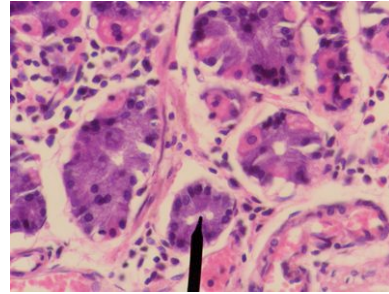


Gastrointestinal #1 – Histology

- 1) Mucin falls under what functional category of the alimentary mucosa?
 - a) Secretion
 - b) Absorption
 - c) Barrier
 - d) Immunologic protection
- 2) Which of the following locations is most likely to contain keratinized epithelial cells?
 - a) Cheeks
 - b) Floor of mouth
 - c) Gums
 - d) Soft palate
 - e) Inferior tongue
- 3) Which of the following type of papillae is large, dome-shaped, and is located just anterior to the sulcus terminalis?
 - a) Filiform papillae
 - b) Fungiform papillae
 - c) Circumvallate papillae
 - d) Foliate papillae
- 4) Which of the following structural components of taste buds acts as stem cells for the other structural cells?
 - a) Neuroepithelial cells
 - b) Supporting cells
 - c) Basal cells
 - d) None do, they are all replaced every 10 days
- 5) Although tongue “taste maps” are controversial, what basic taste is said to be sensed at the circumvallate papillae?
 - a) Sweet
 - b) Salty
 - c) Sour
 - d) Bitter
 - e) Umami
- 6) Which tooth layer is comprised of carbonated calcium hydroxyapatite crystals that are arranged in rods?
 - a) Dentin
 - b) Enamel
 - c) Cementum
 - d) Dental pulp
 - e) None of the above
- 7) Which area of the tooth is vascularized and supplied by abundant nerves?
 - a) Periodontal ligament
 - b) Alveolar bone
 - c) Alveolar processes
 - d) Cementum
 - e) Dental pulp
- 8) Which of the following is NOT true of saliva?
 - a) It contains proteins that coat the teeth with a protective acquired pellicle

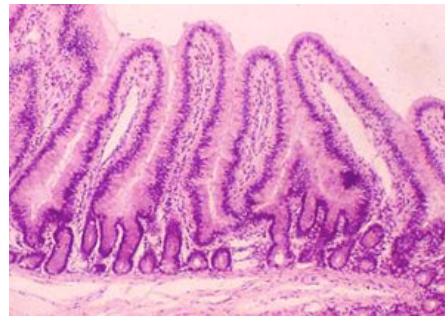
- b) It contains lysozyme (muramidase) that controls certain bacteria (e.g. staph)
 - c) It contains alpha-amylase that breaks down fats as they enter the GI tract
 - d) It contains antibodies including salivary IgA and antibacterial agents
 - e) It contains high concentrations of bicarbonate to buffer the oral cavity
- 9.1) Which of the following layers of the alimentary canal contains nerve fibers and ganglion cells, forming the Meissner plexus?
- a) Plicae circulares
 - b) Villi & microvilli
 - c) Muscularis mucosae
 - d) Submucosa
 - e) Thin connective tissue of muscularis externa
- 9.2) What is the principal site of gastrointestinal absorption?
- a) Plicae circulares
 - b) Villi & microvilli
 - c) Muscularis mucosae
 - d) Submucosa
 - e) Thin connective tissue of muscularis externa
- 10) Which of the following layers of the alimentary canal contains the myenteric (Auerbach) plexus and is also partially responsible for peristalsis?
- a) Plicae circulares
 - b) Villi & microvilli
 - c) Muscularis mucosae
 - d) Submucosa
 - e) Thin connective tissue of muscularis externa
- 11) Which of the following sphincters prevents colonic bacteria from entering the small intestine?
- a) Pharyngoesophageal sphincter
 - b) Pyloric sphincter
 - c) Ileocecal valve
 - d) Internal anal sphincter
- 12) Which area of the esophagus contains the esophageal glands proper, which are small compound tubuloalveolar glands that lubricate the luminal wall?
- a) Mucosa
 - b) Submucosa
 - c) Muscularis externa, upper 1/3
 - d) Muscularis externa, lower 2/3
- 13) What is the role of the gastric mucosa, which lines the surfaces and gastric pits of the stomach?
- a) Secretes HCl
 - b) Secretes pepsin
 - c) Secretes intrinsic factor
 - d) Secretes pepsinogen
 - e) Protects against abrasion and gastric contents
- 14) Which of the following is secreted by parietal (oxyntic) cells?
- a) HCl
 - b) Pepsin

- c) Pepsinogen
 - d) Somatostatin
 - e) Vasoactive intestinal peptide (VIP)
- 15) What structure is being pointed to in this image?
- a) Gastric gland
 - b) Mucous neck cell
 - c) Chief cell
 - d) Parietal cell
 - e) Enteroendocrine cell



- 16) Which of the following is continuous with the parietal peritoneum of the abdominal cavity via the greater omentum and the visceral peritoneum of the liver anterior to the lesser omentum?
- a) Lamina propria
 - b) Muscularis mucosae
 - c) Gastric submucosa
 - d) Gastric muscularis externa
 - e) Gastric serosa
- 17) Gut-associated lymphatic tissue (GALT) contains diffuse lymphatic tissue, nodules, eosinophils, and macrophages. Which of the following areas contains extensive aggregates of lymphatic nodules, known as Peyer patches?
- a) Duodenum
 - b) Jejunum
 - c) Ileum
 - d) Cecum
 - e) Colon
- 18) Submucosal (Brunner) glands are a distinguishing characteristic of which of the following?
- a) Duodenum
 - b) Jejunum
 - c) Ileum
 - d) Cecum
 - e) Colon
- 19) Which of the following stem cell derivatives is most associated with the small intestine and large intestine?
- a) Isthmus mucous cells
 - b) Parietal cells
 - c) Chief cells
 - d) Goblet cells
 - e) Enteroendocrine cells
- 20.1) Which of the following produce the hormones CCK (increase pancreatic and gallbladder activity), GIP (stimulates insulin release), and motilin (increases gastric and intestinal motility)?
- a) Enterocytes
 - b) Goblet cells
 - c) Paneth cells
 - d) Enteroendocrine cells

- e) M (microfold) cells
- 20.2) Which of the following contains lysozyme and alpha-defensins to serve a bacteriostatic function?
- a) Enterocytes
 - b) Goblet cells
 - c) Paneth cells
 - d) Enteroendocrine cells
 - e) M (microfold) cells
- 20.3) Which of the following contains active Na/K ATPase and function in absorption and secretion?
- a) Enterocytes
 - b) Goblet cells
 - c) Paneth cells
 - d) Enteroendocrine cells
 - e) M (microfold) cells
- 20.4) Which of the following overlie Peyer patches, take up microorganisms and macromolecules, and present vesicles to CD4+ lymphocytes?
- a) Enterocytes
 - b) Goblet cells
 - c) Paneth cells
 - d) Enteroendocrine cells
 - e) M (microfold) cells
- 21) What is a major role of the Brunner glands?
- a) Production of acidic secretions
 - b) Production of alkaline secretions
 - c) Production of gastric hormones
 - d) Production of pepsinogen
 - e) Cleavage of pepsinogen to pepsin
- 22) Which of the following is NOT found in the large intestine?
- a) Haustra
 - b) Crypts of Lieberkuhn
 - c) Teniae coli
 - d) Paneth cells
 - e) Goblet cells
- 23) What portion of the GI tract is shown here?
- a) Esophagus
 - b) Stomach
 - c) Small intestine
 - d) Colon
 - e) Anal canal



Gastrointestinal #2 – Biochemistry: Metabolic Fuels & Dietary Components

1) A 25-year-old medical student presents with complaints of weight gain. He is 5'10" tall and weighs 210 pounds. His BMI is calculated ($\text{weight} * 704 / \text{height}^2$) to be 30, which is in the obese range. He would like to be at BMI 21, which is within the healthy range. About how much weight must he lose to achieve this goal?

- a) 25 lbs
 - b) 35 lbs
 - c) 45 lbs
 - d) 55 lbs
 - e) 65 lbs
- 2) For breakfast, a 25-year-old medical student has a fast food sandwich and large orange juice. If the sandwich contains 24g of fat, 30g of carbohydrates, and 21g of protein, and the juice contains 33g of carbohydrates and 1g of protein, about how many calories is she having for breakfast?
- a) 600 kcal
 - b) 750 kcal
 - c) 875 kcal
 - d) 1000 kcal
 - e) 1125 kcal
- 3) Using the rough estimate method for basal metabolic rate (BMR), what is the daily BMR for an individual that weights 100kg?
- a) 1800 kcal
 - b) 2000 kcal
 - c) 2200 kcal
 - d) 2400 kcal
 - e) 2600 kcal
- 4) Which of the following factors would decrease BMR?
- a) Pregnancy
 - b) Fever
 - c) Cold environment
 - d) Hyperthyroidism
 - e) Old age
- 5) To determine daily energy expenditure (DEE), activity factors are added depending on how much of the day they took up. The overall factors is divided by 24 hours and this daily activity factor value is multiplied by BMR, yielding DEE. What is the activity factor associated with sitting in class?
- a) 1.0
 - b) 1.5
 - c) 2.0
 - d) 2.5
 - e) 3.0
- 6) A patient who is gaining weight likely has what type of daily caloric balance?
- a) Positive
 - b) Neutral
 - c) Negative
- 7) Which of the following major dietary requirements is a precursor to eicosannoids (e.g. prostaglandins, thromboxanes, leukotrienes)?
- a) Carbohydrates
 - b) Essential fatty acids
 - c) Proteins
 - d) Vitamins

- e) Minerals
- 8) Which of the following are NOT essential amino acids?
- Phenylalanine, valine, threonine
 - Tryptophan, isoleucine, methionine
 - Alanine, tyrosine, glutamate
 - Histidine, arginine, leucine, lysine
- 9) Which fatty acids are considered essential?
- Linoleic and eicosapentaenoic
 - Myristoleic and palmitoleic
 - Oleic and alpha-linolenic
 - Alpha-linolenic and linoleic
 - Eicosapentaenoic and arachidonic
- 10) Which of the following vitamins is water soluble?
- Vitamin A
 - Vitamin D
 - Vitamin C
 - Vitamin E
 - Vitamin K
- 11) Which of the following is needed for hormones?
- Carbohydrates
 - Essential fatty acids
 - Proteins
 - Vitamins
 - Minerals

Match the nutrient deficiency with the disease or clinical presentation:

- | | |
|--------------------------|------------------------------|
| 12) Megaloblastic anemia | a) Essential amino acids |
| 13) Fatigue & anemia | b) Beta carotene (Vitamin A) |
| 14) Scurvy | c) Thiamine (Vitamin B1) |
| 15) Goiters | d) Niacin (Vitamin B3) |
| 16) Night blindness | e) Folic Acid & Vitamin B12 |
| 17) Rickets | f) Ascorbic acid (Vitamin C) |
| 18) Beri Beri | g) Calciferol (Vitamin D) |
| 19) Pellagra | h) Phylloquinone (Vitamin K) |
| 20) Kwashiorkor | i) Fluoride |
| 21) Cavities | j) Iron |
| 22) Hemorrhage | k) Iodine |

Match the nutrient with the metabolic use/need:

- | | |
|--------------------------------------|----------------------------------|
| 23) Collagen formation | a) Thiamine (Vitamin B1) |
| 24) NAD formation | b) Riboflavin (Vitamin B2) |
| 25) CoA formation | c) Niacin (Vitamin B3) |
| 26) Decarboxylation reactions | d) Pantothenic acid (Vitamin B5) |
| 27) Carboxylation reactions | e) Biotin (Vitamin B7) |
| 28) FAD formation | f) Folic acid (Vitamin B8) |
| 29) One carbon transfer reactions | g) Ascorbic acid (Vitamin C) |
| 30) Protein function (skin problems) | h) Zinc |

Gastrointestinal #3 – Biochemistry: Digestion & Transport of Carbohydrates

- 1.1) Sucrose is a disaccharide made from which of the following?
- Galactose and glucose (beta 1,4 bond)
 - Glucose and fructose (alpha 1,2 bond)
 - Glucose and glucose (alpha 1,1 bond)
 - Glucose and glucose (beta 1,4 bond)
 - Glucose and glucose (alpha 1,4 bond)
- 1.2) Alpha-amylase has activity at which of the following bond types?
- Alpha 1,2
 - Alpha 1,4
 - Beta 1,2
 - Beta 1,4
 - Beta 1,1
- 1.3) Which of the following allows the intestine to hydrolyze alpha-1,6 bonds?
- Glucosamylase
 - Sucrase-maltase
 - Trehalase
 - Lactase-glucosylceramidase
- 2) Which of the following enzymes declines over time, may be absent in adults, is the first to be lost in intestinal injury, and is the last to recover from intestinal injury?
- Maltase
 - Sucrase
 - Lactase
 - Amylase
 - Lipase
- 3) Soluble fibers are associated with disease prevention (e.g. reduce colonic wall pressure or lower cholesterol levels). Which of the following, along with mucilages and gums, is soluble?
- Cellulose
 - Hemicellulose
 - Lignins
 - Pectins
- 4.1) Glucose is transported to the serosal side of the intestine via secondary transport with sodium and via facilitative transport. What GLUT transporter is specific to fructose only?
- GLUT1
 - GLUT2
 - GLUT3
 - GLUT4
 - GLUT5
- 4.2) Which of the following is moved to the plasma membrane in the presence of insulin, allowing for glucose to be passively diffused into muscle and fat cells?
- GLUT1
 - GLUT2
 - GLUT3
 - GLUT4
 - GLUT5

5.1) The slow rate of transport of glucose through the blood-brain barrier (blood to CSF) at low levels of glucose is responsible for neuroglycopenic symptoms (e.g. confusion, visual disturbances, poor coordination). What transporter allows for glucose to cross the blood-brain barrier?

- a) GLUT1
- b) GLUT2
- c) GLUT3
- d) GLUT4
- e) GLUT5

5.2) Which of the following is expressed mostly on neural cells?

- a) GLUT1
- b) GLUT2
- c) GLUT3
- d) GLUT4
- e) GLUT5

Gastrointestinal #4 – Biochemistry: Digestion & Transport of Lipids

1) In the structure of triacylglycerol, fatty acids are bound to a glycerol backbone by what type of chemical bonds?

- a) Alcohol
- b) Thiol
- c) Aldehyde
- d) Ester
- e) Amide

2) Which of the following occurs due to intestinal peristalsis?

- a) Dietary fat is broken up into globules
- b) Fatty acids are hydrolyzed from triacylglycerols
- c) Free fatty acids are packaged into micelles
- d) Intestinal epithelial microvilli absorb packaged fats
- e) Fat globules are emulsified for greater surface area

3) Which of the following occurs due to pancreatic enzymes (lipase)?

- a) Dietary fat is broken up into globules
- b) Fatty acids are hydrolyzed from triacylglycerols
- c) Free fatty acids are packaged into micelles
- d) Intestinal epithelial microvilli absorb packaged fats
- e) Fat globules are emulsified for greater surface area

4) Which of the following enters the blood through the lymphatic thoracic duct and allows triacylglycerides to enter the bloodstream without coalescing, which would inhibit blood flow?

- a) HDL
- b) LDL
- c) VLDL
- d) Chylomicrons
- e) 2-monoacylglycerol

5) At what point is a chylomicron considered mature?

- a) After lysosomal digestion in the liver

- b) After association with ApoB-48
- c) After association with ApoC-II and ApoE
- d) After delivery to muscle and adipose tissue via lipoprotein lipase (LPL)
- e) After ApoE receptor recognition of chylomicron remnants at the liver

Match the lipoprotein with the chylomicron function:

- | | |
|--|------------|
| 6.1) Required for chylomicron assembly in the ER | a) ApoB-48 |
| 6.2) Identifies chylomicron for receptor mediated endocytosis | b) ApoC-II |
| 6.3) Acts as an activator protein for lipoprotein lipase (LPL) | c) ApoE |

Gastrointestinal #5 – Biochemistry: Protein Digestion & Amino Acid Absorption

- 1) Exopeptidases cleave one amino acid at a time, removing them from the carboxyl ends of peptide chains. Where are exopeptidases secreted?
 - a) Stomach
 - b) Duodenum
 - c) Gallbladder
 - d) Pancreas
 - e) Small intestine
- 2) Trypsin catalyzes the cleavage of dietary proteins and activates zymogens. It is formed from trypsinogen, which is secreted at what location?
 - a) Stomach
 - b) Duodenum
 - c) Gallbladder
 - d) Pancreas
 - e) Small intestine
- 3) Which of the following zymogens (proenzymes) is converted to its active enzyme via enteropeptidase?
 - a) Pepsinogen
 - b) Trypsinogen
 - c) Chymotrypsinogen
 - d) Proelastase
 - e) Procarboxypeptidase
- 4) Which of the following would occur in the absence of a secretory trypsin inhibitor?
 - a) Pancreatitis
 - b) Kwashiorkor
 - c) Cystic fibrosis
 - d) Cystinuria
 - e) Hartnup disease
- 5) Which of the following describes the transepithelial amino acid transport used to bring amino acids into circulation?
 - a) K-dependent transport at the luminal membrane and facilitated transport at the serosal membrane
 - b) Facilitated transport at the luminal membrane and K-dependent transport at the serosal membrane
 - c) Na-dependent transport at the luminal membrane and facilitated transport at the serosal membrane

- d) Facilitated transport at the luminal membrane and Na-dependent transport at the serosal membrane
 - e) Na-dependent transport at the luminal membrane and K-dependent transport at the serosal membrane
- 6) Which of the following is autosomal recessive, affects neutral amino acids, and causes hyperaminoaciduria leading to possible renal calculi?
- a) Pancreatitis
 - b) Kwashiorkor
 - c) Cystic fibrosis
 - d) Cystinuria
 - e) Hartnup disease
- 7) Which of the following targets intracellular proteins for degradation?
- a) Proteasome
 - b) Mannitol
 - c) Lysozyme
 - d) Ubiquitin
 - e) Pepsinogen
- 8) Cystinuria is an autosomal recessive disorder that can lead to renal calculi. Defective transport proteins prevent the absorption of histidine, lysine, ornithine, arginine and cysteine. What type of amino acids are these?
- a) Polar
 - b) Non-polar
 - c) Neutral pH
 - d) Basic pH (positive)
 - e) Acidic pH (negative)
- 9) What is the purpose of the gamma-glutamyl cycle?
- a) Glutathione synthesis
 - b) Myeloperoxidase binding
 - c) Decarboxylation of amino acids
 - d) Carbonic anhydrase synthesis
 - e) Ubiquitin synthesis

Gastrointestinal #6 – Nutrition: Growth & Young Children

- 1) An 18-month-old boy is brought in for routine check-up. As part of the exam, you plot his length and weight on the appropriate growth chart. In reference to the weight-for-age chart, which of the following would alert you to possible problems that would warrant further evaluation?
- a) An increase from the 50th to the 75th percentile
 - b) A decrease from the 95th percentile to the 50th percentile
 - c) Any value below 50th percentile
 - d) Continuing along the 10th percentile
 - e) A value at the 90th percentile
- 2) How do the nutritional needs of a child differ from those of an adult?
- a) An adult requires less fat and protein per kg than does a child
 - b) An adult requires more fat and protein per kg than does a child
 - c) Absolute fat and protein requirements decrease with age

- d) Absolute iron requirements decrease with age
 - e) An adult requires more iron per kg than does a child
- 3) Which of the following is the most TYPICAL growth pattern in failure to thrive?
- a) Height curve flattens first, while weight appears unaffected
 - b) Weight curve flattens first, while height curve appears unaffected
 - c) Height and weight curves flatten at the same time
 - d) Weight- or height-or-age falls below the 10th percentile
 - e) Weight-for-height is consistently below the 50th percentile
- 4) Which of the following conditions might you expect to find in an infant with iron-deficiency?
- a) Jaundice
 - b) Visual defects
 - c) Rickets
 - d) Muscle wasting
 - e) Slowed development
- 5) What nutrient is most commonly deficient in children of all ages?
- a) Zinc
 - b) Calcium
 - c) Iron
 - d) Vitamin D
 - e) Vitamin A
- 6) A woman has a 6-year-old with severe peanut allergy. She is now pregnant with her second child and wants to know if there is anything she can do to prevent her baby from developing an allergy. In addition to advising her to breastfeed exclusively for 6 months while avoiding nuts and peanuts her self, she should delay the introduction of peanut products in her child's diet until s/he is:
- a) 6 months old
 - b) 1 year old
 - c) 2 years old
 - d) 3 years old
 - e) 4 years old
- 7) At what age range and weight status do infants usually show signs of readiness to transition to solid foods?
- a) Age 3-4 months, birth weight doubled AND weight > 6kg (13lbs)
 - b) Age 4-6 months, birth weight doubled OR weight > 6kg (13lbs)
 - c) Age 4-6 months, birth weight doubled AND weight > 6kg (13lbs)
 - d) Age 6 months, birth weight doubled AND weight > 8kg (17.6lbs)
 - e) Age 6 months, birth weight doubled OR weight > 8kg (17.6lbs)
- 8) Why are infants more susceptible than adults to food allergies?
- a) They have higher levels of circulating antibodies and immunoglobulins
 - b) They have an immature gastrointestinal tract
 - c) They lack exposure to many foods and antigens
 - d) They have immature kidneys
 - e) They acquire maternal antibodies
- 9) How does oral rehydration therapy counteract the effects of diarrhea?
- a) It inhibits intestinal absorption of liquid and electrolytes

- b) It promotes intestinal secretions
 - c) It drives the release of electrolytes into the intestinal lumen
 - d) It inhibits the aquaporin activity
 - e) It promotes the activity of the sodium-glucose transporter
- 10) A young mother wants to know the benefits of giving meat to her 14-month-old child. What should you tell her?
- a) Meats contain high levels of the antioxidant vitamins C and E, which will reduce the risk of developing cancer in adulthood
 - b) A child who does not consume meat will not receive enough dietary protein
 - c) A child should consume meat to receive an adequate supply of vitamin B6
 - d) Meats provide dietary protein and vitamin B6, which will help her child build body tissues and synthesize essential compounds
 - e) A 14-month-old child is too young to digest meats
- 11) What amino acid would you restrict as a treatment for severe homocysteinemia?
- a) Cysteine
 - b) Methionine
 - c) Betaine
 - d) Leucine
 - e) Valine
- 12) The formula of an infant with maple syrup urine disease should limit the quantity of which amino acids?
- a) Threonine, methionine, and cysteine
 - b) Proline and arginine
 - c) Tyrosine and phenylalanine
 - d) Alanine, glycine, and serine
 - e) Isoleucine, leucine, and valine
- 13) A lacto-ovo vegetarian ate a granola bar with orange juice and a banana for breakfast, cheese and roasted vegetables on pita bread for lunch, and spinach lasagna with a salad for dinner. For snacks, she had carrot sticks with hummus and chocolate chip cookies. Evaluate her diet for protein quality.
- a) She did not consume enough legumes
 - b) She did not consume enough grains
 - c) She should have eaten grains with legumes in at least one meal
 - d) She consumed a good variety of plant and animal proteins
 - e) Her protein quality is insufficient without meat products
- 14) What dietary advice would you give to a vegan who is allergic to soy?
- a) Avoid legumes and eat a variety of grains throughout the day
 - b) Avoid legumes, limit grains, and eat a variety of fruits throughout the day
 - c) Eat an assortment of non-soy plant foods throughout the day
 - d) Eat mostly legumes and only a few grain products each day
 - e) A vegan diet without soy cannot provide sufficient protein
- 15) A preschool director plans to start offering breakfast to the children. She asks for your opinion about the following meal: a scrambled egg on whole-wheat toast, 120mL of 2% milk, 120mL of orange juice, and a small bunch of grape. What problem do you see with this meal?
- a) Whole grapes pose a choking hazard

- b) 2% milk is too low in fat
 - c) The meal is too low in fiber
 - d) Scrambled eggs pose salmonella risk
 - e) The meal lacks sufficient protein
- 16) A mother brings her 2-year-old child in for a regular check-up. Since both she and her husband have a family history of heart disease, they decide to start their daughter out on healthy eating patterns. The child's intake for a typical day is cereal with skim milk, half a banana, a soynut butter and jelly sandwich with real fruit juice, fat-free cheese crackers and tomato juice, mashed potatoes, chicken, green beans and 1/2 cup of yogurt, and skim milk and graham crackers. What concerns do you have about this diet?
- a) There are too many daily servings
 - b) There are too few fruits and vegetables
 - c) Soynut butter is too high in fat
 - d) Soy and milk are allergens
 - e) The diet is likely to be too low in fat
- 17) Excessive intake as a megadose supplement of which nutrient is most likely to diminish the user's copper stores?
- a) Choline
 - b) Zinc
 - c) Folate
 - d) Vitamin D
 - e) Thiamin
- 18) What are typical consequences of zinc deficiency in a 3-year-old child?
- a) Slowed growth, impaired cognitive development, edema
 - b) Slowed growth, edema, bleeding
 - c) Edema, impaired brain function, failure to thrive
 - d) Skin lesions, general malnutrition, reduced immune function
 - e) General malnutrition, edema, loss of vascular integrity
- 19) Which carotenoid or retinoid may cause birth defects when taken in excess during early pregnancy?
- a) Alpha-carotene
 - b) Beta-carotene
 - c) Retinol
 - d) Lycopene
 - e) Zeaxanthin
- 20) How does pantothenate participate in the use of glucose as an energy fuel?
- a) Through phosphorylation of hexose transporters in liver and muscle
 - b) By facilitating the oxidation of citrate to alpha-ketoglutarate
 - c) By binding to pyruvate carboxylase to generate oxaloacetate
 - d) As phosphopantothenate in acylbinding protein
 - e) Through the generation of acetyl CoA and succinyl CoA
- 21) For enzymes in which metabolic pathways is biotin needed?
- a) Phospholipid synthesis and the urea cycle
 - b) Pentose-phosphate pathway and fatty acid beta-oxidation
 - c) Methionine and threonine oxidation and oxidative phosphorylation
 - d) Branched-chain amino acid catabolism and fatty acid synthesis

- e) glycolysis and purine nucleotide synthesis
- 22) In what way does neuronal metabolism depend on adequate thiamin intakes?
- a) Sphingolipid synthesis requires TPP-dependent transaldolase
 - b) Glucose use by the pentose-phosphate-pathway needs thiamin
 - c) W6 fatty acid elongation is not possible without TPP as a cofactor
 - d) TTP is needed for the utilization of ketone bodies in brain
 - e) The catabolism of excess tyrosine is thiamin dependent
- 23) What are the consequences of a loss of exocrine pancreas function?
- a) Glucose malabsorption due to diminished sodium secretion
 - b) Obstipation due to impaired dietary fiber (cellulose) digestion
 - c) Diarrhea due to fat, protein, and carbohydrate malabsorption
 - d) Elevated blood lipid levels due to diminished lipase activity
 - e) Poor thiamin absorption due to lack of mixed micelle formation
- 24) Which mechanism is responsible for the uptake of most of the water entering the small intestine?
- a) Sodium-potassium ATPase pump
 - b) Sodium-glucose transporter
 - c) Passive diffusion through tight junction
 - d) Receptor-mediated transport
 - e) Endocytosis of unstirred water layer
- 25) How is the brain's need for energy met after an overnight fast?
- a) Glycogen in brain is mobilized
 - b) Glucose is transferred from the liver
 - c) Fatty acids are mobilized from adipose tissues
 - d) Liver generates ketone bodies
 - e) Lactate is transferred from muscles
- 26) How does thiamin deficiency affect fuel metabolism in the tricarboxylic acid (Krebs) cycle?
- a) The replenishing of intermediates from glutamate is blocked
 - b) The synthesis of oxaloacetate from pyruvate is disrupted
 - c) The release of succinate from succinyl CoA is slowed
 - d) The synthesis of fatty acids from citrate is diminished
 - e) The conversion of alpha-ketoglutarate to succinyl CoA is impaired
- 27) Where and how is coenzyme A formed?
- a) In intestinal mitochondria using ATP, pantothenate, and glycine
 - b) In a mitochondrial linking of phosphopantothenate and cysteine
 - c) In liver by reduction of pantothenate and conjugation to taurine
 - d) In muscle cytosol by linking pantothenate to protein lysine
 - e) In liver by hydrolysis of protein-linked phosphopantothenate
- 28) What explains the low human requirements of biotin?
- a) Biotin can be produced endogenously from threonine and glycine
 - b) There are alternative pathways for the 4 biotin-dependent reactions
 - c) It is conserved due to its covalent attachment to enzymes
 - d) Biotin is efficiently reactivated by a NADH-dependent carboxylase
 - e) Binding to albumin during transport in blood minimizes renal losses
- 29) How does low bile secretion impact nutrient disposition?

