatic fascia within the inguinal canal.  
E. passes through the deep inguinal ring lateral to the lateral umbilical fold.

31. A surgeon has to remove the diseased rectum of a 56-year-old man. As a result of the surgery, the pelvic splanchnic nerves were damaged. These nerves

A. contain sympathetic fibers.  
B. branch from the lesser splanchnic nerves.  
C. have axons originating in the sacral spinal cord.  
D. have axons which synapse in the inferior mesenteric ganglion.  
E. supply the right colic flexure.

32. A 32-year-old woman had previous gastric surgery in which both vagal trunks were inadvertently severed. After the surgery, which of the following organs would still receive preganglionic parasympathetic fibers?

A. Stomach  
B. Cecum  
C. Sigmoid Colon  
D. Gallbladder  
E. Duodenum
33. A 56-year-old man had an aneurysm of the aorta where it passes through the diaphragm. Compression of structures passing through this opening would MOST LIKELY result in
   A. angina (cardiac pain) resulting from decreased blood flow through the coronary arteries.
   B. decreased peristalsis in the jejunum due to compression of the vagus nerve.
   C. increased blood flow in the hepatic portal vein.
   D. caput medusa.
   E. swelling of the feet due to reduced lymphatic drainage from the lower body.

34. A 23-year-old man who was in a motorcycle accident fractured his pelvis, damaging the pudendal nerve. All of the following could result from this injury EXCEPT loss of
   A. innervation of the sphincter urethrae muscle.
   B. sensation from the glans penis.
   C. innervation of the bulbospongiosus muscle.
   D. innervation of the cremaster muscle.
   E. innervation of the external anal sphincter muscle.

35. A 55-year-old man with portal hypertension resulting from cirrhosis of the liver was admitted to the emergency department. A common surgical procedure used to reduce portal hypertension involves anastomosing the
   A. superior mesenteric vein to the inferior mesenteric vein.
   B. superior rectal vein to the left colic vein.
   C. portal vein to the inferior vena cava.
   D. splenic vein to the inferior mesenteric vein.
   E. hepatic vein to the inferior vena cava.

36. A general surgeon repaired the abdominal wall of a 61-year-old man with a direct inguinal hernia. In his review of this case, the surgeon recalled that the aponeurosis of the external oblique muscle contributes to the formation of all of the following structures EXCEPT the
   A. inguinal ligament.
   B. anterior portion of the sheath of the rectus abdominis muscle.
   C. conjoint tendon.
   D. linea alba.
   E. external spermatic fascia.
37. During surgery for an inguinal hernia repair, the surgeon inadvertently ligated the ilioinguinal nerve as it exited through the superficial inguinal ring. Structures denervated (loss of part or all of their nerve supply) by this injury include the

A. transversus abdominis muscle.
B. scrotum.
C. internal oblique muscle.
D. cremasteric muscle.
E. skin of the suprapubic area.

38. All of the following are derivatives of the embryonic foregut EXCEPT the

A. liver.
B. pancreas.
C. spleen.
D. ileum.
E. gall bladder.

39. During surgery grand rounds, you are put on the spot by the attending physician with a series of questions on characteristics of the GI tract. However, you did well because you knew that all of the following statements characterize the GI tract EXCEPT that the

A. sigmoid colon is secondarily retroperitoneal.
B. ileum is intraperitoneal.
C. transverse colon is intraperitoneal.
D. descending colon is secondarily retroperitoneal.
E. stomach is intraperitoneal.

40. Leakage of urine from the umbilicus is the result of failure of

A. closure of the urachus.
B. closure of the urorectal septum.
C. extrophy of the mesonephric ducts into the bladder.
D. regression of the mesonephric tubules.
E. formation of the ureteric bud.

41. After folding of the head region, what structure(s) lies (lie) just caudal to the pericardial cavity?

A. Developing heart
B. Connecting stalk
C. Developing lungs
D. Developing liver
E. Septum transversum
42. An XY embryo incapable of producing dihydrotestosterone is expected to
A. lack bulbourethral glands.
B. lack vas deferens.
C. lack male external genitalia.
D. form uterine tubes.
E. form ovaries.

43. The vas deferens in the male are derived from the
A. mesonephric tubules.
B. mesonephric ducts.
C. paramesonephric ducts.
D. medullary sex cords.
E. ureteric bud.

44. A baby is born with pulmonary hypoplasia resulting from the presence of abdominal contents in the left pleural cavity. Which of the following structures failed to form?
A. Pleuropericardial fold
B. Ventral mesentery
C. Left crus of the diaphragm
D. Pleuropertoneal membrane
E. Central tendon of the diaphragm

45. In the developing embryo, the ventral mesentery of the primitive gut disappears EXCEPT where it is attached to the
A. cranial region of the foregut.
B. caudal region of the foregut.
C. cranial region of the midgut.
D. caudal region of the midgut.
E. caudal region of the hindgut.

46. What clinical condition will result from the failure of the cervical nephrotomes (pronephros) to develop properly?
A. Bilateral renal agenesis
B. Bifid ureter
C. Oligohydraminos
D. Unilateral renal agenesis
E. No clinical symptoms
47. Which of the following statements about genital primordia, and their definitive male and female adult structures, is correct?

A. The urogenital fold gives rise to the male scrotum or the female labia minora.
B. The urogenital fold gives rise to the male scrotum or the female labia majora.
C. The labioscrotal swellings give rise to the male urethra or the female labia minora.
D. The labioscrotal swellings give rise to the male urethra or the female labia majora.
E. The labioscrotal swellings give rise to the male scrotum or the female labia majora.

48. A Meckel’s diverticulum is an adult remnant of the

A. urachus.
B. vitelline duct.
C. dorsal pancreatic duct.
D. allantois.
E. urorectal septum.

49. Failure of the paramesonephric ducts to fuse will result in a double

A. uterus.
B. prostate gland.
C. urethra.
D. bladder.
E. penis.

50. What is the condition that occurs if the second 180 degree counterclockwise rotation of the gut does not occur after a normal first 90 degree counterclockwise rotation?

A. A mixed or malrotation
B. A nonrotation or left-sided colon
C. A reversed rotation
D. An annular pancreas