- a) Lack of enterokinase activation by bile acids slows protein digestion
 - b) Diminished protease activity will limit bioavailability of biotin
 - c) Reduced biliary losses will cause excessive zinc storage
 - d) Impaired micelle formation will limit absorption of vitamin D
 - e) Low enzyme secretion with bile slows oligopeptide digestion
- 30) How does the loss of brushborder function due to intestinal infection impact absorption?
- a) Hydrolysis of proteins and cleavage of large peptides is slowed
 - b) Micelle formation and hydrolysis of triglycerides is impaired
 - c) Digestion and absorption of lactose are diminished
 - d) Water uptake and sodium cotransport from the lumen are excessive
 - e) Loss of barrier function increases transfer of lipids
- 31) What is a primary characteristic of a food that promotes tooth decay?
- a) Contains white, dark, or milk chocolate
 - b) Has a crunchy or hard surface
 - c) Is sticky, containing fermentable carbohydrates
 - d) Is processed with fluorinated water
 - e) Is usually served with fatty sauces or spreads
- 32) You see a 10-year-old child who reports frequent headaches, almost every morning at school. Her mother reports that her teacher says she seems easily distracted, and that her grades have declined since they moved to a more rural area with a longer bus ride to and from school. What dietary cofactor or habit is critical to assess when evaluating the intake of this child to determine any contributing factors?
- a) How often the family eats fast food
 - b) Intake of potential allergens (peanut, nut, milk, egg, shellfish)
 - c) Total, saturated, and trans-fat intake
 - d) Frequency of consumption of calcium-rich foods
 - e) Usual breakfast consumption
- 33) Your patient is a 12-year-old boy who is 150cm (59in) tall and weights 45kg (100lbs). He has recently gained 2.7kg (6lbs). You suspect that:
- a) The boy must be under active since he is putting on extra weight
 - b) He is likely retaining water
 - c) He could be showing early signs of an eating disorder
 - d) His body is preparing for the growth spurt of adolescence
 - e) He probably has cystic fibrosis
- 34) The main difference between the growth patterns of girls and boys during adolescence is:
- a) Changes in height
 - b) Changes in weight
 - c) Changes in fat and lean mass
 - d) Changes in bone mineral density
 - e) Changes in percent body water
- 35) In addition to calcium, what nutrients are most critical for proper bone formation?
- a) Selenium, vitamin D, ascorbate, magnesium, zinc
 - b) Phosphorus, vitamin D, ascorbate, copper, magnesium
 - c) Phosphorus, vitamin D, vitamin A, copper, zinc

- d) Pantothenate, thiamin, copper, magnesium
 - e) Folate, thiamin, vitamin A, iodine, magnesium
- 36) As a provider at a school-based health center, you are spearheading a health promotion program for preteens and teenage girls focusing on calcium and vitamin D. How might poor calcium intake before age 18 influence risk later in life?
- a) 25-35% lower peak adult bone mass, 10% greater risk of hip fracture
 - b) 50% lower peak adult bone mass, 50% greater risk of hip fracture
 - c) 1-2% lower peak adult bone mass, 5-10% greater risk of hip fracture
 - d) 5-10% lower peak adult bone mass, 50% greater risk of hip fracture
 - e) Slightly lower peak adult bone mass, slightly increased risk of hip fracture
- 37) An adolescent girl complains of muscle weakness. A brief diet history shows that she does not take vitamin or mineral supplements, and she reports she is a strict vegetarian who does not eat fish or dairy products. You suspect a nutrient deficiency. Because you have no previous blood work on her, you want to be sure to check her serum levels of:
- a) 25-OH vitamin D
 - b) Sodium
 - c) Methylmalonic acid
 - d) Total thyroxine (T4)
 - e) Calcium
- 38) How does vitamin D function to maintain serum calcium levels?
- a) By promoting calcium excretion
 - b) By stimulating the kidneys to remove a hydroxyl group
 - c) By enhancing calcium absorption
 - d) By inhibiting the production of parathyroid hormone
 - e) By decreasing the amount of phosphorus available
- 39) What nutrients are most often inadequate in the diet of a typical 15-year-old girl?
- a) Vitamin E and folate
 - b) Magnesium and calcium
 - c) Calcium and iron
 - d) Folate and vitamin B12
 - e) Vitamin B12 and iron
- 40) The typical adolescent dietary intake patterns lead to concerns about the adequacy or excess of which nutrient combinations?
- a) Iron, calcium (females), vitamin A
 - b) Thiamin, riboflavin, selenium
 - c) Calcium, iron (females), fat, saturated fat, cholesterol, sodium
 - d) Iron (females), zinc (males), total calories
 - e) Vitamin C, phosphate, biotin
- 41) A 16-year-old child comes in to see you. Her BMI is 16.5. She expresses that she is afraid of becoming fat and thinks she looks a bit "chunky" now. Although she has had regular menstrual cycles in the past, she has not had any for about 4 months. What, if any, are your concerns?
- a) None, her BMI and feelings are normal for a teenager
 - b) She could have bulimia nervosa
 - c) She could have an ovarian tumor
 - d) She is at risk for delayed sexual maturation

- e) She could be developing anorexia nervosa
- 42) A pregnant 17-year-old, who was of normal pre-pregnancy weight status, should gain approximately how much weight during gestation?
- a) 6.8kg (15lbs)
 - b) 9kg (20lbs)
 - c) 11.4kg (25lbs)
 - d) 13.6kg (30lbs)
 - e) 16kg (35lbs)
- 43) Nutrient needs that are most critical during a teenage pregnancy include:
- a) Calories, fiber, fluids
 - b) Protein, B12, iron
 - c) Saturated fat, choline, DHA
 - d) Calcium, iron, folate
 - e) Vitamin D, thiamin, folate
- 44) A young mother asks you whether she should give her 2-month-old daughter rice cereal. What would you tell her?
- a) Wheat cereal is more appropriate at that age
 - b) Rice cereal is an acceptable food choice for her daughter
 - c) Rice cereal for an infant this age needs to be mixed with formula
 - d) At this age, infants cannot swallow or digest solid foods properly
 - e) Try it and watch for signs of intolerance (gas, diarrhea)
- 45) What advice, if any, would you give to parents whose 8-month-old child weights 1.5 times his birth weight?
- a) Keep up the good work as he is growing at a normal rate
 - b) Encourage faster growth by supplementing his diet with cow's milk
 - c) He is gaining weight too rapidly, reduce his number of feedings by one
 - d) Put him on a low-fat, low-calorie formula
 - e) His slowed growth requires immediate pediatric attention
- 46) Characterize a newborn's stomach.
- a) It is small and functionally immature
 - b) It can hold no more than 1mL of fluid at a time
 - c) Though small, it empties quickly to accommodate more milk
 - d) It has a large number of chief cells
 - e) It is similar to that of a one-year-old child
- 47) At what age are the kidneys of a normally developed term infant mature enough to handle the solute load caused by solid foods?
- a) 4-6 weeks
 - b) 2-3 months
 - c) 4-6 months
 - d) 8-9 months
 - e) 12 months
- 48) What are the risks when a newborn consumes cow's milk?
- a) Hypercalcuria, kidney stones
 - b) Osmotic diuresis, water loss
 - c) Fatty liver, acidosis
 - d) Hypomagnesemia, muscle cramps

- e) Indigestion, colic
- 49) What volume of human milk should three-month-old infants consume to meet their energy needs?
- a) 75mL/kg/day
 - b) 100mL/kg/day
 - c) 150mL/kg/day
 - d) 225mL/kg/day
 - e) 300mL/kg/day
- 50) What is the recommended dietary allowance of energy for term newborn infants?
- a) 20-25 kcal/kg/day
 - b) 35-40 kcal/kg/day
 - c) 45-60 kcal/kg/day
 - d) 65-75 kcal/kg/day
 - e) 80-110 kcal/kg/day
- 51) Lactose from human milk promotes absorption of:
- a) Amino acids
 - b) Calcium
 - c) Choline
 - d) Docosahexaenoic acid
 - e) Folate
- 52) A vegan woman who is breastfeeding should supplement her diet with which of the following nutrients?
- a) Folate
 - b) Thiamin
 - c) Vitamin B6
 - d) Vitamin B12
 - e) Niacin
- 53) A woman who has exclusively breastfed her two-month-old infant asks you if she should be giving her baby an iron supplement; she has noticed that her friends' babies get iron-fortified formula. You tell her:
- a) Yes, an infant has very low stores after two months
 - b) Yes, without an iron supplement, her infant will develop megaloblastic anemia
 - c) Yes, human milk does not contain enough iron for a two-month-old infant
 - d) No, the iron in human milk is more bioavailable than that in formula
 - e) No, the iron content of human milk is much higher than that of formula
- 54) Mature human milk from a well-nourished woman is still likely to contain inadequate amounts of what essential nutrient?
- a) Vitamin C
 - b) Vitamin D
 - c) Vitamin E
 - d) Folate
 - e) Thiamin
- 55) The mother of an exclusively breastfed African American infant complains that her child is very fussy. The infant presents with the following symptoms: rib-breastbone joint enlargement and delayed sitting. You need to assess the infant's intake of:
- a) Taurine

- b) Vitamin B12
 - c) Vitamin D
 - d) Calcium
 - e) Choline
- 56) Your patient is a formula-fed, five-month-old boy. His medical chart shows that until four months of age, he was at the 75th percentiles for length and weight. However, during his first month, he has dropped to the 50th percentile for weight. What is your next course of action?
- a) Investigate the amount of formula that the infant consumes
 - b) Wait for the growth spurt, which normally follows a plateau
 - c) Suggest a multivitamin/mineral supplement
 - d) Monitor growth for the next month to see if there is a change
 - e) Look for the presence of an allergy to cow's milk or other foods
- 57) How many times per day should a 10-day-old term infant nurse?
- a) 2-3 times
 - b) 4-5 times
 - c) 6-7 times
 - d) 8-12 times
 - e) 13-15 times
- 58) At a 1-week visit, a grandmother reports that her granddaughter is producing 8 wet diapers per day in addition to 6 stools. Assess the adequacy of this infant's dietary intake?
- a) The infant's intake is adequate
 - b) The infant's intake is excessive
 - c) The infant's intake is inadequate
 - d) Infants' needs differ too much to know
 - e) You need to know the number of feedings
- 59) How do infant formula and human milk compare in terms of energy?
- a) Infant formula is significantly higher
 - b) Human milk is significantly higher
 - c) They are very similar
 - d) In formula, lipids supply more of the energy
 - e) In human milk, carbohydrates supply more of the energy
- 60) The content of which of the following components is significantly higher in human milk than in infant formula?
- a) Protein
 - b) Cholesterol
 - c) Lactose
 - d) Iron
 - e) Sodium
- 61) At what age is it acceptable to first introduce whole cow's milk to a child with no family history of food allergies?
- a) 2 months
 - b) 4 months
 - c) 6 months
 - d) 8 months
 - e) 12 months

Gastrointestinal #7 – Nutrition: Metabolic Stress

- 1) A 50-year-old man has fallen off a scaffold and suffered severe head injuries and multiple bone fractures. He has been unconscious for ten days. Which is the most important reason to provide nutrition support for this patient?
- Nutrition support is needed to counter side effects of antibiotics on the gut
 - To decrease the morbidity associated with malnutrition
 - He must regain the muscle mass lost during ten days of immobilization
 - To avoid trace mineral and essential fatty acid deficiency
 - The fatty acids released from adipose tissue during fasting will cause fatty liver.
- 2) In the short term, the stress response to trauma will affect fat mobilization from adipose tissue by:
- Activating lipoprotein lipase
 - Inhibiting hormone-sensitive lipase
 - Increasing insulin, cortisol, and glucagon secretion
 - Restricting blood flow to adipose tissue
 - Decreasing beta-oxidation
- 3) A 55-year-old obese woman with late-onset Type 1 diabetes mellitus suffered complicated femur and other fractures and other trauma in a car accident. Following surgical treatment (osteosynthesis) she developed an infection. The amount of insulin that she needs is now much higher than before the accident. Which of the following are NOT probable explanations for the increased insulin requirement?
- Infusing of large amounts of glucose has increased her insulin requirement
 - Insulin secretion is decreased as a typical stress response to trauma
 - Increased cortisol secretion decreases insulin responsiveness of muscle cells
 - Cytokine secretion induced in response to infection causes insulin resistance
 - Insulin secretion is reduced as a typical response to infection
- 4) A patient comes into the emergency room with a gunshot wound to the head. You know that in response to stress, body hormone secretions often change dramatically. If you could observe mediator secretion into blood, which of the following would you expect to see?
- Increased catecholamines, glucocorticoids, and glucagon
 - Decreased catecholamine, glucocorticoids, and glucagon
 - Decreased insulin and thyroid hormones
 - Decreased insulin and interleukins
 - Normal secretion of glucocorticoids and catecholamines
- 5) Three days ago, a 16-year-old girl suffered second and third degree burns over 60% of her body. A balance study indicates severe negative nitrogen balance. She had not received any form of nutrition since she was injured. Which of the following explanations BEST explains why her blood ketone levels are in the normal range?
- Muscle proteolysis is providing citric acid cycle intermediates so fats can be metabolized to carbon dioxide and water.
 - Stress inhibits the ketogenesis normally seen with fasting, despite increased lipolysis
 - Fatty acid uptake by adipose tissue is increased making fatty acids unavailable for metabolism by the liver.

- d) Ketone oxidation by the brain is increased causing rapid clearance of ketone bodies from the plasma.
- e) Energy needs are decreased and can be met by hepatic gluconeogenesis eliminating the need for fatty acid oxidation
- 6) A young man with severe multiple trauma from a motorcycle accident was not fed during the ten days since his injury, because he was unconscious. Which of the following metabolic events are currently to be expected in this situation?
- a) Gluconeogenesis from fat increases
- b) Ketone body generation by muscle increases
- c) Ketone body consumption by brain increases
- d) Adipose tissue secretion of glycerol increases
- e) Glucagon levels decrease
- 7) A severely obese middle-aged man has been in the ICU for several days for the treatment of mechanical and burn injuries sustained in an airplane crash. He has been on intravenous fluids and glucose only since his accident. What changes of fat metabolism are likely to occur as a consequence of the massive stress response to the injuries?
- a) Lipolysis is increased
- b) Ketone body oxidation by the brain is increased
- c) Lipoprotein lipase activity is increased
- d) Ketone bodies inhibit gluconeogenesis from amino acids
- e) Ketone body production is decreased
- 8) A 23-year-old woman suffers a closed head injury, multiple contusions, and several long-bone fractures in a car accident. Compared to her metabolic state in health prior to the accident, which change in her metabolism are you most likely to expect?
- a) Increased hepatic gluconeogenesis
- b) Decreased lipolysis
- c) Decreased muscle proteolysis
- d) Increased ketone oxidation
- e) Hypoglycemia
- 9) In a patient who has been maintained for four days on only intravenous fluids following a right hemicolectomy, increased output of urinary urea is likely to be:
- a) Due to increased input of intravenous fluids
- b) Due to increased catabolism of body proteins
- c) A sign of early hepatic failure
- d) Due to post-operative release of anti-diuretic protein hormone
- e) Due to post-operative release of adrenal steroids
- 10) As a result of the metabolic response to major surgery, in the first two days after the operation:
- a) ADH secretion is suppressed
- b) Urinary excretion of creatinine is increased
- c) Production of urea is increased
- d) Gluconeogenesis is decreased
- e) Lipogenesis is increased
- 11) Starvation induces an increase in activity of the hepatic enzymes involved in:
- a) The hexose monophosphate shunt
- b) Lipogenesis

- c) Glycolysis
 - d) Gluconeogenesis
 - e) Albumin synthesis
- 12) In starvation, which of the following structures is capable of synthesizing large amounts of ketone bodies from fatty acids?
- a) Erythrocytes
 - b) Brain
 - c) Skeletal muscle
 - d) Liver
 - e) Kidney
- 13) In the first 2-3 days following major surgical operations:
- a) The rate of protein catabolism is decreased
 - b) Plasma cortisol is reduced
 - c) There is often hypoglycemia
 - d) Insulin secretion is reduced
 - e) Nitrogen balance is negative
- 14) A patient is found to have lost 5 kg during the first week following hip replacement surgery. In your nutritional assessment of this patient you have obtained the patient's history, and performed a physical examination. Which of the following is the most appropriate laboratory test to detect the presence of chronic malnutrition?
- a) Plasma iron level
 - b) Serum albumin concentration
 - c) Liver function tests
 - d) 24-hour urinary nitrogen
 - e) Serum electrolytes
- 15) You review the chart of an 80-year-old woman hospitalized after surgical treatment of a hip fracture. Laboratory investigations were carried out weekly since admission three weeks ago. Early protein-energy malnutrition would best be identified with which one of the following laboratory parameters?
- a) Serum transthyretin
 - b) Serum transferrin
 - c) Total serum protein
 - d) Total blood nitrogen
 - e) Urinary nitrogen
- 16) A patient with a severe burn injury has increased protein requirements that are influenced by a number of factors. Which of the following factors is LEAST likely to increase the amount of protein you will need to supply to burn patients in order to meet their protein needs?
- a) Initial lean body mass
 - b) Immobilization
 - c) Extent of burn injury
 - d) Superimposed infection
 - e) Quality of protein source
- 17) A 29-year-old woman with primary lipoprotein lipase deficiency is seen in your Florida clinic at week 9 of her first pregnancy. Her usual diet to control her severe hypertriglyceridemia provided a total fat intake ~10% of total calories. With pregnancy,

her serum triglycerides have increased dramatically. She was instructed to reduce her fat intake further to <2% of total calories. She should be monitored for deficiency of:

- a) Vitamins D2 and D3
- b) Omega-3 and omega-6 fatty acids
- c) Thiamin and riboflavin
- d) Calcium and iron
- e) Vitamin B12 and B6

Gastrointestinal #8 – Nutrition: Dietary Supplements

- 1) Your patient wants to take a dietary supplement to ease joint pain. Which should be your first step for evaluation of this supplement?
 - a) Weigh the benefit versus harm
 - b) Determine past supplement use
 - c) Review efficacy data
 - d) Define your question
 - e) Review safety data
- 2) A 46-year-old post-menopausal woman who has been evaluated for mild depression in the past is seen for her annual checkup. She reports that she is taking St. John's Wort and feels better than ever. Her chart indicates a family history of heart disease and diabetes. What is a good clinical question to ask in evaluating her use of this herb?
 - a) Should a post-menopausal woman take St. John's Wort for depression?
 - b) What are the safety concerns with taking herbal supplements such as St. John's Wort?
 - c) Does St. John's Wort work as well as drug therapy to treat mild depression in middle-aged women?
 - d) Does a family history of heart disease and diabetes preclude use of St. John's Wort?
 - e) Does St. John's Wort relieve symptoms of mild depression in post-menopausal women?
- 3) A healthy 45-year-old male with a strong family history of heart disease visits your clinic. He doesn't smoke, exercises almost every day, and wants to make sure he is getting enough vitamins and minerals. He brings the label from his daily supplement in with him. In which location would you find the best information to advise him?
 - a) DRI publications
 - b) The Dietary Guidelines
 - c) A literature search
 - d) Systematic review
 - e) A web search
- 4) A discrepancy in the effectiveness of a synthetic nutrient and a natural one is often due to differences in:
 - a) Bioavailability
 - b) Packaging
 - c) Safety
 - d) Side effects
 - e) Manufacturing
- 5) Which of the following people are most likely to have low folate intake?

- a) A teenager who enjoys pepperoni pizza, colas, and fast food
 - b) A vegetarian who eats boxed breakfast cereals twice a day
 - c) An athlete who drinks a lot of orange juice and likes legumes
 - d) An elderly woman who eats green vegetables from her garden
 - e) A newborn infant getting a soy-based infant formula
- 6) A 40-year-old man has followed a vegan diet, which contains no animal products, for 20 years. He is into natural, organic foods and does not take any supplements. He is at risk for which nutrient deficiency and corresponding adverse health outcome?
- a) Folate, homocysteinemia
 - b) Vitamin B12, anemia
 - c) Magnesium, hypertension
 - d) Niacin, pellagra
 - e) Iodine, goiter
- 7) A successful, but extremely busy career woman in early menopause consults you about taking a soy pill to alleviate her hot flashes and symptoms. Upon further questioning, you find she takes a daily multivitamin, a plant-based phytoestrogen, high-dose vitamin C, vitamin B complex, and melatonin. She skips many meals, or eats mostly fast food. Your PRIMARY concern is:
- a) Interaction of the supplements
 - b) Out-of-pocket expense
 - c) Neglect of healthful habits
 - d) Serious adverse effects
 - e) Poor absorption of some nutrients
- 8) In an elderly person, the most critical risk of excessive folate intake from supplements is:
- a) Neuropathy
 - b) Flushing
 - c) Vomiting
 - d) Anemia
 - e) Dehydration
- 9) A patient decides on her own to take a supplement that contains a nutrient amount above the RDA. This type of supplement use is MOST reasonable when there is:
- a) High level of evidence for minor benefits, lack of significant adverse effects
 - b) Preliminary evidence for some benefits, rare known significant adverse effects
 - c) Theoretical potential for long-term benefits, lack of significant adverse effects
 - d) Limited evidence of long-term benefits, rare significant adverse effects
 - e) Low level of evidence for major benefits, and clear likelihood of adverse effects
- 10) What criterion by itself would be sufficient for reasonable use of an herbal supplement?
- a) Less expensive than traditional medicine
 - b) Natural products are well tolerated
 - c) No reported risks with traditional use
 - d) Serious adverse effects are rare
 - e) Many people report benefits

- 11) Many people believe that nutrients consumed in excess of needs are simply excreted, but this does not hold true for:
- One of the fat-soluble vitamins
 - Most of the fat-soluble vitamins
 - Most of the water-soluble vitamins
 - All of the water-soluble vitamins
 - Most of the fat- and water-soluble vitamins
- 12) A 50-year-old woman takes a "healthy bones" dietary supplement she found on the Internet that contains synthetic chemicals with structures similar to glucosamine and chondroitin. You are familiar with research about glucosamine and chondroitin, so you can make the following assumption:
- The new supplement would achieve the same results because of similar chemical structures
 - The new supplement would not achieve the same results because the chemical structures are not identical
 - The new supplement would have the same action as long as it is easily absorbed
 - You can assume the new supplement is easily absorbed because it is in synthetic form
 - You cannot make any assumptions about the new supplement
- 13) The level of nutrient intake that is 2 standard deviations above the mean estimated need and will meet the needs of 97-98% of the healthy population is:
- Tolerable upper limit
 - Adequate intake
 - Estimated average requirement
 - Dietary reference intake
 - Recommended dietary allowance
- 14) The 50mg niacin daily that a 55-year-old man has been taking for a few months to improve his heart health exceeds the UL for niacin of 35mg. What is your concern about this level?
- Intakes in excess of the UL pose grave danger
 - Intakes above the UL exceed excretion capacity
 - Intakes above the UL may pose some risk
 - Intakes in excess of the UL are stored
 - Intakes even at the UL cause harm in half of users
- 15) Which of the following patients are at increased risk for low antioxidant intake?
- A 23-year-old college student following a vegetarian diet
 - A 75-year-old woman living in an assisted living facility
 - A 6-month-old breastfed infant who just started solid foods
 - A picky 10-year-old who doesn't like vegetables and fruit
 - A 6-year-old who won't drink milk
- 16) A teenager who is on a "no-fat" diet is at risk for deficiency of which vitamin?
- Vitamin E
 - Vitamin C
 - Folate
 - Riboflavin

- e) Pantothenate
- 17) Taking excessive quantities of antioxidants can cause increased production of:
- a) Free radicals
 - b) Platelets
 - c) Vitamin K
 - d) Nitric oxide
 - e) Homocysteine
- 18) A 65-year-old woman with hypertension, mild depression, and a history of stroke wants to take a high dose vitamin E supplement. What is your PRIMARY concern?
- a) Long half-life in circulation at her age
 - b) Excessive out-of-pocket expense
 - c) Neglect of healthful habits
 - d) Excess storage
 - e) Potential adverse effects
- 19) Two of your patients have started taking a hypothetical new "cholesterol-lowering turnip extract" and indeed, cholesterol levels dropped. In a Medline search, you find 2 animal studies showing a beneficial effect on cholesterol levels, case-control studies indicating that people with lower cholesterol levels are larger quantities of turnips, and 1 clinical trial that showed no statistically significant effect. A new patient with high cholesterol asks what they should do. You should tell them:
- a) The evidence is against the efficacy; do not take the supplement
 - b) The evidence is inconclusive; do not take the supplement
 - c) There is conflicting evidence; but it wouldn't hurt to try it
 - d) The evidence is promising; take the supplement
 - e) There is not enough evidence to make a decision
- 20) In evaluating efficacy of a supplement, which of the following types of studies provides the highest level of evidence?
- a) In vitro studies
 - b) Prospective cohort studies
 - c) Ecological studies
 - d) Animal studies
 - e) Case reports
- 21) The most closely regulated aspect of a dietary supplement is:
- a) Efficacy
 - b) Purity
 - c) Composition
 - d) Label
 - e) Ingredient amounts
- 22) Dietary supplement labels in the U.S. MUST provide the following type of information:
- a) Purity
 - b) Composition
 - c) Efficacy
 - d) Activity
 - e) Ingredients

- 23) To gather unbiased data on a supplement, which of the following is most likely to be the BEST source?
- a) The drug information center at a local hospital
 - b) The supplement manufacturer
 - c) The health section of the newspaper
 - d) A search on Medline
 - e) A book on supplements
- 24) A 65-year-old male newly diagnosed with Alzheimer's disease and his wife visit your clinic. He is reluctant to take medication that may slow the progression of the disease and would rather take ginkgo biloba as a natural alternative. You are most likely to find reliable information in which location?
- a) DRI publication
 - b) The Dietary Guidelines
 - c) A literature search
 - d) Alzheimer's website
 - e) Systematic review
- 25) The mother of an overweight teenager wants to introduce dietary changes that will help him lose weight. He consumes two glasses of milk with every meal and regularly snacks on cheese. She plans to reduce his caloric intake by limiting him to two glasses of milk per day, offering diet sodas in place of the extra milk, and cutting out the cheese. What concerns, if any, do you have regarding the new diet plan?
- a) The new diet plan increases the risk of protein deficiency
 - b) The new diet plan increase the risk of phosphate deficiency
 - c) The new diet plan increases the risk of calcium deficiency
 - d) The new diet plan still has too many servings of dairy products per day
 - e) The new diet plan will be fine if the boy increase his exposure to the sun
- 26) Your patient brings you a dietary supplement prepared by extracting foods and asks whether it is as good as the food itself. You tell her that the supplement manufacturing process:
- a) May concentrate harmful substances from the whole food and pose a risk
 - b) Is regulated like food and is safe
 - c) Retains the active ingredients from the food and provides similar benefits
 - d) Compacts only the active components into a small dose and provides better benefits
 - e) Distills out the harmful substances from the whole food to reduce risks
- 27) In what product category is orange juice with calcium?
- a) Modified food
 - b) Functional food
 - c) Nutritional supplement
 - d) Dietary supplement
 - e) Health food
- 28) Functional food are foods that:
- a) Are needed for the body to perform specific function
 - b) Provide 100% of the RDA for a specific nutrient
 - c) Provide adequate levels of beneficial compounds
 - d) Contain added nutrients, metabolites, or botanicals

- e) Contain botanicals with drug-like actions
- 29) Which is the BEST question to determine whether a patient is getting a potential harmful excess of nutrients from a dietary supplement?
- a) Do you take any nutrient or herbal supplements, such as vitamin C or St. John's Wort?
 - b) Do you use any ergogenic aids, such as creatine?
 - c) Do you take dietary supplements?
 - d) Do you take a multivitamin supplement, the once-a-day kind of thing?
 - e) Do you take any non-prescription medication, such as herbal laxatives?
- 30) Why should you ask patients about their use of dietary supplements?
- a) To avoid wasting their money and time on ineffective products
 - b) To ensure what they are taking is beneficial
 - c) To protect them from false hope
 - d) To promote science over alternative medicine
 - e) To identify potential health risks or drug interactions
- 31) Which of the following people is MOST likely to respond to the question, do you take any supplements in gel form?
- a) An elderly person
 - b) An athlete
 - c) A pregnant woman
 - d) An infant's mother
 - e) A heart patient
- 32) What is the most likely mechanism whereby creatinine improves exercise performance involving repeated bouts of intense muscle contraction?
- a) By increasing muscle size
 - b) By increasing glucose metabolism
 - c) By increasing oxygen utilization
 - d) By increasing recovery time
 - e) By increasing muscle energy stores
- 33) A very thin, physically active 35-year-old female is having trouble keeping weight on and wants to know if a dietary supplement would help. A literature search finds one randomized, double-blind, placebo-controlled trial, where 59 college students enrolled in a weight-lifting course received either a new ergogenic aid or a placebo. Strength did not appear to be changed, but female weight lifters had a significant increase in body weight; no change occurred in males. What can you conclude?
- a) Evidence is preliminary, do not recommend supplementation
 - b) Evidence is conflicting since males were not affected; do not supplement
 - c) Evidence supports increase in body weight; take the supplement
 - d) Evidence for weight gain may not apply to her; do not supplement
 - e) Evidence is strong that weight in females increases; recommend the supplement
- 34) An 18-year-old boy who weights 60kg wants to build his upper-body strength. He plans to increase his protein intake by consuming 2 eggs, 4 cups (960mL) of milk, and 10oz (300g) of meat, fish, or poultry each day. He also plans to consume a protein shake with every meal. To ensure enough energy for his workouts, he will also increase his

daily carbohydrate intake by 400g. Evaluate his diet for thiamin, riboflavin, and protein. What imbalances, if any, do you detect?

- a) His diet is appropriate for weight training
 - b) His diet contains excess thiamin
 - c) His diet contains excess protein
 - d) His diet contains excess riboflavin
 - e) His diet contains insufficient protein to build muscle
- 35) Which of the following parameters is part of the information needed to calculate risk?
- a) Most common side effect
 - b) Total number of people taking the supplement
 - c) Extent of benefit
 - d) Number of people with no side effect
 - e) Time interval before side effect appear
- 36) Which of the following statement best describes the calculated risk for a particular supplement?
- a) 2% of people taking it developed light sensitivity at 2 weeks
 - b) Even one time use is likely to cause diarrhea in some people
 - c) Only a few people will develop an adverse effect with use
 - d) Some of the 10 people taking it developed severe headaches
 - e) Two out of 75 people taking it complained
- 37) The manufacturing of supplements is regulated by:
- a) Dietary Supplement Health Education Act (DSHEA)
 - b) Office of Dietary Supplements
 - c) Institute of Medicine Dietary Reference Intakes
 - d) U.S. Pharmacopeia
 - e) Good Manufacturing Practices (GMP) for foods
- 38) The BEST reason for recommending a synthetic supplement over increased consumption of a food containing the nutrient in question would be:
- a) Foods alone are unlikely to cover needs
 - b) No change in dietary habits required
 - c) Allergies to one or more foods
 - d) An overall dietary imbalance
 - e) It's less likely to cause weight gain
- 39) Which claim would be allowed on a supplement label?
- a) Reduces heart disease
 - b) Cures arthritis
 - c) Needed for energy metabolism
 - d) Prevents osteoporosis
 - e) Slows aging
- 40) Which of the following examples is likely to be an appropriate situation for vitamin D supplementation?
- a) A 76-year-old woman with poor appetite
 - b) A 6-year-old girl who drinks a lot of milk
 - c) A formula-fed infant
 - d) A 65-year-old health conscious man who likes fatty fish
 - e) A pregnancy woman taking a prenatal supplement

- 41) Which of the following examples is likely to be an appropriate situation for iron supplementation?
- a) A tired businessman
 - b) An occasional vegetarian
 - c) A weight-lifter
 - d) An elderly woman
 - e) A pregnant teenager
- 42) A young girl experiences severe fat malabsorption due to cystic fibrosis. You are most concerned about her nutritional status related to the absorption of which mineral?
- a) Selenium
 - b) Zinc
 - c) Iron
 - d) Calcium
 - e) Phosphate
- 43) Homocysteinemia can result from a deficiency of which two vitamins?
- a) Niacin and folate
 - b) Vitamin B12 and folate
 - c) Vitamin B12 and vitamin C
 - d) Pantothenate and niacin
 - e) Pantothenate and vitamin C
- 44) Which water-soluble vitamin functions as an antioxidant and is also critical for collagen formation?
- a) Folate
 - b) Vitamin C
 - c) Riboflavin
 - d) Vitamin B6
 - e) Biotin
- 45) A common cause of poisoning in children is due to:
- a) Zinc
 - b) Calcium
 - c) Magnesium
 - d) Iron
 - e) Sodium
- 46) What mineral plays a role in energy production in mitochondria, antioxidant defense, iron metabolism, catecholamine formation, and cross-linking of collagen and elastin?
- a) Potassium
 - b) Phosphate
 - c) Copper
 - d) Magnesium
 - e) Selenium
- 47) What health consequences are due to zinc deficiency?
- a) Cardiomyopathy, Keshan disease
 - b) Cirrhosis, hepatosplenomegaly
 - c) Hypertension, irregular heartbeat
 - d) Growth retardation, immune dysfunction, impaired taste
 - e) Impaired brain function, liver damage

48) What is a nutrient that can be synthesized by the body, but becomes essential during pregnancy and the first year of life?

- a) Alpha-carotene
- b) Molybdenum
- c) Choline
- d) Serine
- e) Ascorbic acid

Gastrointestinal #9 – Microbiology: Oral Cavity & Bacterial Infections

1) Which of the following is a facultative anaerobe, can metabolize sucrose to lactic acid, and is sometimes stained in thioglycollate broth (THIO) culture?

- a) *Actinomyces viscosus*
- b) *Candida albicans*
- c) *Fusobacteria* spp.
- d) *Bacteroides* spp
- e) *Streptococcus mutans*

2) Which of the following is NOT a risk factor for oral candidiasis (thrush)?

- a) Newborns
- b) HIV patients
- c) Elderly patients
- d) Patients who have been recently intubated
- e) Patients on broad-spectrum antibiotics

3) Which of the following is a recommended first-line therapy for an HIV patient found to have Gram-positive oral budding yeast?

- a) No treatment necessary
- b) *Acidophilus* capsules
- c) Unsweetened yogurt
- d) Oral nystatin or clotrimazole
- e) IV fluconazole and amphotericin B

4) Dental plaque forms mostly from what dietary component?

- a) Fiber
- b) Carbohydrates
- c) Fats
- d) Proteins
- e) Basic liquids

5) What is the most common cause of dental plaque?

- a) *Actinomyces viscosus*
- b) *Candida albicans*
- c) *Fusobacteria* spp.
- d) *Bacteroides* spp
- e) *Streptococcus mutans*

6) In dental caries, bacteria produce lactic acid that begins to destroy tooth enamel.

Which of the following is NOT a risk factor for the progression of dental caries?

- a) Methamphetamine use
- b) Xerostomia
- c) Excessive intake of tap water

- d) Sugar intake (e.g. infants and juice)
 - e) Poor dental hygiene
- 7) Which of the following is NOT commonly seen in periodontal disease?
- a) *Actinomyces viscosus*
 - b) *Candida albicans*
 - c) *Actinobacillus* spp.
 - d) *Bacteroides* spp
- 8) Which of the following is NOT a clinical sign of periodontal disease?
- a) Trismus
 - b) Gingivitis
 - c) Bleeding gums
 - d) Halitosis
 - e) Loose teeth

Gastrointestinal #10 – Microbiology: GI Tract Infections & Whipple Disease

- 1.1) A patient develops diarrhea within 4 hours of eating a meal containing cream and meat. Which of the following is most likely?
- a) *S. aureus*
 - b) *C. perfringens*
 - c) *C. botulinum*
 - d) *B. cereus*
 - e) Rotavirus
- 1.2) Which of the following is most associated with fried rice that has been sitting in a warmer, such as at a Chinese food buffet?
- a) *S. aureus*
 - b) *C. perfringens*
 - c) *C. botulinum*
 - d) *B. cereus*
 - e) Rotavirus
- 1.3) A child presents with cramps, fever, and bloody diarrhea. Which of the following is most likely?
- a) *Salmonella* spp.
 - b) *E. coli*
 - c) *Shigella* spp.
 - d) *V. cholera*
 - e) *V. parahaemolyticus*
- 2) Which of the following is known incorrectly by some as the “stomach flu” and is characterized by GI symptoms including nausea, vomiting, diarrhea, and abdominal discomfort?
- a) Gastroenteritis
 - b) Diarrhea
 - c) Dysentery
 - d) Enterocolitis
 - e) Influenza

3.1) Lab cultures of bacteria show yellow colonies on thiosulfate citrate bile salts sucrose (TCBS) medium. The bacteria are highly motile, NaCl tolerant, oxidase positive, and a facultative anaerobe. Which of the following is most likely?

- a) *E. coli*
- b) *Salmonella*
- c) *Campylobacter*
- d) Cholera
- e) *Shigella*

3.2) Lab cultures of bacteria show Gram-negative motile rods that are oxidase negative, do not ferment lactose, but produce H₂S acid. Which of the following is most likely?

- a) *E. coli*
- b) *Salmonella*
- c) *Campylobacter*
- d) Cholera
- e) *Shigella*

3.3) A Gram-negative rod bacteria shows pink to purple colonies on sorbitol MacConkey (SMAC) agar and deep purple to black on EMB agar, due to lactose fermentation. The bacteria are also found to be indole positive, turning the agar red due to tryptophan breakdown. Which of the following is most likely?

- a) *E. coli*
- b) *Salmonella*
- c) *Campylobacter*
- d) Cholera
- e) *Shigella*

3.4) Lab cultures show Gram-negative, non-motile, rods growing on MacConkey agar. They are facultative anaerobes, non-fastidious, non-lactose fermenters, and H₂S negative. Testing also shows the presence of pus and blood. Which of the following is most likely?

- a) *E. coli*
- b) *Salmonella*
- c) *Campylobacter*
- d) Cholera
- e) *Shigella*

3.5) Lab cultures show Gram-negative, S-shaped rods (“seagull wings”) that are oxidase positive and demonstrate “water drop” colonies. The bacteria also grow at 42C. Which of the following is most likely?

- a) *E. coli*
- b) *Salmonella*
- c) *Campylobacter*
- d) Cholera
- e) *Shigella*

4) Secretory IgA as a microbe defense mechanism is seen in which of the following locations?

- a) Mouth
- b) Esophagus
- c) Stomach
- d) Small intestine

- e) Large intestine
- 5.1) A child presents with bloody diarrhea and no fever. History reveals they were recently at a petting zoo. The clinician suspects serotype O157:H7. Which of the following is most likely?
- a) EPEC: Enteropathogenic *E. coli*
 - b) ETEC: Enterotoxigenic *E. coli*
 - c) EHEC: Enterohemorrhagic *E. coli*
 - d) EIEC: Enteroinvasive *E. coli*
 - e) EAEC: Enteroaggregative *E. coli*
 - f) DAEC: Diffuse aggregative *E. coli*
- 5.2) A man with poor hygiene presents with shigella-like symptoms (profuse diarrhea, high fever). History reveals no animal contact. Which of the following is most likely?
- a) EPEC: Enteropathogenic *E. coli*
 - b) ETEC: Enterotoxigenic *E. coli*
 - c) EHEC: Enterohemorrhagic *E. coli*
 - d) EIEC: Enteroinvasive *E. coli*
 - e) EAEC: Enteroaggregative *E. coli*
- 5.3) Which of the following produces LT enterotoxin, ST enterotoxin, is the leading cause of diarrhea in children in the developing world, and is the most common cause of traveler's diarrhea?
- a) EPEC: Enteropathogenic *E. coli*
 - b) ETEC: Enterotoxigenic *E. coli*
 - c) EHEC: Enterohemorrhagic *E. coli*
 - d) EIEC: Enteroinvasive *E. coli*
 - e) EAEC: Enteroaggregative *E. coli*
 - f) DAEC: Diffuse aggregative *E. coli*
- 5.4) Which of the following produces an alpha hemolysis and cytotoxic factor 1?
- a) EPEC: Enteropathogenic *E. coli*
 - b) ETEC: Enterotoxigenic *E. coli*
 - c) EHEC: Enterohemorrhagic *E. coli*
 - d) EIEC: Enteroinvasive *E. coli*
 - e) EAEC: Enteroaggregative *E. coli*
 - f) DAEC: Diffuse aggregative *E. coli*
- 5.5) What is the virulence factor for EPEC (Enteropathogenic *E. coli*)?
- a) Adhesin
 - b) Fimbriae
 - c) LT enterotoxin
 - d) ST enterotoxin
 - e) Capsule
- 5.6) A patient presents with watery diarrhea and no fever. She has had no animal contact recently. Tissue culture shows cells making a "stacked brick" formation. Which of the following is most likely?
- a) EPEC: Enteropathogenic *E. coli*
 - b) ETEC: Enterotoxigenic *E. coli*
 - c) EHEC: Enterohemorrhagic *E. coli*
 - d) EIEC: Enteroinvasive *E. coli*

- e) EAEC: Enteroaggregative E. coli
 - f) DAEC: Diffuse aggregative E. coli
- 6) Which of the following is associated with hemolytic-uremic syndrome (HUS), which can cause acute renal failure, anemia, and thrombocytopenia?
- a) EPEC: Enteropathogenic E. coli
 - b) ETEC: Enterotoxigenic E. coli
 - c) EHEC: Enterohemorrhagic E. coli
 - d) EIEC: Enteroinvasive E. coli
 - e) EAEC: Enteroaggregative E. coli
 - f) DAEC: Diffuse aggregative E. coli
- 7) Which of the following can be mainly found in undercooked meat, in some domestic animals (dogs, cats), and in reptile feces (turtles, lizards) which led to the Four-Inch Law enacted by the FDA in 1975 regarding the sale of turtles shorter than 4 inches in length?
- a) E. coli
 - b) Salmonella
 - c) Campylobacter
 - d) Cholera
 - e) Shigella
- 8.1) What sequela can occur in sickle cell patients who become infected with salmonella?
- a) Cerebral edema
 - b) Hemoptysis
 - c) Vascular emboli
 - d) Osteomyelitis
 - e) Acute renal failure
- 8.2) A patient presents with fever and malaise. They have Rose Spots on the upper abdomen, which are erythematous maculopapular lesions that blanch on pressure. Which of the following is most likely?
- a) *Salmonella enterica*
 - b) *Salmonella choleraesuis*
 - c) *Salmonella typhi*
 - d) *Salmonella bongori*
- 9) Chronic carriers of salmonella, including women and elderly, may need to have surgery involving what organ as it is a common site of infection?
- a) Spleen
 - b) Liver
 - c) Gallbladder
 - d) Pancreas
 - e) Lungs
- 10) What is the pathogenic factor involved in Campylobacter species?
- a) Cell invasion
 - b) Inflammatory response
 - c) LT enterotoxin
 - d) ST enterotoxin
 - e) Inhibits acetylcholine
- 11) Which of the following tests can differentiate Campylobacter species from other enteric bacteria?

- a) Cause bloody diarrhea
 - b) Gram stain
 - c) Growth at 42 degrees
 - d) H₂S production
 - e) Urea breath test
- 12) Now the number one food borne illness in the United States, this corkscrew-shaped bacterium is transmitted normally through contaminated water and undercooked meat.
- a) E. coli
 - b) Salmonella
 - c) Campylobacter
 - d) Shigella
- 13) Cholera (*Vibrio cholerae*) has a history of causing:
- a) Epidemics only
 - b) Being endemic
 - c) Pandemics only
 - d) Epidemics and pandemics
 - e) All of the above
- 14) Which of the following locations is cholera most likely to be found?
- a) Bear meat in the United States
 - b) Mosquitoes in sub-Saharan Africa
 - c) Air conditioning systems
 - d) Ice cubes in a Latin American country
 - e) Well water in a third world country
- 15) What biotype of cholera arose in India in 1992 when it acquired a capsular antigen via horizontal gene transfer, leading to the 8th pandemic strain?
- a) V. cholera O1 classical
 - b) V. cholera O139
 - c) V. cholera O1 E1 Tor
- 16) Which of the following is NOT true of the V. cholera O1 E1 Tor biotype, when compared with the O1 classical biotype?
- a) Responsible for 7th pandemic
 - b) Has a higher rate of carriers
 - c) Causes more severe diarrhea
 - d) Carriage is more prolonged
 - e) Survives better in the environment
- 17) What is the mechanism of action for cholera (cholera toxin)?
- a) Increases cAMP through G_s activation
 - b) Increases cAMP through G_i inactivation
 - c) Inhibits protein synthesis through EF-2
 - d) Inhibits protein synthesis through 60S ribosome
 - e) Blocks acetylcholine release through synaptobrevin cleavage
- 18) What is the principle treatment for cholera?
- a) Chloramphenicol
 - b) Furazolidone
 - c) Doxycycline
 - d) Cotrimoxazole

- e) Oral rehydration
- 19) Which form of shigella is the mildest?
- a) *S. boydii*
 - b) *S. dysenteriae*
 - c) *S. flexneri*
 - d) *S. sonnei*
- 20) Shigella can be transmitted with fewer than 10 organisms present. Which of the following is NOT a common location for shigella to be transmitted?
- a) Mental institution
 - b) University
 - c) Prison
 - d) Day care
- 21) Which of the following forms of shigella produces an ST toxin that invades the mucosal epithelium of the distal ileum and colon, causing inflammation and ulcerations (thus PMNs and RBCs in the stool)?
- a) *S. boydii*
 - b) *S. dysenteriae*
 - c) *S. flexneri*
 - d) *S. sonnei*
- 22.1) A patient presents with watery diarrhea. History reveals he recently ate at an expensive restaurant with business partners. They had ordered a chilled shellfish platter including raw oysters. Lab studies show curved rods that grow on thiosulfate citrate bile salts sucrose (TCBS) medium. Which of the following is most likely?
- a) *C. perfringens*, A strains
 - b) *C. perfringens*, C strains
 - c) *S. dysenteriae*
 - d) *Y. enterocolitica*
 - e) *V. parahaemolyticus*
- 22.2) An infant from Minnesota presents with signs of appendicitis. History reveals the child become ill after contact with local farm animals. Colonoscopy shows necrosis of Peyer patches. Mesenteric adenitis is palpated. Testing shows Gram-negative, urease negative, oxidase negative, non-lactose fermentors that grow at 4-degrees. Which of the following is most likely?
- a) *C. perfringens*, A strains
 - b) *C. perfringens*, C strains
 - c) *S. dysenteriae*
 - d) *Y. enterocolitica*
 - e) *V. parahaemolyticus*
- 23) A patient presents with abdominal pain and diarrhea. Labs show Gram-positive rods, hemolytic colonies, and lectithinase production in the Nalger test. The clinician suspects a possible infection with *C. perfringens*. How did this patient most likely get this illness?
- a) Petting zoo
 - b) Undercooked meat
 - c) Tick bite
 - d) From their child
 - e) Household pet

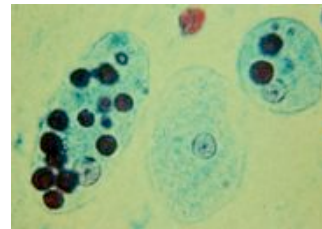
- 24) A nursing home patient undergoing a long course of clindamycin therapy develops green, mucoid diarrhea. Pseudomembranous colitis is suspected. What bacterium is allowed to multiply when the normal gut flora is inhibited by the antibiotic?
- a) *S. aureus*
 - b) *B. cereus*
 - c) *C. difficile*
 - d) *C. perfringens*
 - e) *S. enterica*
- 25) Which of the following has a slow-acting diarrhea toxin associated with undercooked chicken and a quick-acting emetic toxin associated with fried rice?
- a) *B. cereus*
 - b) *S. aureus*
 - c) *C. botulinum*
 - d) *C. perfringens*
- 26) Which of the following is most associated with rotavirus, not norovirus (Norwalk)?
- a) Cruise ships
 - b) Older children
 - c) Infants
 - d) Adults
- 27) A patient presents with watery diarrhea and vomiting. The patient says he just came from a church picnic where he ate potato salad, salted meat, and pastries. Which of the following is most likely?
- a) *Staphylococcus aureus*
 - b) *Bacillus cereus*
 - c) *Clostridium difficile*
 - d) *Clostridium perfringens*
 - e) *Helicobacter pylori*
- 28) An infant presents to the Emergency Department with inability to move. History reveals the mother gave the infant honey as a treat. Labs show Gram-positive rods that grow on blood agar. Which of the following is NOT an initial treatment option?
- a) Mechanical ventilation
 - b) Anti-toxin administration
 - c) Immunization booster shot
 - d) Gastric lavage
 - e) Antibiotics
- 29) A patient presents with stomach pain. Labs from an EGD show comma-shaped (spiral) bacteria. The patient also has a positive urea breath test. Which of the following is most likely?
- a) *Staphylococcus aureus*
 - b) *Bacillus cereus*
 - c) *Listeria monocytogenes*
 - d) *Clostridium perfringens*
 - e) *Helicobacter pylori*
- 30) Which of the following is a major concern when a patient is found to have *H. pylori*?
- a) Myocardial infarction
 - b) Gastric cancer

- c) Dark, tarry stools
 - d) Epigastric pain
 - e) Pneumonia
- 31) A patient presents with mild influenza-like symptoms. Testing shows Gram-positive coccobacilli that tumble and are beta hemolytic. History reveals she recently had unpasteurized milk and soft cheese. Labs show the bacteria grow at 4-degrees. The clinician performs a pregnancy test, as the bacteria can cause stillbirth. Which of the following is most likely?
- a) *Staphylococcus aureus*
 - b) *Bacillus cereus*
 - c) *Listeria monocytogenes*
 - d) *Clostridium perfringens*
 - e) *Helicobacter pylori*
- 32) A patient presents with arthralgia, diarrhea, and weight loss. Whipple disease is suspected. What diagnostic test can be done to show the presence of *Tropheryma whippelii*?
- a) Urea breath test
 - b) PPD skin test
 - c) Congo red stain
 - d) PAS test
 - e) Growth at 42-degrees

Gastrointestinal #11 – Microbiology: Parasitic Infections

1) A camper presents with bloody diarrhea. Lab testing shows nucleated cysts in the stool (see image). The patient is started on metronidazole followed by iodoquinol. Which of the following is most likely?

- a) *Isospora belli*
- b) *Cryptosporidium parvum*
- c) *Cyclospora cayetanensis*
- d) *Entamoeba histolytica*
- e) *Giardia lamblia*
- f) *Balantidium coli*





2) A hiker presents with foul-smelling, mushy stools. History reveals the hiker drank water from a stream near a beaver dam. Testing shows steatorrhea and the protozoa shown, which the physician says looks like a horseshoe crab. Which of the following is most likely?

- a) *Isospora belli*
- b) *Cryptosporidium parvum*
- c) *Cyclospora cayetanensis*
- d) *Entamoeba histolytica*
- e) *Giardia lamblia*
- f) *Balantidium coli*



3) A boar-hunter presents with abdominal pain, tenesmus, nausea, and watery stools with blood and pus. Lab testing shows cysts and trophi that have a large “sausage shaped” macronucleus. Which of the following is most likely?

- a) *Isospora belli*

- b) *Cryptosporidium parvum*
 c) *Cyclospora cayetanensis*
 d) *Entamoeba histolytica*
 e) *Giardia lamblia*
 f) *Balantidium coli*
- 4) An young male patient presents with malabsorption syndrome including loose, foul smelling stools, weight loss, and malaise. History reveals oral-anal sexual contact (anilingus) with a male friend. Blood test show the patient is HIV positive. Further testing shows acid fast oocysts (shown). Which of the following is most likely?
- a) *Isospora belli*
 b) *Cryptosporidium parvum*
 c) *Cyclospora cayetanensis*
 d) *Entamoeba histolytica*
 e) *Giardia lamblia*
 f) *Balantidium coli*
- 
- 5) An AIDS patient presents with complaints of up to 50 watery stools per day. Lab testing shows protozoa that are resistant to chlorine and are acid fast with modified Ziehl-Neelsen stain. Which of the following is most likely?
- a) *Isospora belli*
 b) *Cryptosporidium parvum*
 c) *Cyclospora cayetanensis*
 d) *Entamoeba histolytica*
 e) *Giardia lamblia*
 f) *Balantidium coli*
- 6) A transplant patient presents with prolonged diarrhea. History reveals she was on a recent trip to Guatemala and ate raspberries at a local market. Testing shows acid fast oocysts (shown) with Kinyoun stain. Which of the following is most likely?
- a) *Isospora belli*
 b) *Cryptosporidium parvum*
 c) *Cyclospora cayetanensis*
 d) *Entamoeba histolytica*
 e) *Giardia lamblia*
 f) *Balantidium coli*
- 
- 7) After a camping trip to Mexico, a patient visits her doctor complaining of loose stools and abdominal cramps. The patient describes the stools as having flecks of blood and lots of mucus. The doctor orders a stool specimen in which she finds motile ameba with ingested RBCs. She starts the patient on metronidazole and considers a CT scan to detect any liver abscesses. Which of the following is most likely?
- a) *Isospora belli*
 b) *Cryptosporidium parvum*
 c) *Cyclospora cayetanensis*
 d) *Entamoeba histolytica*
 e) *Giardia lamblia*
 f) *Balantidium coli*
- 8) An HIV patient becomes alarmed after developing a persistent diarrhea. He tells his physician that the diarrhea is watery and without blood. After learning the patient visited

a vacation farm before the diarrhea started, the doctor orders an acid-fast stain of the patient's stool sample. The stain shows oocysts with four motile sporozoites. Which of the following is most likely?

- a) *Isospora belli*
- b) *Cryptosporidium parvum*
- c) *Cyclospora cayetanensis*
- d) *Entamoeba histolytica*
- e) *Giardia lamblia*
- f) *Balantidium coli*

9) A student cuts short an extended backpacking trip in Yosemite Park after developing diarrhea. He explains to his doctor that the diarrhea is non-bloody but smells very bad. On further questioning, the student tells his doctor that he has been drinking water from a fresh water spring. The patient appears malnourished on physical exam. A diarrhea sample reveals 2-nuclei motile ameba with tear-drop shape and 4 pairs of flagella. The patient is given metronidazole. Which of the following is most likely?

- a) *Isospora belli*
- b) *Cryptosporidium parvum*
- c) *Cyclospora cayetanensis*
- d) *Entamoeba histolytica*
- e) *Giardia lamblia*
- f) *Balantidium coli*

10) A traveler presents with bloody diarrhea. Initial testing reveals a *Giardia* infection. Stool examination reveals Charcot-Leyden crystals and eggs (shown). Mebendazole is given and the clinician does an examination for possible rectal prolapse. Which of the following is most likely?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)



11) A South Carolina woman visits her doctor after developing diarrhea. The doctor performs a blood test and finds elevated eosinophils. Suspecting a parasite infection, the doctor examines a stool sample involving the Baermann funnel gauze method. After finding hatched larvae but no eggs, the doctor solidifies a diagnosis upon learning that the patient frequently walks around her house barefoot. The patient is started on thiabendazole to cure the symptoms as well as prevent complications such as peritonitis. Which of the following is most likely?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)

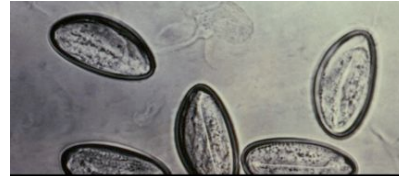
12) A man in Louisiana develops coughing, fever, and abdominal pain. His doctor orders a series of X-rays, which show pulmonary infiltrates characteristic of pneumonia as well as intestinal images consistent with obstruction. On CBC, the patient has increased eosinophils. The doctor examines a stool sample from the patient and discovers

microscopic oval eggs with rough surfaces (knobby-coated). The doctor makes a diagnosis, administers pyrantel pamoate, and forewarns the patient to expect worms in his stool. Which of the following is most likely?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)

13) A mother brings her child to a developmental specialist. She is concerned because of what she considers “negative” behavior. When asked to elaborate, she explains that her child scratches his anal region continuously, even in public places. Indeed, even his kindergarten teacher mentioned it in the last parent-teacher meeting. Before pursuing psychological studies, the specialist recommends a “Scotch tape” test based on past cases with similar complaints. Lab tests reveal eggs (shown). The entire family is stated on drug therapy. Which of the following is most likely?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)



14) A child from a small Alabama community presents with severe weakness and pallor. A CBC shows reduced hematocrit with hypochromic microcytic RBCs as well as increased eosinophils. To investigate the possibility of parasites, the physician orders a stool sample in which she finds numerous eggs. The physician prescribes mebendazole and iron tablets and explains that the child may have acquired the illness by walking barefoot. The helminth likely traveled through the foot into the lymph then into the blood then lungs and finally into the GI tract after coughing and swallowing. Which of the following is most likely?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)

15) A businessman presents with abdominal cramping, nausea, and vomiting after a trip to Scandinavia. History reveals he ate raw gefilte fish. Physical exam shows paresthesia and decreased vibration sensation. Further testing is diagnostic for fish tapeworm (*Diphyllobothrium latum*). What deficiency and complication has likely occurred in this patient?

- a) Iodine deficiency, goiters
- b) Vitamin C deficiency, scurvy
- c) Vitamin B12 deficiency, megaloblastic anemia
- d) Thiamin deficiency, beri beri
- e) Vitamin A deficiency, night blindness

16) A Vietnamese immigrant of 10 years presents with severe headaches and seizures. A physical exam reveals several nodules across her body. Concerned about a neurological disease, the doctor first orders a head CT scan that shows several calcified cysts. This

observation, along with high eosinophils on CBC, prompts the doctor to perform a biopsy of a nodule. A diagnosis is made after the doctor finds cysts in the nodule, and the patient is begun immediately on praziquantel and steroids. Which of the following is most likely?

- a) Trichinosis (*Trichinella spiralis*)
- b) Dog tapeworm (*Echinococcus granulosus*)
- c) Pork tapeworm (*Taenia solium*)
- d) Beef tapeworm (*Taenia saginata*)
- e) Fish tapeworm (*Diphyllobothrium latum*)

17) A pig farmer visits his doctor with muscle aches, fever, and periorbital and facial edema. These symptoms were preceded 2 weeks earlier by an upset stomach and diarrhea. Further history reveals the patient eats bear meat. Blood labs show eosinophilia, increased IgE, and muscle enzymes. Because the symptoms are not severe, the doctor opts not to perform a muscle biopsy. However, if she had performed the biopsy, she would have expected to find cysts. Which of the following is most likely?

- a) Trichinosis (*Trichinella spiralis*)
- b) Dog tapeworm (*Echinococcus granulosus*)
- c) Pork tapeworm (*Taenia solium*)
- d) Beef tapeworm (*Taenia saginata*)
- e) Fish tapeworm (*Diphyllobothrium latum*)

18) A cow rancher arrives in the Emergency Department terrified after discovering a worm-like structure protruding from his anus. After reassuring the man and taking a proper history and physical, the doctor examines a stool sample. As expected, the doctor finds rectangular proglottid segments with the naked eye and uses a low-power microscope to detect eggs. The doctor prescribes niclosamide and a cathartic, confident that the patient will be cured with a single dose. The doctor also instructs the patient to avoid poorly cooked beef in the future. Which of the following is most likely?

- a) Trichinosis (*Trichinella spiralis*)
- b) Dog tapeworm (*Echinococcus granulosus*)
- c) Pork tapeworm (*Taenia solium*)
- d) Beef tapeworm (*Taenia saginata*)
- e) Fish tapeworm (*Diphyllobothrium latum*)

19) A shepherd presents with abdominal discomfort. The discomfort begins as a mild sensation in the RUQ but has become progressively more painful. Physical exam reveals hepatomegaly. The doctor decides to perform an abdominal CT, which shows a large circular mass in the liver with multiple daughter cysts encapsulated by “eggshell” calcifications. Serology, but not stool samples, is used to make a diagnosis. The doctor elects to surgically remove the mass but first neutralizes the cyst contents by injecting ethanol. Which of the following is most likely?

- a) Trichinosis (*Trichinella spiralis*)
- b) Dog tapeworm (*Echinococcus granulosus*)
- c) Pork tapeworm (*Taenia solium*)
- d) Beef tapeworm (*Taenia saginata*)
- e) Fish tapeworm (*Diphyllobothrium latum*)

20) Which of the following can be diagnosed with the “string-test” that involves the patient swallowing a long string and then pulling out larvae that were contained in the duodenum?

- a) Pinworm (*Enterobius vermicularis*)
- b) Roundworm (*Ascaris lumbricoides*)
- c) Whipworm (*Trichuris trichiura*)
- d) Hookworm (*Necator americanus*)
- e) Threadworm (*Strongyloides stercoralis*)

21) Which of the following is true of bacillary (Shigella) dysentery, but not true of amebic (Entameba) dysentery?

- a) Has few polymorphs and macrophages in stool
- b) Has charcot-leydon crystals in stool
- c) Has blood or mucus in stool
- d) Has many organisms in stool
- e) Has eosinophils in stool

22) A patient presents with diarrhea and abdominal pain after eating water chestnuts. Which of the following is most likely?

- a) *Fasciolopsis buski*
- b) *Cryptosporidium parvum*
- c) *Cyclospora cayetanensis*
- d) *Entamoeba histolytica*
- e) *Giardia lamblia*
- f) *Balantidium coli*

Gastrointestinal #12 – Pharmacology: Acid-Peptic Disease

1) A patient presents with complaints of sour stomach. History reveals hypertension. The patient works as a radio host and says the antacids she takes make her belch, which makes work difficult. Given her history, which of the following you suggest?

- a) Sodium bicarbonate (Alka-Seltzer, baking soda)
- b) Calcium bicarbonate (Tums, Os-Cal)
- c) Magnesium Aluminum (Mylanta, Maalox)
- d) None as all increase hypertension due to water retention
- e) None as all cause belching due to CO₂ production

2) Antacids can be given within two-hours of which of the following medications?

- a) Fluoroquinolones
- b) Tetracyclines
- c) Itraconazole
- d) Aspirin
- e) Iron

3) Which of the following H₂ receptor antagonists has little first pass metabolism and nearly 100% bioavailability?

- a) Cimetidine (Tagamet)
- b) Famotidine (Pepcid)
- c) Nizatidine (Axid)
- d) Ranitidine (Zantac)

4) Which of the following is NOT true of H₂ receptor antagonists?

- a) Are associated with increase drowsiness
 - b) Effective at blocking meal-stimulated acid secretion
 - c) Reduce secretions stimulated by histamine and gastrin
 - d) Effective at inhibiting nocturnal acid secretion
 - e) Reduce secretions stimulated by cholinomimetic agents
- 5) Proton pump inhibitors (PPIs) are preferred over H2 blockers in which of the following cases?
- a) Infrequent dyspepsia or heartburn
 - b) Frequent dyspepsia or heartburn
 - c) Erosive esophagitis with GERD
- 6) Which of the following has the quickest time of onset?
- a) Antacids
 - b) H2 blockers
 - c) PPIs
 - d) Sucralfate
- 7) How often should H2 receptor antagonists be taken to help decrease the likelihood of heartburn in patients with gastroesophageal reflux disease (GERD)?
- a) Daily (SID, qd)
 - b) Twice daily (BID)
 - c) Three times per day (TID)
 - d) Four times per day (QID)
 - e) At the onset of symptoms (PRN)
- 8) How often should H2 receptor antagonists be taken to help decrease the likelihood of heartburn in patients with acute uncomplicated ulcers?
- a) Daily (SID, qd)
 - b) Twice daily (BID)
 - c) Three times per day (TID)
 - d) At the onset of symptoms (PRN)
 - e) Intermittent or continuous IV dosing
- 9) How often should H2 receptor antagonists be taken in critically ill patient with stress-related bleeding gastritis?
- a) Daily (SID, qd)
 - b) Twice daily (BID)
 - c) Three times per day (TID)
 - d) At the onset of symptoms (PRN)
 - e) Intermittent or continuous IV dosing
- 10) Although H2 antagonists can cause diarrhea, headache, fatigue, and constipation, which of the following has also been associated with increased CNS side effects and sex hormone effects, such as gynecomastia in men and galactorrhea in women?
- a) Cimetidine (Tagamet)
 - b) Famotidine (Pepcid)
 - c) Nizatidine (Axid)
 - d) Ranitidine (Zantac)
- 11) Which of the following H2 blockers interferes with P450, including CYP1A2, CYP2C9, CYP2D6, and CYP3A4, which includes drugs such as phenytoin, lidocaine, warfarin, theophylline, quinidine, and benzodiazepines?

- a) Cimetidine (Tagamet)
 - b) Famotidine (Pepcid)
 - c) Nizatidine (Axid)
 - d) Ranitidine (Zantac)
- 12) Which of the following proton pump inhibitors is available in an intravenous formulation?
- a) Omeprazole (Prilosec)
 - b) Lansoprazole (Prevacid)
 - c) Rabeprazole (Aciphex)
 - d) Pantoprazole (Protonix)
 - e) Esomeprazole (Nexium)
- 13) Which of the following is NOT true of proton pump inhibitors?
- a) They have a short serum half-life
 - b) They inhibit acid for up to 24 hours
 - c) They should be taken with food
 - d) They required 3-4 days before full pump inhibition
 - e) They required 3-4 days before return of normal acid secretion
- 14) Dose reduction in PPIs is needed in patients with impairment to what organ?
- a) Kidney
 - b) Liver
 - c) Spleen
 - d) Duodenum
 - e) Stomach
- 15) How should PPIs be taken in patients with GERD?
- a) Daily (SID, qd)
 - b) Twice daily (BID)
 - c) Three times per day (TID)
 - d) At the onset of symptoms (PRN)
 - e) Intermittent or continuous IV dosing
- 16) Which of the following is true of treatment of duodenal ulcers?
- a) Antacids are the most effective
 - b) H2 blockers are the most effective
 - c) PPIs are the most effective
 - d) Antacids and H2 blockers are equally effective
 - e) H2 blockers and PPIs are equally effective
- 17) What is the treatment regimen of choice for *H. pylori* associated ulcers?
- a) Amoxicillin and H2 blockers
 - b) Clarithromycin and PPIs
 - c) Amoxicillin, clarithromycin, and H2 blockers
 - d) Amoxicillin, clarithromycin, and PPIs
 - e) Amoxicillin, clarithromycin, clindamycin, H2 blockers, and PPIs
- 18) Which of the following is true of the treatment for NSAID associated ulcers, when NSAID use is discontinued?
- a) Only H2 blockers will work
 - b) Only PPIs will work
 - c) Both H2 blockers and PPIs will work

- d) Neither H2 blockers nor PPIs will work
- 19) Which of the following is true of the treatment for NSAID associated ulcers, when NSAID use is continued?
- a) Only H2 blockers will work
 - b) Only PPIs will work
 - c) Both H2 blockers and PPIs will work
 - d) Neither H2 blockers nor PPIs will work
- 20) How can the risk of re-bleeding of peptic ulcers be significantly reduced?
- a) Oral antacids every 4 hours for 3-5 days
 - b) H2 blockers every hour for 3 days
 - c) High dose H2 blockers taken for 5 days
 - d) PPIs taken every 12 hours for 14 days
 - e) High dose PPIs taken for 3-5 days
- 21) What is the treatment of choice for metastatic gastrinomas?
- a) Antacids and vagotomy
 - b) H2 blockers
 - c) PPIs
 - d) Sucralfate
 - e) Misoprostol
- 22) Which of the following is true for patients taking PPIs?
- a) Decreased risk of salmonella infection
 - b) Decreased risk of shigella infection
 - c) Teratogenic risk, seen in animal models
 - d) No reported mineral deficiencies, including B12
- 23) Which of the following can occur with prolonged treatment using PPIs?
- a) Decreased gastrin production and risk of colon cancer
 - b) Decreased gastrin production and risk of stomach cancer
 - c) Increased gastrin production and risk of colon cancer
 - d) Increased gastrin production and risk of stomach cancer
 - e) No changes in gastrin levels
- 24) Which of the following drugs works by selectively binding to ulcers for up to 6 hours, likely due to negatively charged binding to the positively charged proteins in the base of the ulcer erosion?
- a) Sucralfate (Carafate)
 - b) Ranitidine (Zantac)
 - c) Misoprostol (Cytotec)
 - d) Omeprazole (Prilosec)
 - e) Bismuth subsalicylate (Pepto-Bismol)
- 25) Which of the following drugs reduces the incidence of NSAID induced ulcers to less than 3%, is not widely used due to its side-effect profile, and works as a PGE1 analog that can cause uterine contractions?
- a) Sucralfate (Carafate)
 - b) Ranitidine (Zantac)
 - c) Misoprostol (Cytotec)
 - d) Omeprazole (Prilosec)
 - e) Bismuth subsalicylate (Pepto-Bismol)

26) Which of the following coats ulcers and erosions, had direct antimicrobial activity against *H. pylori*, can turn stools black, may lead to encephalitis with prolonged use, and should be avoided in children and any child with a viral illness?

- a) Sucralfate (Carafate)
- b) Ranitidine (Zantac)
- c) Misoprostol (Cytotec)
- d) Metoclopramide (Reglan)
- e) Bismuth subsalicylate (Pepto-Bismol)

Gastrointestinal #13 – Pharmacology: Gastrointestinal Motility

1) Which of the following drugs works through cholinergic stimulation with 5-HT₄ action to increase esophageal peristaltic amplitude, increase LES pressure, and enhance gastric emptying?

- a) Sucralfate (Carafate)
- b) Ranitidine (Zantac)
- c) Misoprostol (Cytotec)
- d) Metoclopramide (Reglan)
- e) Bismuth subsalicylate (Pepto-Bismol)

Gastrointestinal #14 – Pharmacology: Laxatives

1) Which of the following is NOT a recommended treatment for intermittent constipation?

- a) Laxatives
- b) Regular exercise
- c) High fiber diet
- d) Adequate fluid intake
- e) Fiber supplements

2) Which of the following are hydrophilic colloids that absorb water to form emollient gels that distend the colon and promote peristalsis?

- a) Serotonin 5-HT₄ agonists (tegaserod)
- b) Stool surfactant agents (docusate, mineral oil)
- c) Osmotic laxatives (polyethylene glycol)
- d) Bulk forming laxatives (psyllium, methylcellulose, polycarbophil)
- e) Osmotic laxatives (sorbitol, lactulose, milk of magnesia)

3) Which of the following works by allowing water and lipids to penetrate gastrointestinal contents?

- a) Serotonin 5-HT₄ agonists (tegaserod)
- b) Stool surfactant agents (docusate, mineral oil)
- c) Osmotic laxatives (polyethylene glycol)
- d) Bulk forming laxatives (psyllium, methylcellulose, polycarbophil)
- e) Osmotic laxatives (sorbitol, lactulose, milk of magnesia)

4) Which of the following is true of osmotic laxatives?

- a) Prevent colon from concentrating fecal fluid
- b) Enhance colon's ability to dilute fecal fluid
- c) Increase the gastrointestinal absorption of fecal hardening substances
- d) Increase stool liquidity due to an obligate increase in fecal fluid

- 5) Which of the following categories contains agents that are metabolized by colonic bacteria and thus can create severe flatus and cramps?
- a) Serotonin 5-HT₄ agonists (tegaserod)
 - b) Stool surfactant agents (docusate, mineral oil)
 - c) Osmotic laxatives (polyethylene glycol)
 - d) Bulk forming laxatives (psyllium, methylcellulose, polycarbophil)
 - e) Osmotic laxatives (sorbitol, lactulose, milk of magnesia)
- 6) Which of the following is combined with sodium sulfate, sodium chloride, sodium bicarbonate, and potassium chloride so that no significant electrolyte shift occurs and thus is safe for all patients?
- a) Serotonin 5-HT₄ agonists (tegaserod)
 - b) Stool surfactant agents (docusate, mineral oil)
 - c) Osmotic laxatives (polyethylene glycol)
 - d) Bulk forming laxatives (psyllium, methylcellulose, polycarbophil)
 - e) Osmotic laxatives (sorbitol, lactulose, milk of magnesia)
- 7) Which of the following patients would be indicated for long-term cathartics (stimulant laxatives)?
- a) Elderly patient who uses a walker
 - b) Infants with difficult bowel movements
 - c) Pregnant women
 - d) Neurologically impaired patients
 - e) Patients with renal insufficiency
- 8) Which of the following stimulates afferent nerves to enhance the release of neurotransmitters, including calcitonin gene-related peptide, to stimulate second order enteric neurons to promote peristaltic reflex?
- a) Serotonin 5-HT₄ agonists (tegaserod)
 - b) Stool surfactant agents (docusate, mineral oil)
 - c) Osmotic laxatives (polyethylene glycol)
 - d) Bulk forming laxatives (psyllium, methylcellulose, polycarbophil)
 - e) Osmotic laxatives (sorbitol, lactulose, milk of magnesia)

Gastrointestinal #15 – Pharmacology: Anti-Diarrheal Agents

- 1) Anti-diarrheal agents are NOT indicated in which of the following cases?
- a) Mild diarrhea, due to constipation risk
 - b) Continued, moderate diarrhea
 - c) Continued, severe diarrhea
 - d) Inflammatory bowel disease (IBD) associated diarrhea
 - e) Irritable bowel syndrome (IBS) associated diarrhea
- 2) Anti-diarrheal agents should be discontinued in what situation?
- a) Protozoan infections
 - b) Bezoar in stomach
 - c) Nematode infections
 - d) Rice water stools
 - e) Blood in stools

- 3) Which of the following works by inhibiting the presynaptic cholinergic nerves at the submucosal and myenteric plexus, but does not cross the BBB and thus has no analgesic effects or risk of addiction?
- a) Diphenoxylate (Lomotil)
 - b) Loperamide (Imodium)
 - c) Fentanyl (Sublimaze)
 - d) Morphine (MS-Contin)
 - e) Hydrocodone (Tussigon)
- 4) Bile salt binding resins, such as cholestyramine and colestipol, decrease diarrhea caused by excess fecal bile acids. Due to the location of bile acid absorption, these resins are usually indicated for patients with disease to which of the following locations?
- a) Stomach
 - b) Duodenum
 - c) Jejunum
 - d) Ileum
 - e) Colon
- 5) Octreotide (Sandostatin) would be most useful in which of the following cases?
- a) Heavy steatorrhea
 - b) Mild diarrhea
 - c) Bleeding duodenal ulcers
 - d) Bile duct blockage
 - e) Carcinoid tumors

Gastrointestinal #16 – Pharmacology: Irritable Bowel Syndrome (IBS)

- 1) Which of the following best describes the side effect of antispasmodics (anticholinergics)?
- a) Nausea, vomiting, diarrhea
 - b) Constipation, analgesia, altered coordination
 - c) Dry mouth, visual disturbances, urinary retention
 - d) Seizures, malabsorption syndrome, megaloblastic anemia
 - e) Orange colored urine, liver impairment, light sensitivity
- 2) Alosetron (Lotronex) is a 5-HT₃ blocker used primarily in which situation?
- a) Men with IBS where diarrhea is the predominant symptom
 - b) Women with IBS where diarrhea is the predominant symptom
 - c) Men with IBS where vomiting is the predominant symptom
 - d) Women with IBS where vomiting is the predominant symptom
 - e) Patients with IBS where constipation is the predominant symptom
- 3) Tegaserod (Zelnorm) is a 5-HT₄ blocker used primarily in which situation?
- a) Men with IBS where diarrhea is the predominant symptom
 - b) Women with IBS where diarrhea is the predominant symptom
 - c) Men with IBS where vomiting is the predominant symptom
 - d) Women with IBS where vomiting is the predominant symptom
 - e) Patients with IBS where constipation is the predominant symptom
 - f) Patients with IBS without any predominant symptoms
 - g) None of the above

Gastrointestinal #17 – Pharmacology: Inflammatory Bowel Disease (IBD)

- 1) The azo compounds sulfasalazine, balsalazide, and olsalazine are designed to deliver 5-ASA to a specific portion of the GI tract after cleavage of the azo structure by resident bacteria. High concentrations of the active drug are meant to be made available at what portion of the GI tract?
 - a) Esophagus and stomach
 - b) Stomach and duodenum
 - c) Duodenum and jejunum
 - d) Jejunum and ileum
 - e) Ileum and colon
- 2) Which of the following drugs would be most effective at delivering 5-ASA in a patient with or ulcerative colitis (or Crohn disease) of the small intestine?
 - a) Mesalamine (Asacol)
 - b) Mesalamine (Pentasa)
 - c) Mesalamine (Rowasa)
 - d) Mesalamine (Canasa)
 - e) Mesalamine products are not useful at the small intestine
- 3) Slow acetylators (e.g. Middle Eastern) have more frequent and severe adverse effects than fast acetylators (e.g. Asian) when taking which drug?
 - a) Sulfasalazine (Azulfidine)
 - b) Balsalazide (Coazal)
 - c) Olsalazine (Dipentum)
 - d) Mesalamine (Asacol)
 - e) Mesalamine (Pentasa)
- 4) Prednisone and prednisolone are glucocorticoids used to reduce inflammatory processes in IBD. How are they most commonly administered?
 - a) IV or IM
 - b) Sublingual spray or tablet
 - c) Oral tablet
 - d) Transdermal patch
 - e) Enema or suppository
- 5) A patient with ulcerative colitis is prescribed a purine analog (azathioprine, 6-mercaptopurine). What is the clinical effect?
 - a) Blocks inflammatory cell adhesion molecules
 - b) Inhibits dihydrofolate reductase
 - c) Acts as an immunosuppressant
 - d) Binds to soluble TNF-alpha trimers with high affinity
 - e) Binds to proteins in the ulcer base to protect further damage
- 6) Which of the following is true when combining allopurinol with purine analogs?
 - a) Allopurinol metabolism is reduce, allopurinol dosing is cut in half
 - b) Allopurinol metabolism is reduce, purine analog dosing is cut in half
 - c) Purine analog metabolism is reduce, allopurinol dosing is cut in half
 - d) Purine analog metabolism is reduce, purine analog dosing is cut in half
- 7) What is the mechanism of action for methotrexate (Trexall), a drug used to maintain remission in Crohn disease?
 - a) Blocks inflammatory cell adhesion molecules

- b) Inhibits dihydrofolate reductase
 - c) Acts as an immunosuppressant
 - d) Binds to soluble TNF-alpha trimers with high affinity
 - e) Binds to proteins in the ulcer base to protect further damage
- 8) Infliximab (Remicade) is used in patients with Crohn disease remission or fistulating Crohn disease who are dependent on glucocorticoids or have not responded to methotrexate. What is its mechanism of action?
- a) Blocks inflammatory cell adhesion molecules
 - b) Inhibits dihydrofolate reductase
 - c) Acts as an immunosuppressant
 - d) Binds to soluble TNF-alpha trimers with high affinity
 - e) Binds to proteins in the ulcer base to protect further damage
- 9) What infection seen in patients taking infliximab is the most important clinically?
- a) Sepsis
 - b) Listeriosis
 - c) Pneumonia
 - d) Pneumocystosis
 - e) Latent TB reactivation
- 10) What screening test must be done for patients before beginning infliximab?
- a) HIV blood test
 - b) Chest x-ray
 - c) PPD test
 - d) Blood glucose
 - e) CBC, T4 count
- 11) Which of the following symptoms is most associated with delayed infliximab infusion reaction, where circulating antibodies are present?
- a) Fever
 - b) Pruritis
 - c) Urticaria
 - d) Chills
 - e) Facial edema

Gastrointestinal #18 – Pharmacology: Variceal Hemorrhage

- 1) Which of the following drugs used for portal hypertension works by inhibition of glucagon and other neuropeptides that alter blood flow, and has a half-life of about 1.5 hours?
- a) Somatostatin (GHIH)
 - b) Octreotide (Sandostatin)
 - c) Vasopressin (ADH)
 - d) Terlipressin (Glypressin)
 - e) Beta-blockers
- 2) Which of the following beta-receptor agonists is the most effective at reducing portal pressure and recurrent variceal hemorrhage, but do not reduce mortality?
- a) Esmolol (beta1-selective)
 - b) Propranolol (non-selective)
 - c) Carvedilol (mixed alpha1/beta)

- d) Butaxamine (beta2-selective)
- e) Labetalol (mixed alpha1/beta)

Gastrointestinal #19 – Physiology: GI Motility

- 1) Which of the following areas of the GI tract is responsible for hormone secretion?
 - a) Liver
 - b) Gallbladder
 - c) Pancreas
 - d) Salivary glands
 - e) Stomach
- 2) Which layer of the gastrointestinal tract is made of loose connective tissue, is rich in collagen and elastin, and contains the Meissner plexus?
 - a) Mucosal layer
 - b) Submucosal layer
 - c) Muscularis externa, inner circular layer
 - d) Muscularis externa, outer longitudinal layer
 - e) Serosal layer
- 3) Which of the following is NOT true of the enteric nervous system?
 - a) The myenteric (Auerbach) plexus is found in the stomach and intestines
 - b) The myenteric plexus is located between the muscularis externa layers
 - c) Myenteric plexus fibers are carried by the anterior and posterior vagal nerves
 - d) The ENS is made of the Auerbach and Meissner plexi with other neurons
 - e) Severing SNS and PNS to the gut would stop all GI motor activities
- 4) Pancreatic release of glucagon and insulin is what type of GI system regulation?
 - a) Neurocrine
 - b) Paracrine
 - c) Endocrine
 - d) Exocrine
- 5) Cells that regulate or respond that lie within the GI tract form what type of regulation mechanism?
 - a) Intrinsic
 - b) Extrinsic

Match the cell type with the secreted substance:

- | | |
|------------------|------------------------------------|
| 6.1) Alpha cells | a) Somatostatin |
| 6.2) Beta cells | b) Neurotensin |
| 6.3) D cells | c) Motilin |
| 6.4) G cells | d) Insulin |
| 6.5) K cells | e) Pancreatic polypeptide |
| 6.6) L cells | f) Glucagon |
| 6.7) M cells | g) Gastrin |
| 6.8) N cells | h) Glucagon like peptide 1 (GLP-1) |
| 6.9) Nerve cells | i) Enteroglucagon, peptide YY |
| 6.10) PP cells | j) Gastric inhibitory peptide |
| 6.11) S cells | k) Secretin |
| 6.12) I cells | l) Cholecystokinin (CCK) |

- 7) Which of the following is NOT found within the intestinal lamina propria?

- a) B & T cells
 - b) Goblet cells
 - c) Plasma cells
 - d) Macrophages
 - e) Eosinophils
- 8) Patients with celiac disease (i.e. celiac sprue) should avoid which of the following?
- a) Red meats
 - b) Gluten
 - c) Dairy
 - d) Purines
 - e) Cysteine
- 9) Which of the following is considered extrinsic innervation of the GI tract?
- a) ENS
 - b) SNS
 - c) PNS
 - d) ENS & SNS
 - e) SNS & PNS
- 10) Which of the following provides parasympathetic innervation to the ileum?
- a) Celiac plexus
 - b) Superior mesenteric plexus
 - c) Inferior mesenteric plexus
 - d) Vagus nerve
 - e) Pelvic splanchnic nerves
- 11) The myenteric plexus is primarily involved in regulation of GI:
- a) Secretion
 - b) Digestion
 - c) Motility
 - d) Absorption
 - e) Secretion & absorption
- 12) Which of the following is not under conscious control and directly influences the enteric nervous system (ENS)?
- a) Central nervous system (CNS)
 - b) Autonomic nervous system (ANS)
 - c) Somatic nervous system (SNS)
 - d) Peripheral nervous system (autonomic + somatic, PNS)
- 13) Vasoactive intestinal peptide (VIP) has its vasorelaxant effect on arterioles at what location, which is also the location of short-distance reflex pathways?
- a) Mucosa
 - b) Submucosa
 - c) Circular muscle
 - d) Myenteric plexus
 - e) Longitudinal muscle
- 14) Which of the following would most likely move the basic electrical rhythm (BER) from the interstitial cells of Cajal furthest toward -40mV?
- a) Sympathetic activation
 - b) Sympathetic inactivation

- c) Parasympathetic activation
 - d) Parasympathetic inactivation
- 15) Where are the interstitial cells of Cajal located?
- a) Internal to the mucous layer
 - b) Between the mucous and submucosal layers
 - c) Between the submucosal and circular muscle layers
 - d) Between the circular and longitudinal muscle layers
 - e) External to the serous layer
- 16) The slow wave rate in the stomach is 3 per minute. What is the rate at the duodenum?
- a) 1 per minute
 - b) 3 per minute
 - c) 6 per minute
 - d) 12 per minute
 - e) 18 per minute
- 17) How does the sympathetic nervous system affect slow waves?
- a) Decreases amplitude and frequency
 - b) Decreases amplitude, increases frequency
 - c) Increases amplitude and frequency
 - d) Increases amplitude, decreases frequency
 - e) It has no direct effect on slow waves
- 18) Action potentials can occur in GI smooth muscle when slow waves exceed:
- a) Threshold for contraction
 - b) Electrical threshold
 - c) Both A & B
 - d) Neither A nor B; they can occur at any amplitude
- 19) Which of the following would lead to the strongest (most intense) smooth GI muscle contraction?
- a) High slow wave amplitude
 - b) High slow wave frequency
 - c) High action potential amplitude
 - d) High action potential frequency
- 20) Which of the following regarding GI smooth muscle is NOT true?
- a) Its length-tension curve is broader than that of skeletal muscle
 - b) Cells of the circular layer have numerous gap junctions
 - c) Contractions are stronger when action potentials occur on the crests of the slow waves
 - d) Rhythmic oscillations of the resting membrane potential occur
 - e) Tone is due to a baseline level of spontaneous action potentials in the smooth muscle cells
- 21) Which of the following statements is NOT true?
- a) GI smooth muscle may contract in the absence of action potentials
 - b) Nerves and hormones can influence the frequency and amplitude of slow waves
 - c) The electrogenicity of the Na,K-ATPase contributes significantly to the resting potential in GI smooth muscle
 - d) Slow waves are generated in neurons of the myenteric plexus

- e) Calcium that enters during an action potential participates in excitation-contraction coupling
- 22) Which of the following is an inhibitory transmitter to smooth muscle cells, an excitatory secretomotor transmitter to epithelial and gland cells, and a vasodilator transmitter?
- a) Acetylcholine
 - b) GRP (bombesin)
 - c) NO
 - d) Substance P
 - e) VIP
 - f) Cholecystokinin (CCK)
 - g) Norepinephrine
- 23.1) Which of the following is released by enteric sensory neurons onto interneurons in enteric ganglia and central ganglia, which is important in intrinsic reflexes?
- a) Acetylcholine (Ach)
 - b) Adenosine triphosphate (ATP)
 - c) Calcitonin gene-related peptide (CGRP)
 - d) Gastrin-releasing peptide (GRP)
 - e) Nitric oxide (NO)
 - f) Serotonin (5-HT)
- 23.2) Which of the following is released from mucosal enterochromaffin (EC) cells when evoked by stimuli?
- a) Acetylcholine (Ach)
 - b) Adenosine triphosphate (ATP)
 - c) Calcitonin gene-related peptide (CGRP)
 - d) Gastrin-releasing peptide (GRP)
 - e) Nitric oxide (NO)
 - f) Serotonin (5-HT)
- 24) Which of the following best describes chewing, which is done to lubricate food, partition food, and mix in salivary amylase?
- a) Voluntary
 - b) Involuntary
 - c) Reflexive
 - d) A or B
 - e) A or C
- 25) Which of the following is inhibited as food reaches the afferent touch receptors near the opening of the pharynx?
- a) Upper esophageal musculature
 - b) Pharyngeal musculature
 - c) Breathing
 - d) Cardiac sympathetics
 - e) Gastric parasympathetics
- 26) At what point does swallowing become reflexive?
- a) Food bolus separation by tip of tongue
 - b) Pressure of food on hard palate by posterior portions of tongue
 - c) Entering of food into the pharynx

- d) Pressure of food on the upper esophageal sphincter
 - e) Sensation of food at junction of esophageal smooth and striated muscle
- 27) The vocal cords are moved together during what phase of swallowing?
- a) Oral
 - b) Pharyngeal
 - c) Esophageal
- 28) Which of the following is true regarding esophageal peristalsis?
- a) Poorly lubricated food can lead to the need for secondary peristalsis
 - b) If food travels faster than primary peristalsis, the peristalsis will stop
 - c) Secondary peristalsis occurs with lodged food, lasting up to 30 seconds
 - d) Peristalsis reverses with vomiting
 - e) If food is lodged, primary peristalsis will continue until the food is removed
- 29) Which of the following, along with achalasia due to high basal tone, causes the lower esophageal sphincter (LES) to contract?
- a) Nitric oxide
 - b) VIP
 - c) PNS
 - d) SNS
 - e) Primary peristalsis
- 30) Which of the following would improve LES incompetence?
- a) GERD
 - b) Expiration
 - c) Increased intrathoracic pressure
 - d) Obesity
 - e) Hiatal hernia
- 31) Which of the following is a function of gastric motility?
- a) To allow the stomach to serve as a food reservoir
 - b) To fragment food into smaller particles
 - c) To mix food with gastric secretions
 - d) To empty gastric contents into the duodenum at a controlled rate
 - e) All of the above
- 32) As food enters the stomach, the fundus and body receptively relax to accommodate large volumes. What neurotransmitter is involved in this process?
- a) Acetylcholine (ACh)
 - b) GRP (bombesin)
 - c) Nitric oxide (NO)
 - d) Substance P
 - e) Vasoactive intestinal peptide (VIP)
- 33) What is the sympathetic innervation for the stomach?
- a) Celiac plexus
 - b) Superior mesenteric plexus
 - c) Inferior mesenteric plexus
 - d) Vagus nerve
 - e) Pelvic splanchnic nerves
- 34) Which of the following components of stomach chyme (pH ~ 2) is the first to leave the stomach?

- a) Large particles
 - b) Liquids
 - c) Fats
 - d) Indigestible particles
 - e) Dense particles
- 35) In a non-fasting individual, what is the contraction (motility) rate of the stomach antrum as food enters?
- a) 1 contraction per minute
 - b) 3 contractions per minute
 - c) 6 contractions per minute
 - d) 12 contractions per minute
 - e) 18 contractions per minute
- 36) Migrating motor complexes (or migrating myoelectric complex, MMC) are waves of peristalsis that occur between meals at roughly 75-90 minute intervals. They are sometimes referred to as “hunger pangs.” MMC would be most useful for what type of gastric contents?
- a) Dairy
 - b) Acids
 - c) Fats
 - d) Bones
 - e) Proteins
- 37) Where is the origin (pacemaker zone) of electrical activity of the stomach?
- a) Esophagus
 - b) Fundus
 - c) Body
 - d) Antrum
 - e) Pylorus
- 38) Ach and gastrin stimulate gastric contractility at the plateau phase of the gastric slow wave. Gastric slow waves resemble cardiac muscle action potentials. However, the slow waves last _____ longer than cardiac action potentials.
- a) 2 times
 - b) 4 times
 - c) 6 times
 - d) 8 times
 - e) 10 times
- 39) Which of the following is true when comparing the rate and regularity of electrical activity in the stomach and duodenum?
- a) The duodenum rate is faster and more irregular
 - b) The duodenum rate is faster and more regular
 - c) The stomach rate is faster and more irregular
 - d) The stomach rate is faster and more regular
- 40) Which of the following best regulates the function of the gastroduodenal junction?
- a) Antrum contraction rate
 - b) HCl production rate
 - c) Chyme processing rate
 - d) Duodenal contraction rate

- e) Bile secretion rate
- 41.1) Which of the following relaxes the pyloric sphincter?
- a) Gastrin
 - b) Gastric inhibitory protein (GIP)
 - c) Cholecystokinin (CCK)
 - d) Vasoactive intestinal peptide (VIP)
- 41.2) Which of the following speeds up gastric emptying?
- a) Secretin & gastrin
 - b) Presence of acid in the duodenum
 - c) Parasympathetic activity
 - d) Presence of fat in duodenum
 - e) Cholecystokinin (CCK)
- 42) Closure of which of the following sphincters separates vomiting from retching?
- a) Upper esophageal sphincter
 - b) Lower esophageal sphincter
 - c) Pyloric sphincter
 - d) Ileocecal valve
 - e) Anal sphincters
- 43) Segmentation (versus peristalsis) is the most frequent form of movement seen at what location?
- a) Esophagus
 - b) Stomach
 - c) Duodenum
 - d) Small intestine
 - e) Large intestine
- 44) Which of the following increases the excitability of small intestine smooth muscle?
- a) Sympathetic activity
 - b) Parasympathetic activity
 - c) Lack of circulating hormones
- 45) Most of the direct control of intestinal motility resides in the:
- a) Sympathetic nervous system
 - b) Parasympathetic nervous system
 - c) Intramural plexuses
- 46) When a bolus of food is placed in the small intestine, the intestine contracts behind the bolus and relaxes ahead of it. What is this called?
- a) The Law of the Intestine
 - b) The intestinointestinal reflex
 - c) The gastroileal reflex
 - d) The ileocecal reflex
 - e) The gastrocolic reflex
- 47) A patient with absent contractions during the active phase of MMC may be troubled with bacterial overgrowth at what location? (Ligament of Treitz marks separation between duodenum and jejunum)
- a) Stomach
 - b) Duodenum
 - c) Jejunum

- d) Ileum
 - e) Colon
- 48) The muscularis mucosae contract irregularly to mix luminal contents and bring different parts of the mucosal surface into contact with freshly mixed chyme. What is the approximate contraction rate of the muscularis mucosae?
- a) 1 contraction per minute
 - b) 3 contractions per minute
 - c) 6 contractions per minute
 - d) 12 contractions per minute
 - e) 18 contractions per minute
- 49) The bow and arrow sign is an endoscopic sign for determining the location of the which of the following, a sphincter critical in preventing reflux?
- a) Upper esophageal sphincter
 - b) Lower esophageal sphincter
 - c) Pyloric sphincter
 - d) Ileocecal valve
 - e) Internal anal sphincter
- 50) Mass movements occur in the large intestine about three times per day, pushing contents long distances. What reflex is most responsible for mass movements?
- a) The Law of the Intestine
 - b) The intestinointestinal reflex
 - c) The gastroileal reflex
 - d) The ileocecal reflex
 - e) The gastrocolic reflex
- 51) The taeniae coli of the colon correspond to the muscularis externa of the previous GI tract. With regard to the anal sphincters, what type of muscle are they made of?
- a) Both internal and external are made of smooth muscle
 - b) Both internal and external are made of skeletal muscle
 - c) The internal is made of smooth muscle and external is made of skeletal muscle
 - d) The internal is made of skeletal muscle and external is made of smooth muscle
- 52.1) Anti-propulsion and reverse peristalsis occurs at what colon location?
- a) Appendix
 - b) Cecum
 - c) Ascending colon
 - d) Transverse colon
 - e) Descending colon
- 52.2) Which of the following requires function of the sacral spinal cord via pelvic nerves?
- a) Intestinointestinal reflex
 - b) Defecation reflex
 - c) Gastroileal reflex
 - d) Colonocolonic reflex
 - e) Gastrocolic reflex
- 53) Which of the following is true of colonic longitudinal and circular (haustra) muscles, relative to the peaks of myenteric potential oscillations?
- a) Longitudinal muscles fire occasional action potentials

- b) Circular muscles fire occasional action potentials
 - c) Both A & B
 - d) Neither A nor B
- 54) Distention at one part of the colon causes relaxation of other parts, mediated by the ENS and modulated by SNS. This is known as the:
- a) Intestinointestinal reflex
 - b) Defecation reflex
 - c) Gastroileal reflex
 - d) Colonocolonic reflex
 - e) Gastrocolic reflex
- 55) An individual would defecate involuntarily as the rectum is filled via mass movements in the sigmoid colon, if they had problems with which of the following?
- a) External anal sphincter
 - b) Internal anal sphincter
 - c) Ileocecal valve
 - d) Gastroileal reflex
 - e) Appendix
- 56) A 4-day-old baby boy has not defecated since coming home from the hospital, even though feeding has been normal without any excessive vomiting. Rectal examination reveals a normal anus, anal cavity, and rectum. However, a large fecal mass is found in the colon, and a large release of flatus and feces follows the rectal examination. Which of the following would be suspected?
- a) Rectal atresia
 - b) Hirschsprung disease
 - c) Imperforated anus
 - d) Anal agenesis
 - e) Anorectal agenesis

Gastrointestinal #20 – Physiology: GI Secretions

- 1) What is a secretagogue?
- a) A substance that is excreted from a paracrine organ
 - b) A substance that is excreted from an endocrine organ
 - c) Any secreted substance
 - d) A substance that stimulates secretion
 - e) A substance that mimics a secretion
- 2) Ptyalin is a form of amylase in the saliva of humans and some animals that catalyzes the hydrolysis of starch into dextrin and:
- a) Glucose
 - b) Galactose
 - c) Maltose
 - d) Sucrose
 - e) Asbestos
- 3) Which of the following glands is entirely serous (does not produce mucous)?
- a) Parotid
 - b) Sublingual
 - c) Submandibular

- d) None of the above
- 4) Which of the following is NOT true of salivary production?
- a) VIP and acetylcholine are released from parasympathetic nerve terminals in the salivary glands
 - b) VIP and acetylcholine cause vasodilation during secretory activity
 - c) Excitation of sympathetic and parasympathetic nerves stimulates secretion
 - d) Cutting sympathetic nerves causes a major defect in salivary function
 - e) Salivary glands atrophy without parasympathetic nervous supply
- 5) As flow rates increase, which of the following is higher in acinar fluid (saliva) than in plasma?
- a) Na⁺
 - b) HCO₃⁻
 - c) Cl⁻
 - d) K⁺
 - e) A & C
 - f) B & D
- 6) Which of the following would lead to saliva that is closest to plasma isotonicity?
- a) Large amounts of saliva
 - b) Small amounts of saliva
 - c) Fast saliva flow rate
 - d) Slow saliva flow rate
- 7) Which of the following is true of actively secreting salivary glands?
- a) High metabolism and high blood flow
 - b) Low metabolism and low blood flow
 - c) High metabolism and low blood flow
 - d) Low metabolism and high blood flow
- 8) Which of the following increases acinar cell secretion via elevating cAMP, versus elevating intracellular Ca⁺⁺?
- a) Substance P
 - b) VIP
 - c) Norepinephrine on alpha receptors
 - d) Acetylcholine
- 9) The surface of gastric mucosa is covered by columnar epithelial cells. This surface is studded with gastric pits, where the gastric glands empty. Which of the following is secreted by chief cells?
- a) Intrinsic factor
 - b) Mucous
 - c) HCl
 - d) Pepsinogen
 - e) Somatostatin
- 10) HCl and intrinsic factor are secreted by parietal (oxyntic) cells mainly from what location in the stomach?
- a) Lesser curvature
 - b) Greater curvature
 - c) Body
 - d) Fundus

- e) Pylorus
- 11.1) Although Cl^- is the major anion of gastric juice, what problematic condition can occur with vomiting due to its increased gastric ion concentration?
- a) Hypocalcemia
 - b) Hyponatremia
 - c) Hypokalemia
 - d) Acidosis
- 11.2) As secretion rates increase, what gastric juice ion drops dramatically?
- a) Ca^{++}
 - b) Na^+
 - c) H^+
 - d) K^+
 - e) Cl^-
- 12) Which of the following allows for the entry of Cl^- at the basolateral membrane of parietal cells?
- a) ATP
 - b) H^+
 - c) K^+
 - d) CO_2
 - e) HCO_3^-
- 13) Which of the following cleaves pepsinogens to pepsin, which can digest proteins?
- a) CCK
 - b) Gastrin
 - c) Low pH
 - d) High pH
 - e) Acetylcholine
- 14) The secretion of intrinsic factor by parietal cells is the only gastric function that is essential for human life, as it leads to the absorption of which of the following?
- a) Vitamin B12
 - b) Folic acid
 - c) Iron
 - d) Vitamin D
 - e) Vitamin E
- 15) Release of which of the following from parasympathetic nerve endings most increases mucous secretion?
- a) Acetylcholine (ACh)
 - b) Adenosine triphosphate (ATP)
 - c) Calcitonin gene-related peptide (CGRP)
 - d) Gastrin-releasing peptide (GRP)
 - e) Nitric oxide (NO)
 - f) Serotonin (5-HT)
- 16) Which of the following increase the rate of HCO_3^- secretion?
- a) Bleeding ulcers
 - b) High gastric Na^+
 - c) High gastric pH
 - d) Low gastric amylase

- e) Eating food
- 17) Along with mucin, what ion is a major component of the gastric mucousal barrier and may be diminished due to circulating epinephrine (leading to stress ulcers)?
- a) Na⁺
 - b) H⁺
 - c) K⁺
 - d) Cl⁻
 - e) HCO₃⁻
- 18) Enterochromafin-like (ECL) cells synthesize and store histamine. When stimulated by acetylcholine or gastrin, these ECL cells release histamine, which stimulates HCl secretion. Which of the following is the most important physiological antagonist of this HCl secretion?
- a) Intrinsic factor
 - b) Gastrin
 - c) CCK
 - d) Pepsinogen
 - e) Somatostatin
- 19) Which of the following stimulates HCl secretion during the gastric phase?
- a) Chewing
 - b) Swallowing
 - c) Taste and smell
 - d) Amino acids
 - e) Duodenal distension
- 20) Which of the following causes inhibition of gastric acid secretion during the intestinal phase?
- a) Release of gastrin
 - b) Somatostatin inhibition
 - c) Secretin and CCK
 - d) High duodenal pH
 - e) Duodenal hypotonicity
- 21) Which of the following is a component of *Helicobacter pylori*, the bacterium present in most gastric and duodenal ulcers, that leads to diminished mucosal barrier and hypersecretion of acid?
- a) Urease
 - b) Capsule
 - c) Type III secretion system
 - d) Antigenic phase variation
 - e) Endotoxin
- 22) How are the secretion of acid (HCl) and pepsinogen related?
- a) Acid (parietal cells) stimulates pepsinogen (chief cells)
 - b) Pepsinogen (chief cells) stimulates acid (parietal cells)
 - c) Secretin, CCK, gastrin, and Ach are not involved in pepsinogen release
 - d) Acid secretion is not related to pepsinogen secretion
- 23) Which of the following originally secretes the enzyme component of pancreatic juice in the exocrine pancreas?
- a) Common bile duct

- b) Extralobular duct
 - c) Intralobular duct
 - d) Intercalated ducts
 - e) Acinar cells
 - f) Islets of Langerhans
- 24.1) Which major ions change drastically as the rate of pancreatic secretion increases?
- a) Cl⁻ increases and HCO₃⁻ decreases
 - b) HCO₃⁻ increases and Cl⁻ decreases
 - c) Na⁺ increases and K⁺ decreases
 - d) K⁺ increases and Na⁺ decreases
- 24.2) At what pancreatic duct location does secretin stimulate the release of Na⁺, K⁺, HCO₃⁻, and Cl⁻?
- a) Common bile duct
 - b) Extralobular duct
 - c) Intralobular duct
 - d) Intercalated ducts
 - e) Acinar cells
- 25) Most of the inactive zymogens secreted by the pancreas (trypsinogens, chymotrypsinogen, proelastase, procarboxypeptidases) are responsible for protein and peptide digestion. Which of the following active enzymes secreted by the pancreas is involved in triglyceride digestion?
- a) Amylase
 - b) Glycerol ester hydrolase
 - c) Cholesterol ester hydrolase
 - d) Colipase
 - e) DNase and RNase
- 26) Secretin is released by S cells in the mucosa in response to acid in the lumen. This leads to extralobular ducts that are high in what ion?
- a) Cl⁻
 - b) HCO₃⁻
 - c) Na⁺
 - d) K⁺
- 27) The pancreatic acinar fluid closely resembles plasma in its tonicity and its concentration of various ions. If pancreatic enzymes are absent, which of the following will be malabsorbed?
- a) Lipids
 - b) Proteins
 - c) Carbohydrates
 - d) All of the above
 - e) None of the above
- 28) Enteropeptidase activates which of the following, a major pancreatic protease that has an associated inhibitor to prevent premature activation in the pancreatic ducts, which could lead to pancreatitis?
- a) Proelastase
 - b) Trypsinogen
 - c) Chymotrypsinogen

- d) Procarboxypeptidase
- 29) Which of the following inhibits pancreatic secretion?
- a) Gastrin
 - b) CCK
 - c) Secretin
 - d) Sympathetic fibers
 - e) None of the above
- 30) During the intestinal phase of pancreatic secretion, which of the following stimulates the afferent arm of vagovagal reflexes on acinar and duct cells, acting as the most important physiological mediator of the enzyme component of pancreatic juice?
- a) Gastrin
 - b) CCK
 - c) Secretin
 - d) Sympathetic fibers
 - e) Enteropancreatic reflexes
- 31) Which of the following decreases cAMP, leading to decreased secretions?
- a) Ach
 - b) CCK
 - c) Bombesin
 - d) Secretin
 - e) Somatostatin
 - f) VIP
- 32) Which of the following is the major site of gluconeogenesis and well as glycogenolysis?
- a) Skeletal muscle
 - b) Pancreas
 - c) Liver
 - d) Spleen
 - e) Kidneys
- 33) The liver breaks down what toxic metabolite to urea?
- a) Ammonia
 - b) Aldehyde
 - c) Cysteine
 - d) SAM
 - e) MDMA
- 34) What is the major gastrointestinal function of the liver?
- a) Processing of metabolites
 - b) Gluconeogenesis
 - c) Blood glucose homeostasis
 - d) Oxidative phosphorylation
 - e) Production and secretion of bile
- 35) What is the primary secretagogue of bile?
- a) Ach
 - b) CCK
 - c) Secretin
 - d) Cholesterol

- e) Somatostatin
- 36) Primary bile acids (carboxyl, hydroxyl) are converted to secondary bile acids (dehydroxyl) via:
- a) Taurine
 - b) Glycine
 - c) Bile salts
 - d) Low pH
 - e) Bacteria
- 37) Which of the following describes the structure of bile acids that allows them to form micelles?
- a) Hydrophilic
 - b) Hydrophobic
 - c) Amphipathic
- 38) What is the primary function of the gallbladder?
- a) Secretion of bile
 - b) Storage of bile
 - c) Bile metabolism
 - d) Liver detoxification
 - e) Fat emulsification
- 39) What is the function of bile acid emulsification of lipids?
- a) To directly degrade them
 - b) To make them hydrophilic
 - c) To make them hydrophobic
 - d) To increase surface area for lipolytic enzymes
 - e) To prevent metabolism by lipolytic enzymes
- 40) When bile acids reach critical micelle concentration, which of the following occurs?
- a) Bile acid micelles are formed
 - b) Lipolytic enzymes are activated
 - c) Micelle degradation starts
 - d) Saturation prevents micelle formation
 - e) Hepatocytes secrete lecithins (phospholipids), leading to gallstones
- 41) The enterohepatic circulation allows for bile salts to be reabsorbed at what location?
- a) Stomach
 - b) Duodenum
 - c) Gallbladder
 - d) Jejunum
 - e) Ileum
- 42) Which of the following is a taurocholate transporter protein that allows for Na⁺ dependent reabsorption of bile acid?
- a) OATP
 - b) OCT1
 - c) NTCP
 - d) BSEP
 - e) MDR1
- 43) What is the strongest stimulus for emptying of the gallbladder (relaxation of the sphincter of Oddi) during the intestinal phase of digestion?

- a) Ach
 - b) CCK
 - c) Bombesin
 - d) Secretin
 - e) Somatostatin
 - f) VIP
- 44) In general, secretions of the small and large intestines are made of mucus to protect from mechanical damage. What is the approximate production of intestinal secretions?
- a) 100mL per day
 - b) 500mL per day
 - c) 1000mL per day
 - d) 1500mL per day
 - e) 2000mL per day

Gastrointestinal #21 – Physiology: Digestion & Absorption

- 1) Which of the following is the major source of carbohydrates in most human diets?
- a) Amylose
 - b) Amylopectin
 - c) Cellulose
 - d) Glycogen
 - e) Sucrose and lactose
- 2) Which of the following is a direct product of alpha-amylase digestion?
- a) Galactose
 - b) Glucose
 - c) Maltose
 - d) Sucrose
 - e) Lactose
- 3) Oligosaccharidase activity is highest at the upper jejunum. Which enzyme forms glucose and galactose as its product?
- a) Lactase
 - b) Sucrase
 - c) Alpha-dextrinase
 - d) Glucoamylase
- 4) Na⁺ and glucose or galactose enter the brush border at the duodenum and jejunum via SGLT1. What transporter is responsible for glucose, galactose, and fructose crossing at the basolateral membrane?
- a) GLUT1
 - b) GLUT2
 - c) GLUT3
 - d) GLUT4
 - e) GLUT5
- 5) What transporter is responsible for brush border entry of fructose?
- a) GLUT1
 - b) GLUT2
 - c) GLUT3
 - d) GLUT4

- e) GLUT5
- 6) Since the duodenum and small intestine have such a high capacity to digest protein, a total absence of which of the following would not impair protein digestion?
- a) Trypsin
 - b) Pepsin
 - c) Elastase
 - d) Chymotrypsin
 - e) Carboxypeptidases A and B
- 7) Dipeptides and tripeptides across the brush border is accomplished via a symported that is powered by which of the following?
- a) ATP
 - b) ADP
 - c) H⁺
 - d) Na⁺
 - e) HCO₃⁻
- 8) What is the primary lipid of a normal diet?
- a) Cholesterols
 - b) Triglycerides
 - c) Sterols
 - d) Esters
 - e) Phospholipids
- 9) Which of the following is true of lipid processing?
- a) Lipids leave stomach first and fat in the duodenum enhances gastric emptying
 - b) Lipids leave stomach last and fat in the duodenum enhances gastric emptying
 - c) Lipids leave stomach first and fat in the duodenum inhibits gastric emptying
 - d) Lipids leave stomach last and fat in the duodenum inhibits gastric emptying
- 10) Gastric lipase is secreted by:
- a) Chief cells
 - b) Parietal cells
 - c) Acinar cells
 - d) Goblet cells
 - e) Lecithins
- 11) Of the following pancreatic lipolytic enzymes, which cleaves the 1 and 1' fatty acids preferentially from a triglyceride and is known as pancreatic lipase?
- a) Glycerol ester hydrolase
 - b) Colipase
 - c) Cholesterol esterase
 - d) Phospholipase A2
- 12) Which of the following is most effective at forming mixed micelles with bile salts?
- a) Long chain fatty acids
 - b) Triglycerides
 - c) Cholesterol
 - d) 2-monoglycerides
 - e) Phospholipids

13) Diffusion of micelles through the unstirred layer is the rate-limiting step in absorption of lipid digestion products. Micelles are important in this process as they help with absorption of all of the following EXCEPT:

- a) Vitamin A
- b) Vitamin C
- c) Vitamin D
- d) Vitamin E
- e) Vitamin K

14) Once inside an intestinal epithelial cell, where are dietary lipids processed to be released as chylomicrons?

- a) Mitochondria
- b) Rough ER
- c) Smooth ER
- d) Golgi apparatus
- e) Lysosomes

15) The majority of fat-soluble vitamins leave the intestines via:

- a) Chylomicrons in lymph
- b) Chylomicrons in systemic blood
- c) Chylomicrons in portal blood
- d) Bile salt in lymph
- e) Bile salts in portal blood

16.1) The small intestines typically absorb how much fluid throughout the day?

- a) 2500mL
- b) 4000mL
- c) 5500mL
- d) 7000mL
- e) 8500mL

16.2) All of the following are absorbed, EXCEPT _____, which is secreted in ileum and colon.

- a) Na⁺
- b) K⁺
- c) Cl⁻
- d) HCO₃⁻

16.3) Absorption of which of the following is active (uses ATP) throughout the GI tract?

- a) Na⁺
- b) K⁺
- c) Cl⁻
- d) HCO₃⁻

16.4) Which of the following is true of the cells in Lieberkuhn crypts?

- a) Absorb water
- b) Absorb electrolytes
- c) Absorb water and electrolytes
- d) Secrete water and electrolytes

17) Regarding the enteric nervous system, which of the following would promote net absorption of water and electrolytes in the intestine?

- a) NO

- b) 5-HT
 - c) Norepinephrine
 - d) VIP
 - e) Ach
- 18) The absorption of calcium in the intestine is stimulated by:
- a) Intestinal membrane calcium binding protein (IMCBP)
 - b) Vitamin C
 - c) Vitamin D
 - d) Vitamin K
 - e) Calbindin
- 19) Which of the following helps to prevent excess iron absorption?
- a) Iron reductase at the duodenal membrane
 - b) DCT1 transporter exchanging H⁺
 - c) Conversion of Fe⁺⁺⁺ to ferritin
 - d) Iron-binding proteins for Fe⁺⁺⁺
 - e) The heme transporter in the jejunum
- 20) Although magnesium and phosphate are absorbed along the intestine, copper is mostly absorbed at what location?
- a) Stomach
 - b) Duodenum
 - c) Jejunum
 - d) Ileum
 - e) Colon

Match the vitamin with the site of absorption:

- 21.1) Ascorbic acid a) Jejunum
21.2) Folic acid b) Ileum
21.3) Thiamine c) Distal ileum
21.4) Vitamin B12 (receptor mediated endocytosis)

Gastrointestinal #22 – Pathology

- 1.1) Which of the following is the most common type of esophageal atresia (usually at tracheal bifurcation, TV4)?
- a) Type A: Esophageal atresia without fistula.
 - b) Type B: Esophageal atresia where the upper esophageal pouch connects abnormally to the trachea
 - c) Type C: Esophageal atresia where the lower esophageal pouch makes an abnormal connection with the trachea
 - d) Type D: Esophageal atresia where the upper and lower esophageal pouches make an abnormal connection with the trachea in two separate, isolated places
 - e) Type F: Esophageal stricture
- 1.2) A middle-aged woman presents with iron deficiency anemia, glossitis, cheilosis, and upper esophageal webs. Which of the following is most likely?
- a) Zenker diverticulum
 - b) Mallory-Weiss syndrome
 - c) Plummer-Vincent syndrome
 - d) Zollinger-Ellison syndrome

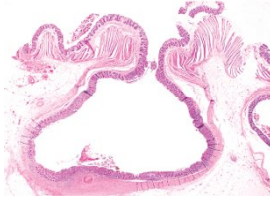
- e) Meckel diverticulum
- 2) A South American patient presents with inability to swallow whole foods. A barium swallow shows a “bird’s beak” dilation of the lower esophagus, just above the lower esophageal sphincter (LES). The clinician is concerned about squamous cell carcinoma of the esophagus. Which of the following describes this case?
- a) Atresia
 - b) Fistula
 - c) Stenosis
 - d) Rings
 - e) Achalasia
- 3) A patient presents with an out-pouching of the esophagus near the upper esophageal sphincter (UES). The patient complains of dysphagia, vomiting, and severe halitosis. Which of the following is most likely?
- a) Zenker diverticulum
 - b) Traction diverticulum
 - c) Sliding hiatal hernia
 - d) Epiphrenic diverticulum
 - e) Meckel diverticulum
- 4) An alcoholic presents after waking up vomiting painful blood. History reveals the patient often uses alcohol to the point of vomiting. Labs are negative for liver cirrhosis or portal hypertension. Which of the following is most likely?
- a) Zenker diverticulum
 - b) Mallory-Weiss syndrome
 - c) Plummer-Vincent syndrome
 - d) Zollinger-Ellison syndrome
 - e) Esophageal varices
- 5) A patient presents complaining of “looking pregnant.” History reveals chronic alcohol abuse but no history of hematemesis. Physical exam reveals abdominal ascites with caput medusae as well as enlarged hemorrhoids. Liver function tests suggest cirrhosis. Which of the following might this patient likely have that is fatal 50% of the time upon first complication?
- a) Zenker diverticulum
 - b) Mallory-Weiss syndrome
 - c) Plummer-Vincent syndrome
 - d) Zollinger-Ellison syndrome
 - e) Esophageal varices
- 6) A teenager is diagnosed with a sliding hiatal hernia. Which of the following would be the most likely type of esophagitis seen in this patient?
- a) Barrett esophagus
 - b) Reflux esophagitis
 - c) Infectious esophagitis
 - d) Chemical esophagitis
- 7) Which of the following is the biggest risk factor for esophageal adenocarcinoma?
- a) Barrett esophagus with gastric metaplasia
 - b) Barrett esophagus with intestinal metaplasia
 - c) Stage 3 squamous cell carcinoma of the esophagus

- d) Primary achalasia with absence of NO and VIP
 - e) Autoimmune gastritis with pernicious anemia
- 8) Benign esophageal tumors are mostly mesenchymal. Which of the following is NOT a benign tumor of the esophagus?
- a) Fibrovascular polyps or pedunculated lipomas
 - b) Leiomyoma
 - c) Inflammatory polyp
 - d) Squamous cell carcinoma
 - e) Squamous papilloma
- 9) A 50-year-old black male presents with large, gray-white, plaque-like elevations of the mucosa. The patient complains of no symptoms. History reveals alcohol and tobacco use, as well as being from an area where fungal carcinogens are found in everyday food. Prognosis is poor for this patient, as most squamous cell esophageal carcinoma diagnoses are made at what stage?
- a) Stage 1
 - b) Stage 2
 - c) Stage 3
 - d) Stage 4
 - e) Post-mortem
- 10) A 50-year-old white male presents with a tumor of the distal esophagus. After finding mucin-producing glandular tissue, esophageal adenocarcinoma is diagnosed. What is the most likely cause?
- a) *H. pylori*
 - b) Alcohol use
 - c) Tobacco use
 - d) p53 over expression
 - e) bcl-2 under expression
- 11) A male infant is brought in by his mother who explains that the child is “like something out of the movie Exorcist.” History reveals projectile vomiting. Physical exam reveals a palpable olive-like mass in the epigastric region. Which of the following is most likely?
- a) Zenker diverticulum
 - b) Primary achalasia
 - c) Plummer-Vincent syndrome
 - d) Esophageal adenocarcinoma
 - e) Pyloric stenosis
- 12) A heavy smoker with a history of aspirin use presents with epigastric pain and coffee-ground hematemesis. Microscopic examination of the stomach reveals neutrophilic infiltration. Testing would likely show too much HCl with back diffusion and low HCO₃-production. Which of the following is most likely?
- a) Hypertrophic gastropathy
 - b) Peptic stomach ulcer
 - c) Chronic gastritis
 - d) Acute gastritis
 - e) Gastric adenocarcinoma
- 13) What is the major cause of chronic gastritis, which shows lymphocytic infiltration?

- a) *H. pylori* infection
 - b) Smoking and alcohol use
 - c) Autoimmune (pernicious anemia)
 - d) NSAID use
 - e) Crohn disease
- 14) An elderly patient presents with sternal pain. After ruling out an MI, a peptic ulcer is suspected. Testing reveals an ulcer in the duodenum. History reveals NSAID use. What is the most likely cause of this patient's peptic ulcer?
- a) *H. pylori* infection
 - b) Smoking and alcohol use
 - c) Autoimmune (pernicious anemia)
 - d) NSAID use
 - e) Crohn disease
- 15) A patient presents with epigastric pain, diarrhea, bleeding, and mild weight loss. The patient is found to have giant cerebriform enlargement of the rugal folds of gastric mucosa. Growth factor over expression is suspected. Further testing shows that aside from the profound hyperplasia of the surface mucous cells, there is gland atrophy. Which of the following is most likely?
- a) Ménétrier disease
 - b) Hypertrophic-hypersecretory gastropathy
 - c) Gastric gland hyperplasia
 - d) Gastric lymphoma
 - e) Gastric adenocarcinoma
- 16) Which of the following forms of stomach polyps is the most likely to become cancerous?
- a) Hyperplastic polyps
 - b) Fundic gland polyps
 - c) Adenomas
 - d) All of the above
 - e) None of the above
- 17.1) Gastric adenocarcinoma is the second most common tumor in the world, seen mostly in men > 50 and involving the stomach antrum. Which of the following signs of gastric adenocarcinoma involves metastasis to the periumbilical region?
- a) Leukoplakia ("leather bottle")
 - b) Singlet-ring cells
 - c) Krukenberg tumor
 - d) Acanthosis nigricans
 - e) Sister Mary Joseph nodule
- 17.2) In gastric adenocarcinoma, Virchow node refers to the:
- a) Right supraclavicular node
 - b) Left supraclavicular node
 - c) Right infraclavicular node
 - d) Left infraclavicular node
 - e) Submental node
- 18) Which of the following tumors would originate from the interstitial cells of Cajal and thus affect peristalsis?

- a) Gastric adenocarcinoma
 - b) Gastric lymphoma
 - c) Gastrointestinal stromal tumor
 - d) Gastric neuroendocrine cell (carcinoid) tumor
 - e) Gastric gland hyperplasia
- 19) Meckel diverticulum is the most common congenital abnormality of the GI tract. Which of the following is INCORRECT regarding the “Rule of 2’s?”
- a) Occurs at 2 years of age
 - b) Occurs in 2:1 ratio of female predominance
 - c) Usually 2 inches in length
 - d) Occurs 2 feet from ileocecal valve
 - e) Occurs in 2% of general population
- 20) Which of the following is caused by a failure of neural crest cell migration, causing absence of ganglion cells of Auerbach and Meissner plexuses in part of the colon, leading to colon dilation (megacolon)?
- a) Rectal atresia
 - b) Hirschsprung disease
 - c) Imperforated anus
 - d) Anal agenesis
 - e) Anorectal agenesis
- 21) Atresia and stenosis of the small bowel is most commonly caused by:
- a) Colon denervation
 - b) Colon blockage
 - c) Colon ulcers
 - d) Duodenal obstruction
 - e) Failed ileocecal valve
- 22) Necrotizing enterocolitis (NEC) is the most common acquired GI emergency in neonates. When does it usually occur?
- a) During first bowel movement
 - b) Immediately after birth
 - c) During first rectal exam
 - d) After first meal
 - e) Immediately before onset of meningitis
- 23) A patient presents with diarrhea and steatorrhea. If malabsorption is found due to pancreatic insufficiency, which of the following categories is most likely?
- a) Lymphatic obstruction
 - b) Infection
 - c) Primary mucosal cell abnormalities
 - d) Defective intraluminal digestion
 - e) Reduced small intestinal surface area
- 24) A 40-year-old patient presents with diarrhea, flatulence, and weight loss. The patient complains of smelly steatorrhea. Testing shows low blood ferritin. Biopsy shows diffuse enteritis with marked atrophy of the villi. Which of the following is likely causing the symptoms in this patient?
- a) Red meats
 - b) Gluten

- c) Dairy
 - d) Purines
 - e) Cysteine
- 25) Tropical sprue is an infectious disease affecting people living or visiting the tropics and is caused by bacterial overgrowth by enterotoxigenic microbes. What deficiency do these patients often have?
- a) Iron and vitamin C
 - b) Vitamin A, D, E, and K
 - c) Folate and B12
 - d) Vitamin B2 and B6
 - e) Thiamin
- 26) A patient presents with arthritis, weight loss, and fever. Which of the following tests is definitive for diagnosing Whipple disease (*Tropheryma whippelii*)?
- a) Urea breath test
 - b) PPD skin test
 - c) Congo red stain
 - d) PAS test
 - e) Growth at 42-degrees
- 27) Bacterial overgrowth syndrome can be demonstrated by the presence of bacteria at what location?
- a) Stomach
 - b) Duodenum
 - c) Jejunum
 - d) Ileum
 - e) Colon
- 28) Disaccharidase deficiency leads to osmotic diarrhea after the consumption of which of the following?
- a) Red meats
 - b) Gluten
 - c) Dairy
 - d) Purines
 - e) Cysteine
- 29) An infant presents with failure to thrive, diarrhea, and steatorrhea. Blood testing shows burr cells. Which of the following is most likely?
- a) Abetalipoproteinemia
 - b) Tropical sprue
 - c) Ménétrier disease
 - d) Crohn disease
 - e) Ulcerative colitis
- 30) A patient presents with duodenal and colonic ulcers with a characteristic skipping distribution (skip lesions). Biopsy shows transmural involvement with non-caseating granulomas. Which of the following is most likely?
- a) Abetalipoproteinemia
 - b) Tropical sprue
 - c) Ménétrier disease
 - d) Crohn disease

- e) Ulcerative colitis
- 31) A patient presents with GI tract ulcers that began at the internal rectum. The lesions only involve the mucosa and may be a precursor to GI carcinoma. Which of the following is most likely?
- Abetalipoproteinemia
 - Tropic sprue
 - Ménétrier disease
 - Crohn disease
 - Ulcerative colitis
- 32) A patient with mitral valve stenosis presents with severe abdominal pain. A transmural infarction is found at the splenic flexure of the colon due to watershed between the thrombosed superior mesenteric artery (SMA) and the anastomosing inferior mesenteric artery (IMA). What aspect of treatment for this patient will most likely lead to further damage?
- Bowel resection
 - Reperfusion
 - Nasogastric feeding
 - Antibiotics
 - IV fluids
- 33) Shown here is a section through the sigmoid colon of a patient with intermittent abdominal discomfort and recent bright red blood per rectum (BRBPR). Which of the following is most likely?
- Diverticulitis
 - Diverticulosis
 - Crohn disease
 - Ulcerative colitis
 - Ménétrier disease
- 
- 34) Post-surgical bowel obstruction is most likely caused by:
- Hernias
 - Adhesions
 - Intussusception
 - Volvulitis
- 35) Peutz-Jeghers polyps fall under what category of small intestine and colonic tumors?
- Non-neoplastic polyps
 - Neoplastic epithelial lesions
 - Mesenchymal lesions
 - Lymphomas
- 36) A 50-year-old man presents with complaints of black feces (melena). Testing shows iron deficiency anemia. Further testing shows polyps that result from proliferation and dysplasia of the epithelium. The clinician is concerned about the risk of carcinoma. Which of the following is most likely?
- Adenomatous polyps of the colon
 - Familial adenomatous polyposis
 - Adenocarcinoma of the colon
 - Non-neoplastic polyps of the colon
 - Carcinoid tumor of the small intestine

- 37) Which of the following non-neoplastic polyps comprises 90% of all polyps found in the large intestine and results from decreased cell turnover and accumulation of mature cells, seen in the 6th and 7th decades of life?
- a) Hyperplastic polyps
 - b) Hamartomatous polyps
 - c) Inflammatory polyps
 - d) Lymphoid polyps
- 38) Familial adenomatous polyposis (FAP) is caused by mutations in the APC gene on chromosome 5q21. Which form of FAP involves 500-2500 adenomas combined with multiple epidermal cysts, fibromatosis, and retinal hyperplasia?
- a) Classic FAP syndrome
 - b) Attenuated FAP
 - c) Gardner syndrome
 - d) Turcot syndrome
- 39) A 65-year-old male undergoes a rectal exam that reveals occult blood on stool guaiac. History reveals a high fat, low fiber diet. Blood tests show anemia. CT scan of the liver shows metastasis. Which of the following is most likely?
- a) Adenomatous polyps of the colon
 - b) Familial adenomatous polyposis
 - c) Adenocarcinoma of the colon
 - d) Non-neoplastic polyps of the colon
 - e) Carcinoid tumor of the small intestine
- 40) Carcinoid tumor of the small intestine and colon shows a characteristic solid, yellow-tan appearance. Where is the most common location?
- a) Colon
 - b) Stomach
 - c) Small intestine
 - d) Rectum
 - e) Appendix
- 41) Carcinoid syndrome affects about 1% of patients with carcinoid tumors, causing problems such as vasomotor disturbances, intestinal hypermotility, asthmatic bronchoconstrictive attacks, hepatomegaly, and systemic fibrosis. What neurotransmitter is released in abundance, leading to these symptoms?
- a) Acetylcholine
 - b) Dopamine
 - c) Serotonin
 - d) Epinephrine
 - e) Norepinephrine

Gastrointestinal #23 – Clinical: Dysphagia

- 1) Which of the following best describes dysphagia?
- a) Pain on swallowing
 - b) Inability to breathe while swallowing
 - c) Hyper-peristalsis
 - d) Regurgitation of food
 - e) Defective transport of food

- 2) Which of the following best describes odynophagia?
 - a) Pain on swallowing
 - b) Inability to breathe while swallowing
 - c) Hyper-peristalsis
 - d) Regurgitation of food
 - e) Defective transport of food
- 3) Which of the following questions would NOT suggest the type of dysphagia present?
 - a) Is there heartburn?
 - b) What is the course of the dysphagia?
 - c) Is there increased bowel motility or diarrhea?
 - d) What type of food produces the dysphagia?
- 4) Which of the following is NOT a cause of intermittent dysphagia?
 - a) Motility disorder
 - b) GERD
 - c) Ring
 - d) Web
- 5) Mechanical obstruction associated with dysphagia occurs when the lumen diameter is less than how many millimeters?
 - a) 3mm
 - b) 6mm
 - c) 9mm
 - d) 12mm
 - e) 15mm
- 6) Where are peptic strictures most commonly located?
 - a) Proximal esophagus
 - b) Distal esophagus
 - c) Gastric fundus
 - d) Gastric body
 - e) Gastric antrum
- 7) Patients who ingest which of the following should not have vomiting induced due to the risk of alkaline stricture?
 - a) Snake venom
 - b) Brake cleaner
 - c) Radiator fluid
 - d) Soap
 - e) Lye
- 8) What is the treatment of choice for the prevention of alkaline stricture?
 - a) Bougienage
 - b) H2 blockers
 - c) PPIs
 - d) Antacids
 - e) Inducing singultus
- 9) What type of cancer is associated with lye stricture?
 - a) Fibrovascular polyps
 - b) Leiomyoma
 - c) Adenocarcinoma

- d) Squamous cell carcinoma
 - e) Squamous papilloma
- 10) What is the most common benign esophageal tumor?
- a) Fibrovascular polyps
 - b) Leiomyoma
 - c) Adenocarcinoma
 - d) Squamous cell carcinoma
 - e) Squamous papilloma
- 11) Which of the following is NOT a predisposing factor for esophageal squamous cell cancer?
- a) Tylosis (Howell-Evans syndrome)
 - b) Achalasia
 - c) Plummer-Vinson syndrome
 - d) Whipple disease
 - e) Human papillomavirus
- 12) Which of the following describes the typical presentation for esophageal malignancy?
- a) Hematemesis and night sweats
 - b) Progressive dyspnea and neck pain
 - c) Progressive dysphasia and weight loss
 - d) Steatorrhea and progressively frequent bowel movements
 - e) Progressive stricture and loss of control of the esophageal sphincters
- 13) Which of the following treatment options for esophageal cancer is the most effective?
- a) Chemotherapy
 - b) Laser endoscopy and chemotherapy
 - c) Surgery and preoperative radiation for proximal 1/3 lesions
 - d) Surgery and preoperative radiation for middle 1/3 lesions
 - e) Surgery and preoperative radiation for distal 1/3 lesions
- 14) A patient presents after a choking incident at a steak house. Testing shows a ring formed near the lower esophageal sphincter (Schatzki ring). What is the treatment of choice?
- a) Dilation
 - b) Surgery
 - c) Chemotherapy
 - d) Skeletal muscle relaxants
 - e) Smooth muscle relaxants
- 15) Plummer-Vinson syndrome involves a cervical esophageal web and is associated with a risk of oropharyngeal or esophageal squamous cell cancer. What blood finding is also seen in this syndrome?
- a) Megaloblastic anemia
 - b) Anemia of chronic disease
 - c) Iron deficiency anemia
 - d) Aplastic anemia
 - e) Sideroblastic anemia
- 16) Which of the following describes the clinical course of functional dysphagia?
- a) Progressive with dysphagia for solids
 - b) Progressive with dysphagia for liquids

- c) Intermittent with dysphagia for solids
 - d) Intermittent with dysphagia for liquids
 - e) Intermittent with dysphagia for solids and liquids
- 17) Which of the following is NOT a major motor abnormality of the esophagus?
- a) Scleroderma
 - b) Stricture
 - c) Diffuse esophageal spasm
 - d) Achalasia
- 18) An elderly patient presents with dysphasia heartburn. Barium swallow fluoroscopy shows a beak-like tapering. Denervation of Auerbach ganglion cells is suspected. Which of the following is most likely?
- a) Chagas disease
 - b) Scleroderma
 - c) Achalasia
 - d) Diffuse esophageal spasm
 - e) Functional dysphagia
- 19) Endoscopy is important in patients with suspected achalasia as it can be differentiated from which of the following?
- a) Chagas disease
 - b) Scleroderma
 - c) Cancer
 - d) Human papillomavirus
 - e) Diffuse esophageal spasm
- 20) A patient presents with a triad of achalasia, cardiomyopathy, and megacolon. Which of the following is most likely?
- a) Plummer-Vinson syndrome
 - b) Howell-Evans syndrome
 - c) Scleroderma
 - d) Chagas disease
 - e) Turcot syndrome
- 21) A patient presents with chest pain and intermittent dysphagia, which is aggravated by hot and cold liquids. Barium swallow shows a corkscrew esophagus. Which of the following is most likely?
- a) Chagas disease
 - b) Scleroderma
 - c) Achalasia
 - d) Diffuse esophageal spasm
 - e) Functional dysphagia
- 22) A patient presents with complaints of severe gastric reflux as well as color changes of the hands in cold weather. Barium swallow shows a common esophagogastric tube. Which of the following is most likely?
- a) Chagas disease
 - b) Scleroderma
 - c) Achalasia
 - d) Diffuse esophageal spasm
 - e) Oropharyngeal dysphagia

- 23) Which of the following is seen with neurologic dysfunction?
- a) Chagas disease
 - b) Scleroderma
 - c) Achalasia
 - d) Diffuse esophageal spasm
 - e) Oropharyngeal dysphagia
- 24) Which of the following is NOT a likely cause of oropharyngeal dysphasia?
- a) Geriatric delirium
 - b) Multiple sclerosis (MS)
 - c) Parkinson disease
 - d) Cerebrovascular accident (CVA)
 - e) Amyotrophic lateral sclerosis (ALS)

Gastrointestinal #24 – Clinical: Gastroesophageal Reflux Disease (GERD)

- 1) What is the major barrier to gastric reflux?
- a) Antrum anatomy
 - b) Upper esophageal sphincter
 - c) Lower esophageal sphincter
 - d) Pyloric sphincter
 - e) Cardiac sphincter
- 2) A patient presents with complaints of heartburn that occurs when he lies down to watch T.V. after dinner. What is the appropriate management for this patient?
- a) Endoscopy
 - b) Barium swallow
 - c) Esophageal biopsy
 - d) Esophageal CT scan
 - e) Trial pharmacotherapy
- 3) Which of the following is an alarm signal indicating the need to perform endoscopy on a patient with presumed gastroesophageal reflux disease (GERD)?
- a) High fever
 - b) Weight loss
 - c) Vomiting
 - d) Coughing
 - e) Nocturnal reflux
- 4) Which of the following is considered a typical symptom of GERD?
- a) Non-cardiac chest pain
 - b) Asthma
 - c) Chronic cough
 - d) Hoarseness
 - e) Nocturnal reflux
- 5) What is the most common cause of non-cardiac chest pain?
- a) Reflux
 - b) Musculoskeletal
 - c) Pleural effusion
 - d) Pulmonary embolism
 - e) Anxiety

- 6) Which of the following reflux complications is most associated with adenocarcinoma of the esophagus?
- a) Ulceration
 - b) Bleeding
 - c) Stricture
 - d) Barrett esophagus
 - e) Aspiration
- 7) What change is seen in Barrett esophagus?
- a) Squamous dysplasia
 - b) Cuboid dysplasia
 - c) Columnar dysplasia
 - d) Destruction of mucous glands
 - e) Enhanced HCl secretion
- 8) What patient population should be screened for Barrett esophagus?
- a) Obese
 - b) Elderly men
 - c) Elderly women
 - d) Alcoholics
 - e) Patients with reflux
- 9) Which of the following screening and treatment techniques is agreed upon for patients with Barrett esophagus?
- a) Surgery
 - b) Photodynamic therapy
 - c) Aggressive anti-reflux therapy
 - d) Chemotherapy
 - e) Barium swallow and endoscopy biopsy
- 10) A barium swallow fluoroscopy used in testing for GERD can distinguish between normal and abnormal reflux.
- a) True
 - b) False
- 11) What is the first test for long-standing cases of reflux to rule out Barrett esophagus?
- a) Barium swallow
 - b) Urea breath test
 - c) Endoscopy biopsy
 - d) Esophagoscopy
 - e) CT scan
- 12) Which of the following biopsy specimen findings is 100% sensitive for the diagnosis of esophagitis?
- a) Columnar dysplasia
 - b) Squamous dysplasia
 - c) Neutrophilia
 - d) Burr cells
 - e) Eosinophilia
- 13) Which of the following is NOT an indication for 24-hour intraesophageal pH monitoring?
- a) Water brash

- b) Pulmonary symptoms
 - c) Non-diagnostic evaluation
 - d) Therapy-refractory symptoms
 - e) Atypical reflux symptoms
- 14) The Bernstein test used for reflux is performed by:
- a) Infusing saline solution then acidic solution via nasogastric (NG) tube
 - b) Infusing saline solution then alkaline solution via nasogastric (NG) tube
 - c) Infusing acidic solution then saline solution via nasogastric (NG) tube
 - d) Infusing alkaline solution then saline solution via nasogastric (NG) tube
- 15) Esophageal manometry is used for preoperative evaluation of surgical patients or for patients with suspected:
- a) GERD
 - b) Esophageal varices
 - c) Barrett esophagus
 - d) Plummer-Vinson syndrome
 - e) Esophageal motility disorders
- 16) Which of the following is NOT a component of phase 1 therapy for GERD?
- a) Elevate head of bed 6 inches
 - b) No eating for 3 hours before reclining
 - c) Decrease dietary protein
 - d) Weight loss if overweight
 - e) Avoid specific foods (coffee, fatty foods)
- 17) A female college student presents with reflux symptoms. What drug is she likely taking that would decrease LES pressure?
- a) Theophylline
 - b) Tranquilizer
 - c) Anticholinergic
 - d) Progestosterone
 - e) Beta agonist
- 18) What medications are used for phase 2 therapy for GERD?
- a) Antacids and H2 blockers
 - b) Antacids and PPIs
 - c) H2 blockers and PPIs
 - d) Phase 2 therapy requires surgery
 - e) Phase 2 GERD cannot be treated
- 19) Proton pump inhibitors are the most effective at relieving GERD symptoms and promoting mucosal healing. How long should therapy last?
- a) 2 weeks
 - b) 1 month
 - c) 6 weeks
 - d) 2 months
 - e) 3 months
- 20) Which of the following patients is a candidate for anti-reflux surgery?
- a) Younger patient who wants to avoid lifelong therapy
 - b) Elderly patient who may have side effects with PPIs
 - c) Patients who are allergic to H2 blockers

- d) Patients with a good surgical history
 - e) Surgery should be disused with all reflux patients
- 21) What is the preferred surgical procedure for severe GERD?
- a) Dor fundoplication
 - b) Nissen fundoplication
 - c) Toupet fundoplication
 - d) Roux-en-Y gastric bypass
 - e) Stricture dilatation

Gastrointestinal #25 – Clinical: Non-Cardiac Chest Pain

- 1) What does an esophagogastroduodenoscopy rule out when a patient presents with non-cardiac chest pain?
- a) GERD
 - b) Esophageal spasm
 - c) Mucosal disease
 - d) Pancreatitis
 - e) Zenker diverticulum

Gastrointestinal #26 – Clinical: Infections of the Esophagus

- 1) Along with immunodeficiency, patients with what disorder have an increased susceptibility to opportunistic infection?
- a) GERD
 - b) Esophageal varices
 - c) Barrett esophagus
 - d) Plummer-Vinson syndrome
 - e) Esophageal motility disorders
- 2) What is the presenting symptom in patients with esophagitis?
- a) Pain on swallowing
 - b) Inability to breathe while swallowing
 - c) Hyper-peristalsis
 - d) Regurgitation of food
 - e) Defective transport of food
- 3) A barium radiography and endoscopy show small discrete ulcers without plaques. Intranuclear inclusions (Cowdy bodies) are found. Which of the following is most likely?
- a) Candida infection
 - b) Herpes infection
 - c) Cytomegalovirus
 - d) Whipple disease
 - e) Barrett esophagus

Gastrointestinal #27 – Clinical: Other Esophageal Problems

- 1) Drug-induced esophagitis most commonly presents:
- a) In the elderly, affecting the proximal esophagus
 - b) In the elderly, affecting the mid esophagus
 - c) In the elderly, affecting the distal esophagus
 - d) In the chronically ill, affecting the entire esophagus

- e) In the immunosuppressed, affecting the entire esophagus
- 2) Which of the following is NOT associated with pill-induced esophagitis?
 - a) Calcium supplements
 - b) Doxycycline
 - c) Tetracycline
 - d) Quinidine
 - e) Bisphosphonates
- 3) What treatment stops bleeding in 90% of patients with Mallory-Weiss syndrome?
 - a) Vasopressin
 - b) Endoscopic injection
 - c) Electrocautery
 - d) Surgery
 - e) Bleeding stops spontaneously
- 4) What procedure most commonly precedes esophageal perforation?
 - a) Dor fundoplication
 - b) Nissen fundoplication
 - c) Toupet fundoplication
 - d) Roux-en-Y gastric bypass
 - e) Stricture dilatation
- 5) An alcoholic presents after a drinking binge leading to violent retching. Endoscopy shows perforation of the left posterior portion of the distal esophagus. If pleural fluid is present, what would be found in increased concentration?
 - a) Glucose
 - b) Calcium
 - c) Amylase
 - d) Surfactant
 - e) Eosinophils

Gastrointestinal #28 – Clinical: Peptic Ulcer Disease

- 1) Peptic ulcer disease (PUD) is divided into three categories, including NSAIDs and miscellaneous. Which of the following encompasses the third category?
 - a) Zollinger-Ellison syndrome
 - b) *Helicobacter pylori*
 - c) Idiopathic hypersecretion
 - d) Bile salt reflux
 - e) Lysolecithin reflux
- 2) The miscellaneous category accounts for what percentage of PUD?
 - a) 95%
 - b) 75%
 - c) 50%
 - d) 25%
 - e) 5%

Gastrointestinal #29 – Clinical: Helicobacter pylori

- 1) *H. pylori* infections cause which of the following over a period of weeks to months?
 - a) Chronic superficial gastritis

- b) Gastric malignancy
 - c) Chronic atrophic gastritis
 - d) GERD
 - e) Barrett esophagus
- 2) Which of the following individuals would be LEAST likely to be infected with *Helicobacter pylori*?
- a) Gastrointestinal physician
 - b) Young child in developing country
 - c) Elderly in developing country
 - d) Young child in developed country
 - e) Elderly in developed country
- 3) Type B chronic gastritis is found universally in patients with active chronic gastritis that is not caused by type A or C. Which of the following is associated with type A chronic gastritis?
- a) NSAIDS
 - b) Bile salts
 - c) Pernicious anemia
 - d) Alcohol
 - e) Aspirin
- 4) What is the most common type of chronic gastritis
- a) Infectious granulomatous gastritis
 - b) Gastritis in patients who are immunosuppressed
 - c) Autoimmune gastritis
 - d) Autoimmune gastritis
 - e) *H. pylori* associated chronic gastritis
- 5) Which of the following is associated with about 60-95% of all duodenal ulcers?
- a) *H. pylori* infection
 - b) Bile salt reflux
 - c) NSAIDS use
 - d) Alcohol use
 - e) Aspirin use
- 6) Which of the following describes the relapse rate at 1 year without treatment of *H. pylori* duodenal ulcer, as well as the relapse rate with treatment?
- a) 1-year relapse is about 50% without treatment, nearly 0% with treatment
 - b) 1-year relapse is nearly 100% without treatment, nearly 0% with treatment
 - c) 1-year relapse is about 50% without treatment, about 25% with treatment
 - d) 1-year relapse is nearly 100% without treatment, about 25% with treatment
 - e) 1-year relapse rate is not affected by treatment or non-treatment
- 7) What is the approximate prevalence rate of *H. pylori* infections in patients with gastric ulcers?
- a) 0%
 - b) 20%
 - c) 40%
 - d) 60%
 - e) 80%
- 8) Which of the following has the strongest association with *H. pylori* infection?

- a) MALT lymphoma
 - b) Hypertrophic-hypersecretory gastropathy
 - c) Gastric gland hyperplasia
 - d) Gastric lymphoma
 - e) Gastric adenocarcinoma
- 9) What is the treatment of choice for non-ulcer dyspepsia in patients with *H. pylori*?
- a) Early antibiotic therapy is essential for clinical improvement
 - b) Most evidence points toward treating the infection early
 - c) Most evidence finds that treatment leads to poor clinical outcomes
 - d) Most evidence shows that treatment will not clear the infection
 - e) No evidence exists showing clinical improvement with treatment
- 10) What is the most cost effective, non-invasive method for diagnosing primary *H. pylori*?
- a) Urea breath test
 - b) Biopsy
 - c) Serologic testing
 - d) Stool antigen test
 - e) Barium swallow
- 11) What radio labeled substance is examined on exhalation for a patient undergoing a urea breath test?
- a) Urea
 - b) HCl
 - c) H₂O
 - d) CO₂
 - e) NaCl
- 12) Which of the following is the least invasive way to differentiate between active disease and past *H. pylori* infection?
- a) Urea breath test
 - b) Biopsy
 - c) Serologic testing
 - d) Endoscopy
 - e) Barium swallow
- 13) Which of the following is a simple and non-invasive method used to assess the success of *H. pylori* eradication efforts?
- a) Octreotide scan
 - b) Urea breath test
 - c) Serologic testing
 - d) Stool antigen test
 - e) Barium swallow
- 14) Which of the following is NOT a commonly used method in the initial evaluation of symptomatic patients with suspected *H. pylori* infections?
- a) Biopsy urease test
 - b) Barium swallow
 - c) Endoscopy
 - d) Histological examination
- 15) What is the treatment of choice for *H. pylori* positive duodenal or gastric ulcers?

- a) High dose anti-secretory agents
 - b) Anti-microbial therapy
 - c) Anti-secretory agents and anti-microbial therapy
 - d) Surgical intervention
 - e) Treatment is not recommended
- 16) What is the treatment of choice for non-ulcer dyspepsia and asymptomatic *H. pylori* infections?
- a) High dose anti-secretory agents
 - b) Anti-microbial therapy
 - c) Anti-secretory agents and anti-microbial therapy
 - d) Surgical intervention
 - e) Treatment is not recommended

Gastrointestinal #30 – Clinical: NSAID-Induced Ulcers

- 1) Which of the following occurs with PUD caused by NSAIDs?
- a) Prostaglandin synthesis is blocked
 - b) Mucosal blood flow is reduced
 - c) Mucous secretion is decreased
 - d) Bicarbonate secretion is decreased
 - e) All of the above
- 2) Where are NSAID-induced ulcers typically located?
- a) Fundus
 - b) Body
 - c) Antrum
 - d) Pylorus
 - e) A & B
 - f) C & D
- 3) Elderly patients with a previous history of peptic ulcer disease are at the highest risk for NSAID-induced PUD. After NSAID therapy is started, when is the risk highest?
- a) In the first day
 - b) In the first month
 - c) After 2 months
 - d) After 4 months
 - e) After 6 months
- 4) What is the initial treatment for NSAID-induced ulcers?
- a) Prostaglandin replacement
 - b) Prostaglandin agonist
 - c) PPIs
 - d) H2 blockers
 - e) Discontinue NSAID
- 5) Which of the following is a drug used to prevent NSAID-induced ulcers and works via prostaglandin replacement?
- a) Misoprostol (Cytotec)
 - b) Omeprazole (Prilosec)
 - c) Esomeprazole (Nexium)
 - d) Ranitidine (Zantac)

- e) Domperidone (Motilium)
- 6) Which of the following is NOT associated with duodenal ulcers?
 - a) NSAIDs
 - b) Cigarettes
 - c) Alcohol
 - d) Cirrhosis
 - e) Chronic renal or pulmonary disease
- 7) Which of the following is NOT associated with gastric ulcers?
 - a) Bile reflux
 - b) NSAIDs
 - c) Acid hyposecretion
 - d) *H. pylori* infection
 - e) Cigarettes

Gastrointestinal #31 – Clinical: Zollinger-Ellison Syndrome

- 1) Which of the following is NOT part of the triad seen in Zollinger-Ellison syndrome (ZES)?
 - a) Acid hypersecretion
 - b) Iron-deficiency anemia
 - c) Peptic ulceration
 - d) Diarrhea
- 2) Where is the most common tumor location seen in ZES?
 - a) Stomach
 - b) Pancreas
 - c) Duodenum
 - d) Bile duct
 - e) Liver
- 3) The most common clinical presentation seen in ZES is ulceration of the:
 - a) Stomach
 - b) Duodenum
 - c) Jejunum
 - d) Cecum
 - e) Ileum
- 4) Which of the following is NOT a situation that would suggest ZES?
 - a) Diarrhea with duodenal ulcer
 - b) Hypercalcemia with duodenal ulcer
 - c) Duodenal ulcer without *H. pylori* or NSAID use
 - d) Recurrent ulcers or intractable ulcers
 - e) Low serum gastrin levels with pancreatic tumor
- 5) What lab finding is considered essentially diagnostic of Zollinger-Ellison syndrome?
 - a) High serum pepsin levels
 - b) High serum HCl levels
 - c) High serum gastrin levels
 - d) Low serum gastrin levels
 - e) Low serum pepsinogen levels
- 6) What test is used to localize a gastrinoma?

- a) Octreotide scan
 - b) Stool antigen test
 - c) Magnetic resonance imaging
 - d) Computed tomography scan
 - e) Barium swallow
- 7) What is the primary treatment for ZES gastrinomas?
- a) Chemotherapy with streptozocin
 - b) Chemotherapy with 5-FU
 - c) Surgical resection
 - d) Parietal cell vagotomy
 - e) High-dose long-term PPIs

Gastrointestinal #32 – Clinical: Stress Ulcers

- 1) Gastric mucosal ischemia due to an underlying disease leads to:
- a) *H. pylori* ulcers
 - b) Adenocarcinoma
 - c) Stress ulcers
 - d) Zollinger-Ellison syndrome
 - e) Plummer-Vinson syndrome
- 2) Which of the following is most likely to cause stress ulcers?
- a) Cytomegalovirus infection
 - b) Immunosuppression
 - c) NSAIDs
 - d) Sepsis
 - e) Bone fracture
- 3) What is the goal when using antacids, H2 receptor blockers, and sucralfate in the prophylaxis of stress ulcers?
- a) Increase mucosal volume
 - b) Enhance mucosal tonicity
 - c) Keep gastric pH high
 - d) Keep gastric pH low
 - e) Heal gastric wall damage
- 4) What is the added benefit of sucralfate use in ventilator-dependent patients?
- a) Reduces cardiac workload
 - b) Enhances FEV1 volume
 - c) Prevents pneumothorax
 - d) Reduces pneumonia risk
 - e) Prevents airway spasm
- 5) What is the primary treatment for bleeding, acute gastric mucosal ulcers?
- a) Treat underlying condition
 - b) Endoscopic epinephrine injection
 - c) Endoscopic electrocautery
 - d) Intra arterial vasopressin injection
 - e) Transcatheter embolization
 - f) None of the above

Gastrointestinal #33 – Clinical: Bleeding Ulcers

- 1) What is the first line therapy for a UGI bleed?
 - a) Endoscopic epinephrine and electrocautery
 - b) Endoscopic lidocaine and electrocautery
 - c) Intra arterial vasopressin injection
 - d) Transcatheter embolization
 - e) No treatment necessary

Gastrointestinal #34 – Clinical: Non-Erosive Non-Specific Chronic Gastritis

- 1) Which of the following is NOT true of Type A chronic gastritis?
 - a) Located in the body or fundus of the stomach
 - b) Is autoimmune in etiology
 - c) Is associated with sideroblastic anemia
 - d) Is associated with Addison disease and Hashimoto thyroiditis
 - e) There is a risk of gastric polyps and adenocarcinoma
- 2) Which of the following is NOT true of Type B chronic gastritis?
 - a) Located in the antrum of the stomach
 - b) Etiology is related to *H. pylori*
 - c) Serum gastrin is decreased
 - d) Is associated with gastric ulcers
 - e) There is a risk of gastric polyps and adenocarcinoma

Gastrointestinal #35 – Clinical: Gastric Cancer

- 1) Which of the following is true of gastric cancer?
 - a) Associated with pickled vegetables, salted meats, and smoked foods
 - b) Has a 2:1 female to male ratio
 - c) Risk decreases with age
 - d) Higher socioeconomic status increases risk
- 2) Which of the following would suggest the need to perform endoscopy with multiple (7-8) biopsies, suspecting gastric cancer?
 - a) Night sweats and crushing chest pain
 - b) Abdominal discomfort and weight loss
 - c) Dyspnea on exertion and reflux
 - d) Hemoptysis and hematuria in a teenager
 - e) Vomiting and bloody diarrhea
- 3) Which of the following is true of metastatic gastric cancer?
 - a) Has a 90% survival rate as it remains confined to mucosa
 - b) Is surgically resectable in most cases
 - c) Responds well to chemotherapy
 - d) Responds well to radiation
 - e) Is only viable for palliation

Gastrointestinal #36 – Clinical: Gastric Polyps

- 1) Which of the following types of polyps is considered malignant?
 - a) Hyperplastic polyps
 - b) Adenomatous polyps, < 2cm

- c) Adenomatous polyps, > 2cm
- d) B & C
- e) None of the above

Gastrointestinal #37 – Clinical: Gastroduodenal Dysmotility Syndromes

- 1) Which of the following is suggestive of delayed gastric emptying (gastroparesis)?
 - a) Nausea and vomiting
 - b) Bloating and anorexia
 - c) Early satiety and weight loss
 - d) Dyspnea and heart burn
 - e) All of the above
- 2) Anticholinergic drugs are associated with gastroparesis, which can be treated with metoclopramide. What patient population or condition is also at risk for gastroparesis?
 - a) HIV positive
 - b) Gastric cancer
 - c) Wernicke-Korsakoff syndrome
 - d) Diabetes mellitus
 - e) Addison disease

Gastrointestinal #38 – Clinical: Diarrhea

- 1) Which of the following best describes diarrhea?
 - a) Increased stool weight
 - b) Increased stool volume
 - c) Increased stool weight or volume
 - d) Increased stool density
 - e) Increased stool density and solute concentration
- 2) Which of the following describes the mechanism for osmotic diarrhea?
 - a) Poor absorption of fats
 - b) Poor absorption of water soluble molecules
 - c) Poor absorption of water insoluble molecules
 - d) Excretion of ionic compounds into the intestine
 - e) Intestinal excretion of fluid with poor absorption
- 3) Which of the following would cause osmotic diarrhea?
 - a) Lactase deficiency
 - b) H2 blockers and PPIs
 - c) Bacterial toxins
 - d) Hypersecretion of gastrin
 - e) Loss of intestinal GALT
- 4) Which of the following describes the mechanism for secretory diarrhea?
 - a) Abnormal diarrhea membrane permeability
 - b) Poor absorption of water soluble molecules
 - c) Poor absorption of water insoluble molecules
 - d) Excretion of ionic compounds into the intestine
 - e) Intestinal excretion of fluid with poor absorption
- 5) Which of the following would NOT cause secretory diarrhea?
 - a) Bacterial toxins

- b) Hormone secreting tumors
 - c) Laxative ingestion
 - d) Sorbitol foods
 - e) Fatty acid diarrhea
- 6) Which of the following is indicative of osmolar diarrhea?
- a) Osmolality around 290
 - b) No osmolar gap presents
 - c) Fasting stops the diarrhea
 - d) Volume is > 1L per day
- 7) Which of the following describes the mechanism for exudative diarrhea?
- a) Abnormal diarrhea membrane permeability
 - b) Poor absorption of water soluble molecules
 - c) Poor absorption of water insoluble molecules
 - d) Excretion of ionic compounds into the intestine
 - e) Intestinal excretion of fluid with poor absorption
- 8) Which of the following best describes the typical exudative diarrhea?
- a) High volume, watery
 - b) Low volume, watery
 - c) High volume, bloody
 - d) Low volume, bloody
- 9) Which of the following is NOT associated with exudative diarrhea?
- a) Inflammatory bowel disease
 - b) Shigella
 - c) Salmonella
 - d) Cholera
- 10) Which of the following would decrease intestinal transit time?
- a) Post-gastrectomy
 - b) Intestinal resection
 - c) Visceral neuropathy
 - d) Carcinoid syndrome
- 11) Which of the following would increase intestinal transit time?
- a) Strictures
 - b) Hyperthyroidism
 - c) Blind loops
 - d) Myopathy (scleroderma)
- 12) Which of the following is indicative of right-sided diarrhea?
- a) Large stool volume
 - b) Urgency
 - c) Blood or mucus
 - d) Inflammation
- 13) Acute diarrhea is:
- a) Abrupt in onset, lasting 3-10 days
 - b) Abrupt in onset, lasting 1-3 days
 - c) Progressive in onset, lasting 3-10 days
 - d) Progressive in onset, lasting 1-3 days
- 14) Chronic diarrhea is an initial episode of diarrhea that last longer than:

- a) 4 days
 - b) 8 days
 - c) 2 weeks
 - d) 4 weeks
 - e) 8 weeks
- 15) What is the most common cause of chronic diarrhea?
- a) Stress ulcers
 - b) Gastric cancer
 - c) Crohn disease
 - d) Irritable bowel syndrome
 - e) Inflammatory bowel disease
- 16) Which of the following is absorbed at the ileum, not the duodenum?
- a) Iron
 - b) Calcium
 - c) Vitamin B12
 - d) Vitamin C
 - e) Folate
- 17) A patient presents with history of steatorrhea. Physical exam reveals parasthesia, tetany, and bone pain. Tapping on the angle of the jaw reveals twitching of the facial muscles (Chvostek or Weiss sign). Which of the following is most likely?
- a) Decreased protein absorption
 - b) Decreased vitamin D absorption
 - c) Decreased calcium absorption
 - d) Potassium loss
 - e) Decreased vitamin K
- 18) Which of the following would lead to fat malabsorption?
- a) Common bile duct obstruction
 - b) Duodenal ulcers due to *H. pylori*
 - c) *Trichuris trichiura* infection
 - d) Whipple disease
 - e) Carcinoid tumor

Gastrointestinal #39 – Clinical: Diseases Causing Diarrhea

- 1) Which of the following is a characteristic stool finding of lactase deficiency?
- a) pH of stool > 6.0
 - b) pH of stool < 6.0
 - c) Blood in stool
 - d) Pus in stool
 - e) High stool glucose content
- 2) Which of the following ethnic groups is least likely to acquire lactase deficiency?
- a) Asians
 - b) Eskimos
 - c) South Americans
 - d) African Americans
 - e) Middle Easterners

- 3) A patient presents with massive diarrhea (5L daily), hypokalemia, and achlorohydrria. Verner-Morrison syndrome is suspected. Where would a clinician expect to find a tumor in this patient?
- Carcinoid tumor
 - Gastric pylorus
 - Duodenal bulb
 - Pancreas, beta islet cells
 - Pancreas, non-beta islet cells
- 4) A patient presents with watery diarrhea, wheezing, and episodic flushing that lasts up to 10 minutes per episode. Urine shows increased levels of 5-hydroxyindoleacetic acid (5-HIAA). Which of the following is most likely?
- Niacin overdose
 - Raynaud syndrome
 - Trichuris trichiura* infection
 - Whipple disease
 - Carcinoid tumor
- 5) An elderly patient presents with complaints of diarrhea. Protoscopic findings show melanosis coli (brown/black pigmentation of large intestine mucosa). Barium enema shows a “cathartic colon” (dilated, hypomobile, lacking haustra). Upon questioning, the patient denies taking laxatives. Which of the following is the most likely cause of this patient’s diarrhea?
- Bacterial toxin
 - Hormone secreting tumor
 - Sorbitol foods
 - Laxatives
 - Pancreatic insufficiency
- 6) What is the most common cause of watery diarrhea in referral centers?
- Cholera
 - Food poisoning
 - Sorbitol foods
 - Verner-Morrison syndrome
 - Surreptitious laxative ingestion
- 7) Extensive resection of which area of the GI tract would lead to steatorrhea due to fat malabsorption?
- Stomach
 - Duodenum
 - Jejunum
 - Ileum
 - Transverse colon
- 8) Which of the following is NOT suggestive of bacterial overgrowth?
- Vitamin B12 malabsorption
 - Decreased folate levels
 - Abnormal bile acid breath test
 - Steatorrhea
 - Positive jejunal cultures

- 9) Which of the following stool findings can usually differentiate invasive diarrhea from toxigenic diarrhea?
- a) Cysts
 - b) Sorbitol
 - c) Folate
 - d) Leukocytes
 - e) Eosinophils
- 10) A patient presents with rapid onset diarrhea that has lasted for 24 hours. The patient says their last meal prior to the diarrhea was an egg salad sandwich. Which of the following is most likely?
- a) *Staphylococcus aureus*
 - b) *Clostridium perfringens*
 - c) *Escherichia coli*
 - d) *Vibrio cholerae*
 - e) *Bacillus cereus*
 - f) *Clostridium botulinum*
- 11) What is the only toxigenic bacterial diarrhea in which antibiotics shorten the duration of the disease?
- a) *Staphylococcus aureus*
 - b) *Clostridium perfringens*
 - c) *Escherichia coli*
 - d) *Vibrio cholerae*
 - e) *Bacillus cereus*
 - f) *Clostridium botulinum*
- 12) Which of the following is NOT a specific sign seen in invasive bacterial diarrhea?
- a) Fecal leukocytes
 - b) Blood stools
 - c) Cramps
 - d) Fever
- 13) A patient presents with fever and bloody diarrhea after a business trip. After stool and blood cultures, the clinician worries about the patient developing Reiter syndrome (reactive arthritis). Which of the following is most likely?
- a) *Aeromonas hydrophila*
 - b) *Vibrio vulnificus*
 - c) *Salmonella typhimurium*
 - d) *Shigella* species
 - e) *Escherichia coli*
- 14) A college student presents with watery diarrhea. History reveals the patient tried to cook chicken for the first time on a grill and it “might have been a little pink in the middle.” Which of the following is most likely?
- a) *Aeromonas hydrophila*
 - b) *Vibrio vulnificus*
 - c) *Salmonella typhimurium*
 - d) *Shigella* species
 - e) *Escherichia coli*

15) Cruise ship vacationers come to the physician's quarters with complaints of acute onset of explosive diarrhea and fever. History reveals each patient had eaten shellfish for dinner and some questioned how well it was cooked. Which of the following is most likely?

- a) *Vibrio vulnificus*
- b) *Vibrio parahaemolyticus*
- c) *Escherichia coli*
- d) *Yersinia enterocolitica*
- e) *Campylobacter jejuni*

16) A patient presents with bloody diarrhea after eating a hamburger. The clinician worries about hemolytic uremic syndrome. Which of the following is most likely?

- a) *Vibrio vulnificus*
- b) *Vibrio parahaemolyticus*
- c) *Escherichia coli*
- d) *Yersinia enterocolitica*
- e) *Campylobacter jejuni*

17) A patient presents with fever, diarrhea, leukocytosis, and sore throat. Further testing shows ankylosing spondylitis and erythema multiforme. Which of the following is most likely?

- a) *Vibrio vulnificus*
- b) *Vibrio parahaemolyticus*
- c) *Escherichia coli*
- d) *Yersinia enterocolitica*
- e) *Campylobacter jejuni*

18) A bushwalker presents with bloody diarrhea after trekking near wombats and kangaroos. Lab testing shows bacterial growth at 42 degrees. Which of the following is most likely?

- a) *Vibrio vulnificus*
- b) *Vibrio parahaemolyticus*
- c) *Escherichia coli*
- d) *Yersinia enterocolitica*
- e) *Campylobacter jejuni*

19) A patient presents to the hospital with severe vomiting, diarrhea, and septicemia. The patient is visiting the Gulf of Mexico and has been seeking the best tasting oysters in town. The patient is immediately placed in ICU and given broad-spectrum antibiotics, since this bacterium has a nearly 50% mortality rate. What is the bacterium?

- a) *Aeromonas hydrophila*
- b) *Vibrio vulnificus*
- c) *Salmonella typhimurium*
- d) *Vibrio parahaemolyticus*
- e) *Escherichia coli*

20) A young child in California presents with gastroenteritis symptoms including high volume diarrhea. History reveals the child has not eaten any undercooked food but has recently been swimming in the ocean. Which of the following is most likely?

- a) *Aeromonas hydrophila*
- b) *Vibrio vulnificus*

- c) *Salmonella typhimurium*
- d) *Vibrio parahaemolyticus*
- e) *Escherichia coli*

Gastrointestinal #40 – Clinical: Malabsorption Due to Small Intestine Diseases

- 1) A patient presents with fatigue and GI complaints. Testing shows iron deficiency anemia and Howell-Jolly bodies. Small bowel biopsy shows villous atrophy. Which of the following is most likely?
- a) Abetalipoproteinemia
 - b) Celiac sprue
 - c) Ménétrier disease
 - d) Crohn disease
 - e) Ulcerative colitis
- 2) Which of the following is considered diagnostic for celiac sprue?
- a) Antigliadin antibody test
 - b) Endomysial antibody test
 - c) Tissue transglutaminase antibody test
 - d) Presence of small bowel lymphoma
 - e) Response to gluten-free diet
- 3) Which of the following should be considered in the differential diagnosis for a patient who is unresponsive to treatment for celiac sprue?
- a) Noncompliance
 - b) Pancreatic insufficiency
 - c) Lactose intolerance
 - d) Intestinal lymphoma
 - e) All of the above
- 4) A patient presents with diarrhea. History reveals a cruise to the Bahamas, but the vacation was nearly 3 months ago. Small bowel biopsy shows blunted villi. Which of the following is most likely?
- a) Collagenous sprue
 - b) Tropical sprue
 - c) Celiac sprue
 - d) Whipple disease
 - e) Eosinophilic gastroenteritis
- 5) A patient presents with diarrhea, arthritis, adenopathy, and pigmentation near the corners of her mouth. Small bowel biopsy shows foamy macrophages that are positive for periodic acid-schiff stain. Which of the following is most likely?
- a) Collagenous sprue
 - b) Tropical sprue
 - c) Celiac sprue
 - d) Whipple disease
 - e) Eosinophilic gastroenteritis
- 6) A patient presents with nausea, vomiting, and abdominal pain. History reveals food intolerances and asthma. Labs show iron deficiency anemia and steatorrhea. Which of the following is most likely?
- a) Collagenous sprue

- b) Tropical sprue
- c) Celiac sprue
- d) Whipple disease
- e) Eosinophilic gastroenteritis

Gastrointestinal #41 – Clinical: Amyloidosis

1) A patient presents with diarrhea peripheral neuropathy. Exam reveals hepatomegaly and macroglossia. Small bowel radiography shows symmetrical, sharply demarcated thickening of the valvulae conniventes. Further testing shows fat aspiration and Congo red stain positive on renal biopsy. Which of the following is most likely?

- a) Scleroderma
- b) Diabetes mellitus
- c) Amyloidosis
- d) Gastric cancer
- e) Meckel diverticulum

Gastrointestinal #42 – Clinical: Miscellaneous Small Bowel Disorders

1) A patient presents with lower GI tract bleeding. Radiography is negative. A nuclear scan shows a diverticulum, but the clinician is skeptical about false-positives. Further testing shows intussusception and volvulus, confirming a Meckel diverticulum. Which of the following is most likely true about this patient?

- a) Latino
- b) Elderly
- c) Young
- d) Diabetic
- e) High socioeconomic status

Gastrointestinal #43 – Clinical: Chronic Intestinal Pseudo-Obstruction

1) A pseudo-obstruction can present as complete mechanical occlusion of the lumen.

- a) True
- b) False

2) Which of the following is NOT true of idiopathic (primary) pseudo-obstruction?

- a) Can run in a family
- b) May be due to sporadic visceral myopathy or neuropathy
- c) Is associated with recurrent attacks of abdominal pain, nausea, and vomiting
- d) Has dilatation on radiography of lower GI tract
- e) Has slowed transit time without mechanical obstruction

3) Which of the following drugs is NOT associated with pseudo-obstruction?

- a) L-DOPA
- b) Metoclopramide
- c) Narcotics
- d) Ganglion blockers
- e) Phenothiazines

4) In assessing pseudo-obstruction, the first step is to rule out mechanical obstruction. Next is to seek an underlying cause; if radiography shows large mouth diverticula of the small intestine, what should be suspected?

- a) Scleroderma
- b) Diabetes mellitus
- c) Amyloidosis
- d) Meckel diverticulum

Gastrointestinal #44 – Clinical: Inflammatory Bowel Disease (IBD)

- 1) Which of the following is characteristic of Crohn disease, when compared against chronic ulcerative colitis?
 - a) Frequent bloody diarrhea
 - b) No fistulas and likely no perianal disease
 - c) Likely no strictures
 - d) Inflamed areas alternate with normal areas
 - e) Affects only the colon and mostly rectum
- 2) Which of the following is an extra-intestinal manifestation of inflammatory bowel disease (IBD)?
 - a) Hemarthrosis
 - b) Extrapylamidal symptoms
 - c) Cerebrovascular accident
 - d) Diabetes mellitus
 - e) Arthritis
- 3) Primary sclerosing cholangitis may occur in IBD patients who have which of the following?
 - a) Elevated alkaline phosphatase (ALP)
 - b) Elevated aspartate transaminase (AST)
 - c) Elevated alanine transaminase (ALT)
 - d) Elevated total bilirubin (TBIL)
 - e) Elevated gamma glutamyl transpeptidase (GGT)
- 4) Which of the following is an indication for colonoscopy in patients with IBD?
 - a) To evaluate for small intestine bleeding
 - b) To evaluate for small intestine ulcers
 - c) To evaluate the extent of disease and stricture
 - d) To inject (e.g. epinephrine) any bleeding colonic ulcers
 - e) To determine if cancer is present
- 5) What is the drug of choice for patients with mild or moderate ulcerative colitis (UC)?
 - a) Sulfasalazine
 - b) Mesalamine
 - c) Metoclopramide
 - d) Fentanyl
 - e) Clopidogrel
- 6) A male patient presents with malaise, pancreatitis, rashes, and complaints of infertility. What drug are they likely taking?
 - a) Sulfasalazine
 - b) Mesalamine
 - c) Metoclopramide
 - d) Fentanyl
 - e) Clopidogrel

- 7) Which of the following drugs is a member of the 5-aminosalicylic acid (5-ASA) class?
- a) Sulfasalazine
 - b) Mesalamine
 - c) Metoclopramide
 - d) Fentanyl
 - e) Clopidogrel
- 8) A patient with IBD is indicated for pharmacotherapy. History reveals a sulfa allergy. What drug should be used if suppository therapy is the goal?
- a) Mesalamine (Asacol)
 - b) Mesalamine (Pentasa)
 - c) Mesalamine (Rowasa)
 - d) Sulfasalazine (Azulfidine)
 - e) Osalazine (Dipentum)
- 9) What is the treatment of choice for mild to moderate UC when sulfasalazine does not control the attacks?
- a) Colectomy
 - b) 5-ASA drugs
 - c) Endoscopic injections
 - d) IV prednisone
 - e) Palliative only
- 10) What other option is available for progressively worsening cases of ulcerative colitis?
- a) Colectomy
 - b) 5-ASA drugs
 - c) Endoscopic injections
 - d) IV prednisone
 - e) Palliative only
- 11) What is the preferred tapering dose for prednisone, changing every 3-7 days?
- a) 1mg decrease
 - b) 2.5mg decrease
 - c) 5mg decrease
 - d) 7.5mg decrease
 - e) 10mg decrease
- 12) Which of the following drugs is considered ineffective in chronic UC and can contribute to the development of toxic megacolon?
- a) Metoprolol
 - b) Mesalamine
 - c) Metoclopramide
 - d) Morphine
 - e) Clopidogrel
- 13) Which of the following is an option for severe intractable ulcerative colitis with life-threatening complications?
- a) Colectomy
 - b) 5-ASA drugs
 - c) Endoscopic injections
 - d) IV prednisone

- e) Palliative only
- 14) Which of the following is effective in Crohn disease (CD) and does not have a steroid-sparing effect?
- a) Sulfasalazine
 - b) 5-ASA drugs
 - c) Metoclopramide
 - d) Corticosteroids
 - e) Morphine
- 15) Which of the following can be used to quickly control an acute exacerbation of CD?
- a) Sulfasalazine
 - b) 5-ASA drugs
 - c) 6-mercaptopurine
 - d) Corticosteroids
 - e) Metronidazole
- 16) 6-mercaptopurine and azathioprine are useful in treatment and maintenance of remission for Crohn disease. These drugs require blood monitoring due to the risk of:
- a) GI bleed and DIC
 - b) Renal failure
 - c) Pancytopenia
 - d) Liver failure
 - e) Neoplasm and leukopenia
- 17) Metronidazole is effective in perianal disease associated with Crohn disease, but may take up to six weeks for full effect. Which of the following describes side effects of this drug?
- a) Eosinophilia confusion, confabulation
 - b) Glossitis, paresthesias, vaginal burning
 - c) Bloody diarrhea, steatorrhea, somnolence
 - d) Tinnitus, hepatomegaly, splenomegaly
 - e) Stroke, myocardial infarction, pulmonary embolism

Gastrointestinal #45 – Clinical: Colon

- 1) A hospitalized patient undergoing a long course of clindamycin therapy develops green, mucoid diarrhea. Pseudomembranous colitis is suspected. What bacterium is responsible?
- a) *Staphylococcus aureus*
 - b) *Bacillus cereus*
 - c) *Clostridium difficile*
 - d) *Clostridium perfringens*
 - e) *Salmonella enterica*
- 2) Which of the following should be done first when testing for pseudomembranous colitis?
- a) Fecal leukocyte test
 - b) Toxic assay
 - c) Enzyme immunoassay (EIA)
 - d) Urea breath test
 - e) Colonoscopy

3) Metronidazole may be effective for pseudomembranous colitis. What other drug is considered first-line therapy, although it has led to an epidemic of *Enterococcus faecium*?

- a) Clindamycin
- b) Amoxicillin
- c) Ceftriaxone
- d) Vancomycin
- e) Penicillin

Gastrointestinal #46 – Clinical: Ischemia

1) An elderly patient presents with severe abdominal pain. History reveals CHF and atherosclerosis. Testing suggests superior mesenteric artery blockage with mesentery ischemia. What ECG finding would this patient most likely have?

- a) ST depression in inferior leads with unifocal PVCs
- b) Diffuse ST elevation suggestive of pericarditis
- c) QT interval prolongation with possible bouts of ventricular tachycardia
- d) Second degree AV block type I
- e) Atrial fibrillation

2) A patient presents with a prodrome of malaise and vague abdominal discomfort. Labs show elevated amylase and phosphate levels. Acute mesenteric ischemia (AMI) is suspected. What test would be the LEAST useful in achieving a definitive diagnosis?

- a) Plain abdominal films
- b) Computed tomography scan
- c) Angiography
- d) Ultrasonography
- e) Magnetic resonance imaging

3) Which of the following is NOT part of the classic triad seen in mesenteric ischemia (intestinal angina)?

- a) Pain after meals
- b) Bloody diarrhea
- c) Abdominal bruit
- d) Weight loss

4) A patient presents with abdominal pain that is relieved with defecation. After history and testing come back negative, the patient is told to reduce stress, increase dietary fiber, and given further reassurance. Which of the following is most likely?

- a) Pseudo-obstruction
- b) Crohn disease (CD)
- c) Ulcerative colitis (UC)
- d) Irritable bowel syndrome (IBS)
- e) Inflammatory bowel disease (IBD)

5) A patient presents with abdominal pain after a non-abdominal operation. A hypaque enema is negative. A nasogastric (NG) tube is placed and drug therapy is discontinued. Which of the following is most likely?

- a) Pseudo-obstruction
- b) Crohn disease (CD)
- c) Ulcerative colitis (UC)

- d) Irritable bowel syndrome (IBS)
 - e) Inflammatory bowel disease (IBD)
- 6) Hirschsprung disease is seen with higher incidence in Down syndrome patients and is usually diagnosed at birth. For those who make it to adulthood, which of the following would likely be found in their history?
- a) History of diarrhea
 - b) History of constipation
 - c) History of excessive laxative use
 - d) History of anal sexual intercourse
 - e) History of pudendal nerve trauma
- 7) Which of the following is NOT a component of the initial exam for rectal bleeding?
- a) Anoscopy
 - b) Digital exam
 - c) Angiography
 - d) Proctosigmoidoscopy
 - e) Stool guaiac
- 8) Which of the following is considered the procedure of choice for active bleeding?
- a) Anoscopy
 - b) Digital exam
 - c) Angiography
 - d) Proctosigmoidoscopy
 - e) Stool guaiac
- 9) Which of the following is usually only beneficial if there is a slower rate of rectal bleeding?
- a) Colonoscopy
 - b) Angiography
 - c) Anoscopy
 - d) Surgery
 - e) Electrocautery
- 10.1) Which of the following is the most common cause of rectal bleeding in young patients and usually presents as painless bleeding?
- a) Meckel diverticulum
 - b) Hemorrhoids
 - c) Cancer
 - d) Angiodysplasia
 - e) IBD colitis
- 10.2) Which of the following presents as painful and bloody diarrhea?
- a) Meckel diverticulum
 - b) Hemorrhoids
 - c) Ischemic colitis
 - d) Angiodysplasia
 - e) IBD colitis
- 11) Which of the following tests used in evaluating lower GI bleeding is used to rule out rectal outlet bleeding (hemorrhoids)?
- a) Epinephrine injection
 - b) NG tube aspiration

- c) Meckel (technetium) scan
- d) Proctoscopy
- e) Radionucleotide tagged RBC scan

Gastrointestinal #47 – Clinical: Diverticular Disease of the Colon

- 1) The presence of uninflamed acquired herniations of the mucosa and submucosa through the muscular layers of the colonic wall is called:
- a) Diverticula
 - b) Diverticulosis
 - c) Diverticulitis
 - d) Crohn disease
 - e) Irritable bowel syndrome
- 2) A patient presents with LLQ pain, fever, and high WBC count. BUN:Cr ratio is 20:1. The patients stool is maroon in color and painless. Which of the following is most likely?
- a) Diverticulitis
 - b) Upper GI bleed
 - c) Crohn disease
 - d) Ulcerative colitis
 - e) Ménétrier disease
- 3) A patient with diverticulitis is able to drink without peritoneal signs, so they are treated with antibiotics as an outpatient. What treatment is recommended?
- a) Ticarcillin-clavulanic acid
 - b) Imipenem-cilastin
 - c) Metronidazole plus ciprofloxacin
 - d) Aminoglycoside plus clindamycin
 - e) Amoxicillin plus doxycycline

Gastrointestinal #48 – Clinical: Colon Polyps

- 1) Which of the following types of polyps is neoplastic (pre-malignant)?
- a) Hyperplastic
 - b) Adenomatous
 - c) Inflammatory
 - d) Hamartomatous
 - e) None of the above
- 2) Which of the following forms of adenomatous polyps is associated with hypokalemia and profuse mucous?
- a) Tubular
 - b) Tubulovillous
 - c) Villous
 - d) A & B
 - e) B & C
- 3) Adenomatous polyps confer a higher risk of malignancy if they contain villous elements and are larger than:
- a) 1mm
 - b) 5mm
 - c) 1cm

- d) 3cm
 - e) 5cm
- 4) If flexible sigmoidoscopy (flex sig) shows a hyperplastic polyp, what additional testing is needed?
- a) Colonoscopy
 - b) Polypectomy
 - c) Proctoscopy
 - d) Radionucleotide tagged RBC scan
 - e) No additional testing is necessary
- 5) What genetic inheritance pattern is seen with familial colonic polyposis?
- a) Autosomal dominant
 - b) Autosomal recessive
 - c) X-linked dominant
 - d) X-linked recessive
 - e) Mitochondrial
- 6) A man presents with concerns about having children due to his autosomal dominant genetic problem. He has been recently diagnosed with colorectal cancer and has a history including retinal pigment epithelium hypertrophy and osteomas of the skull. Which of the following is most likely?
- a) Familial colonic polyposis
 - b) Turcot syndrome
 - c) Gardner syndrome
 - d) Juvenile polyposis
 - e) Peutz-Jeghers syndrome
- 7) A female patient presents with abdominal pain. Testing reveals intussusception and hemartomas of the small intestine. An ovarian sex cord tumor of the proximal small bowel is found. The patient also has pigmentation of the mouth, hands, and feet. Which of the following is most likely?
- a) Familial colonic polyposis
 - b) Turcot syndrome
 - c) Gardner syndrome
 - d) Juvenile polyposis
 - e) Peutz-Jeghers syndrome
- 8) What genetic inheritance pattern is seen with juvenile polyposis (hyperplastic polyps)?
- a) Autosomal dominant
 - b) Autosomal recessive
 - c) X-linked dominant
 - d) X-linked recessive
 - e) Mitochondrial

Gastrointestinal #49 – Clinical: Colorectal Cancer

- 1) Hereditary non-polyposis colon cancer (Lynch syndrome) carries a 5% risk of cancer. What is the inheritance pattern?
- a) Autosomal dominant
 - b) Autosomal recessive
 - c) X-linked dominant

- d) X-linked recessive
 - e) Mitochondrial
- 2) Colon cancer risk increase dramatically after what age?
- a) 20-years
 - b) 30-years
 - c) 40-years
 - d) 50-years
 - e) 60-years
- 3) Colon cancer usually metastasizes through local lymph nodes. Hematogenous spread usually affects which organ?
- a) Spleen
 - b) Pancreas
 - c) Heart
 - d) Liver
 - e) Brain
- 4) At what Duke classification of colorectal cancer do regional nodes become involved?
- a) Class A
 - b) Class B1
 - c) Class B2
 - d) Class C1
 - e) Class C2
 - f) Class D
- 5) Along with obstruction and perforation, what patient population has a poor prognosis with colorectal cancer?
- a) Elderly
 - b) Young
 - c) Diabetic
 - d) Bedridden
 - e) Pregnant
- 6) Anemia, abdominal discomfort, and abdominal mass are most commonly seen in colon cancer at what location?
- a) Proximal colon
 - b) Mid colon
 - c) Distal colon
 - d) Sigmoid colon
 - e) Rectum
- 7) Which of the following is part of the workup for a suspected colon cancer?
- a) Liver enzyme evaluation
 - b) Chest radiograph
 - c) Air contrast barium enema
 - d) Flexible sigmoidoscopy
 - e) All of the above
- 8) Surgery is curative without the need for adjuvant chemotherapy at what Duke classifications for colorectal cancer?
- a) Class A
 - b) Class A & B

- c) Class A, B, & C
 - d) Class A, B, C, & D
- 9) A postoperative colonoscopy is needed within 6-12 months for a colorectal cancer patient. How often should a colonoscopy be performed after the initial visit?
- a) Annually
 - b) Bi-annually
 - c) Every 3 years
 - d) Every 4 years
 - e) Every 5 years
- 10) 5-FU with levamisole as a potentiator is the recommended adjuvant chemotherapy for what Duke colorectal cancer classifications?
- a) Class D
 - b) Class C
 - c) Class D & C
 - d) Class C & B
 - e) Class D, C, & B
- 11) Current colorectal screening recommendations for those at average risk include an annual rectal exam starting at what age?
- a) 20-years
 - b) 30-years
 - c) 40-years
 - d) 50-years
 - e) 60-years
- 12) Which of the following patients should undergo more intensive screening, which could include periodic occult blood testing, colonoscopies, and sigmoidoscopies?
- a) Previous adenoma or carcinoma
 - b) Familial adenomatous polyposis
 - c) Hereditary non-polyposis cancer
 - d) First degree relative with colon cancer
 - e) Woman with genital or breast cancer
 - f) Ulcerative colitis
 - g) All of the above

Gastrointestinal #50 – Clinical: Pancreas

- 1) Interstitial pancreatitis is differentiated from necrotizing pancreatitis by:
- a) Presence of inflammation
 - b) Hormone secretion
 - c) Presence of infection
 - d) Perfusion
 - e) Location
- 2) What is the most common cause of pancreatitis?
- a) Idiopathic
 - b) Medication
 - c) Hypertriglyceridemia
 - d) Alcohol
 - e) Coxsackievirus

- 3) Which of the following is NOT a clinical symptom of pancreatitis?
- “Too sick to eat”
 - RUQ pain with radiation to the back
 - Fever
 - Jaundice
 - Constipation
- 4) Which of the following tests is the most useful for acute pancreatitis?
- Serum amylase
 - Aspartate transaminase (AST)
 - Alanine transaminase (ALT)
 - Total bilirubin (TBIL)
 - Alkaline phosphatase (ALP)
- 5) Generally, the treatment for pancreatitis is supportive. Which of the following is the recommended analgesic as it causes less spasm of the sphincter of Oddi?
- Diphenoxylate (Lomotil)
 - Fentanyl (Sublimaze)
 - Meperidine (Demerol)
 - Diazepam (Valium)
 - Hydrocodone (Tussigon)
- 6) Which of the following is NOT part of the triad seen in chronic pancreatitis?
- Pancreatic calcification
 - Vomiting
 - Diabetes mellitus
 - Steatorrhea
- 7) A CT scan may aid in diagnosis of chronic pancreatitis. Which of the following tests is the most likely to show abnormal results in a patient with chronic pancreatitis?
- Serum amylase
 - Serum lipase
 - 48 to 72-hour stool collection for fat
 - CCK/secretin stimulation test
- 8) Which of the following is malabsorbed in patients with chronic pancreatitis?
- Fats
 - Essential fatty acids
 - Fat-soluble vitamins
 - A & C
 - All of the above
- 9) A 70-year old man presents with malaise and weight loss. History reveals diabetes mellitus. They have a painless jaundice with palpable gallbladder (Courvosier sign). They also have migratory thrombophlebitis (Trousseau sign), suggesting pancreatic cancer. Abdominal ultrasound and CT scan confirm pancreatic carcinoma. What is this patient’s 5-year survival rate?
- < 2%
 - 10%
 - 50%
 - 90%
 - > 98%

10) What is the most common sign of intestinal complication in patients with cystic fibrosis?

- a) Endocrine pancreatic insufficiency (diabetes)
- b) Exocrine pancreatic insufficiency (malabsorption)
- c) Common bile duct obstruction
- d) Gallstones
- e) Pancreatic carcinoma

Gastrointestinal #51 – Clinical: Postoperative Management of Bariatric Surgery

1) Which of the following is true when comparing the two current bariatric surgical procedures for weight loss?

- a) Lap Band results in faster weight loss and less mortality
- b) Roux-en-Y results in faster weight loss and less mortality
- c) Lap Band results in faster weight loss, Roux-en-Y has less mortality
- d) Roux-en-Y results in faster weight loss, Lap Band has less mortality

2) Which of the following is NOT a common complication of bariatric surgery occurring with the first 30 days?

- a) Bleeding
- b) Stomal stricture
- c) Bowel obstruction
- d) Myocardial infarction
- e) Pulmonary embolism

3) Post-bariatric surgery patients should be monitored for:

- a) Hypertension only
- b) Hypotension only
- c) Hypertension and diabetes
- d) Hypotension and diabetes

4) What etiology should be ruled out in patients with vomiting in the phase II postoperative period?

- a) Pancreatitis
- b) Infection
- c) Hypotension
- d) Diabetes
- e) Bulimia

5) A patient presents with prolonged vomiting and postprandial pain in the gastric pouch after a gastric bypass. Barium swallow and endoscopic dilation confirm a diagnosis. The patient is started on low dose metoclopramide. What is the diagnosis?

- a) Bowel obstruction
- b) Stomal stricture
- c) Pancreatitis
- d) Salmonella spp. infection
- e) Shigella spp. infection

6) A post-bariatric surgery patient presents with shaking, diaphoresis, and diarrhea (“dumping”). They likely ate foods high in:

- a) Fiber
- b) Calories

- c) Protein
 - d) Glucose
 - e) Salt
- 7) Although all of the following may be deficient in post-bariatric surgery patients, they should receive injections every 6 months for which of the following?
- a) Folate
 - b) Vitamin A
 - c) Vitamin B1 & B2
 - d) Vitamin B12
 - e) Vitamin C
- 8) Which of the following foods is NOT associated with intolerance in bariatric surgery patients?
- a) Rice
 - b) Bread
 - c) Milk
 - d) Meat
 - e) Pasta
- 9) What is the average weight lost expected at one-year post-bariatric surgery?
- a) 10-15lbs
 - b) 30-55lbs
 - c) 60-80lbs
 - d) 80-95lbs
 - e) 100-120lbs
- 10) At what time period does weight gain typically occur after bariatric surgery?
- a) 6-12 months
 - b) 12-18months
 - c) 18-24months
 - d) 24-30months
 - e) 30-36months
- 11) Which of the following physical improvements is attributed to bariatric surgery?
- a) Back pain disappears
 - b) Increased energy levels
 - c) Exercise habits improve
 - d) Osteoarthritis improves
 - e) All of the above
- 12) Which of the following should be given to a post-bariatric surgery patient with sleep apnea that exists 6 months after the operation?
- a) CPAP device
 - b) Eszopiclone (Lunesta)
 - c) Ramelteon (Rozerem)
 - d) Zolpidem (Ambien)
 - e) Ventricular assist device (LVAD)
 - f) Implantable cardioverter defibrillator (ICD)
 - g) Implantable pacemaker
 - h) No treatment is needed

Gastrointestinal #52 – Extra: What’s Wrong With This Picture?

1) A 59-year-old smoker presents with facial swelling and dyspnea that has progressed gradually over the past month. She reports the sensation of pressure in her neck and ears, and swelling of the lower eyelids, neck, upper chest, and upper limbs. The blood vessels on her upper chest are prominent (Pemberton sign). A dry, irritating cough has worsened. A chest film is shown here. Which is most likely?



- a) Cancer of the lung
 - b) Thymoma
 - c) Retrosternal goiter
 - d) Dermoid cyst
 - e) Sarcoidosis
- 2) The 59-year-old patient had marked improvement with radiation therapy, but died of a cardiac arrest a month later. SVC syndrome was the cause. What is the most likely cause of SVC syndrome?
- a) Thymoma
 - b) Breast cancer
 - c) Small-cell lung cancer
 - d) Fibrosing mediastinitis with primary infection
 - e) Primary mediastinal germ cell neoplasm
- 3) Approximately what percentage of patients with malignancy-related SVC syndrome presents without a known diagnosis of cancer?
- a) 20%
 - b) 40%
 - c) 60%
 - d) 80%
 - e) 100%

AnswerKey	16) B	9) A	44) D	8) A
GI #1	17) G		45) E	9) A
1) A	18) C	GI #6	46) A	10) C
2) C	19) D	1) B	47) C	11) B
3) C	20) A	2) A	48) B	12) E
4) C	21) I	3) B	49) C	13) E
5) D	22) H	4) E	50) E	14) C
6) B	23) G	5) C	51) B	15) D
7) E	24) C	6) D	52) D	16) A
8) C	25) D	7) C	53) D	17) A
9.1) D	26) A	8) B	54) B	18) E
9.2) B	27) E	9) E	55) C	19) A
10) E	28) B	10) D	56) A	20) B
11) C	29) F	11) B	57) D	21) D
12) B	30) H	12) E	58) A	22) E
13) E		13) D	59) C	23) D
14) A	GI #3	14) C	60) B	24) E
15) C	1.1) B	15) A	61) E	25) C
16) E	1.2) A	16) E		26) A
17) C	1.3) B	17) B	GI #7	27) B
18) A	2) C	18) D	1) B	28) D
19) D	3) D	19) C	2) C	29) A
20.1) D	4.1) E	20) E	3) B	30) E
20.2) C	4.2) D	21) D	4) A	31) B
20.3) A	5.1) A	22) B	5) B	32) E
20.4) E	5.2) C	23) C	6) C	33) D
21) B		24) B	7) A	34) C
22) D	GI #4	25) B	8) A	35) B
23) C	1) D	26) E	9) B	36) A
	2) A	27) B	10) C	37) E
GI #2	3) B	28) C	11) D	38) A
1) E	4) D	29) D	12) D	39) C
2) D	5) C	30) C	13) E	40) A
3) D	6.1) A	31) C	14) B	41) E
4) E	6.2) C	32) E	15) A	42) D
5) B	6.3) C	33) D	16) B	43) B
6) A		34) C	17) B	44) B
7) B	GI #5	35) B		45) D
8) C	1) E	36) D	GI #8	46) C
9) D	2) D	37) A	1) D	47) D
10) C	3) B	38) C	2) C	48) C
11) B	4) A	39) C	3) A	
12) E	5) C	40) C	4) A	GI #9
13) J	6) E	41) E	5) A	1) E
14) F	7) D	42) E	6) B	2) D
15) K	8) D	43) D	7) C	3) D

- 4) B
5) E
6) C
7) B
8) A
- GI #10**
1.1) A
1.2) D
1.3) C
2) A
3.1) D
3.2) B
3.3) A
3.4) E
3.5) C
4) D
5.1) C
5.2) D
5.3) B
5.4) F
5.5) A
5.6) E
6) C
7) B
8.1) D
8.2) C
9) C
10) A
11) C
12) C
13) D
14) E
15) B
16) C
17) A
18) E
19) D
20) B
21) B
22.1) E
22.2) D
23) B
24) C
25) A
26) C
- 27) A
28) E
29) E
30) B
31) C
32) D
- GI #11**
1) D
2) E
3) F
4) A
5) B
6) C
7) D
8) B
9) E
10) C
11) E
12) B
13) A
14) D
15) C
16) C
17) A
18) D
19) B
20) E
21) D
22) A
- GI #12**
1) C
2) D
3) C
4) A
5) C
6) A
7) B
8) A
9) E
10) A
11) A
12) D
13) C
14) B
- 15) A
16) C
17) D
18) C
19) B
20) E
21) C
22) D
23) D
24) A
25) C
26) E
- GI #13**
1) D
- GI #14**
1) A
2) D
3) B
4) D
5) E
6) C
7) D
8) A
- GI #15**
1) C
2) E
3) A
4) D
5) E
- GI #16**
1) C
2) B
3) E
- GI #17**
1) E
2) B
3) A
4) E
5) C
6) D
7) B
- 8) D
9) E
10) C
11) E
- GI #18**
1) B
2) B
- GI #19**
1) C
2) B
3) E
4) C
5) A
6.1) F
6.2) D
6.3) A
6.4) G
6.5) J
6.6) I
6.7) C
6.8) B
6.9) H
6.10) E
6.11) K
6.12) L
7) B
8) B
9) E
10) D
11) C
12) B
13) B
14) C
15) D
16) D
17) A
18) B
19) D
20) E
21) D
22) E
23.1) C
23.2) F
24) E
- 25) C
26) C
27) B
28) A
29) D
30) B
31) E
32) E
33) A
34) B
35) B
36) D
37) C
38) E
39) A
40) C
41.1) D
41.2) C
42) A
43) D
44) B
45) C
46) A
47) D
48) B
49) D
50) E
51) C
52.1) C
52.2) B
53) A
54) D
55) A
56) B
- GI #20**
1) D
2) C
3) A
4) D
5) F
6) C
7) A
8) B
9) D
10) D

11.1) C	9) D	24) B	1) C	5) A
11.2) B	10) A	25) C	2) E	6) B
12) E	11) A	26) D	3) B	7) E
13) C	12) D	27) D	4) E	8) E
14) A	13) B	28) C	5) A	9) E
15) A	14) C	29) A	6) D	10) C
16) E	15) A	30) D	7) C	11) D
17) E	16.1) E	31) E	8) E	12) A
18) E	16.2) D	32) B	9) C	13) D
19) D	16.3) A	33) B	10) B	14) D
20) C	16.4) D	34) B	11) D	15) C
21) A	17) C	35) A	12) E	16) E
22) A	18) C	36) A	13) A	
23) E	19) C	37) A	14) A	GI #30
24.1) B	20) C	38) C	15) E	1) E
24.2) B	21.1) B	39) C	16) C	2) F
25) B	21.2) A	40) E	17) D	3) B
26) B	21.3) A	41) C	18) C	4) E
27) D	21.4) C		19) C	5) A
28) B		GI #23	20) A	6) C
29) D	GI #22	1) E	21) B	7) C
30) B	1.1) C	2) A		
31) E	1.2) C	3) C	GI #25	GI #31
32) C	2) E	4) B	1) C	1) B
33) A	3) A	5) D		2) B
34) E	4) B	6) B	GI #26	3) B
35) C	5) E	7) E	1) E	4) E
36) E	6) B	8) A	2) A	5) C
37) C	7) B	9) D	3) B	6) A
38) B	8) D	10) B		7) C
39) D	9) C	11) D	GI #27	
40) A	10) D	12) C	1) B	GI #32
41) E	11) E	13) E	2) A	1) C
42) C	12) D	14) A	3) E	2) D
43) B	13) A	15) C	4) E	3) C
44) D	14) A	16) E	5) C	4) D
	15) A	17) B		5) A
GI #21	16) C	18) C	GI #28	
1) B	17.1) E	19) C	1) B	GI #33
2) C	17.2) B	20) D	2) E	1) A
3) A	18) C	21) D		
4) B	19) B	22) B	GI #29	GI #34
5) E	20) B	23) E	1) A	1) C
6) B	21) D	24) A	2) D	2) C
7) C	22) D		3) C	
8) B	23) D	GI #24	4) E	GI #35

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|---------------|---------------|---------------|---------------|
| 1) A | 15) B | GI #45 | 12) G |
| 2) B | 16) C | 1) C | |
| 3) E | 17) D | 2) A | GI #50 |
| | 18) E | 3) D | 1) D |
| GI #36 | 19) B | | 2) D |
| 1) D | 20) A | GI #46 | 3) E |
| | | 1) E | 4) A |
| GI #37 | GI #40 | 2) A | 5) C |
| 1) E | 1) B | 3) B | 6) B |
| 2) D | 2) E | 4) D | 7) D |
| | 3) E | 5) A | 8) E |
| GI #38 | 4) B | 6) B | 9) A |
| 1) C | 5) D | 7) C | 10) B |
| 2) B | 6) E | 8) C | |
| 3) A | | 9) A | GI #51 |
| 4) E | GI #41 | 10.1) A | 1) D |
| 5) D | 1) C | 10.2) C | 2) B |
| 6) C | | 11) D | 3) D |
| 7) A | GI #42 | | 4) E |
| 8) D | 1) C | GI #47 | 5) B |
| 9) D | | 1) B | 6) D |
| 10) C | GI #43 | 2) A | 7) D |
| 11) B | 1) B | 3) C | 8) C |
| 12) A | 2) D | | 9) E |
| 13) A | 3) B | GI #48 | 10) C |
| 14) D | 4) A | 1) B | 11) E |
| 15) D | | 2) E | 12) A |
| 16) C | GI #44 | 3) C | |
| 17) C | 1) D | 4) E | GI #52 |
| 18) A | 2) E | 5) A | 1) A |
| | 3) A | 6) C | 2) C |
| GI #39 | 4) C | 7) E | 3) C |
| 1) B | 5) A | 8) A | |
| 2) C | 6) A | | |
| 3) E | 7) B | GI #49 | |
| 4) E | 8) C | 1) A | |
| 5) D | 9) B | 2) C | |
| 6) E | 10) D | 3) D | |
| 7) D | 11) C | 4) D | |
| 8) B | 12) D | 5) B | |
| 9) D | 13) A | 6) A | |
| 10) A | 14) A | 7) E | |
| 11) D | 15) D | 8) B | |
| 12) C | 16) E | 9) C | |
| 13) D | 17) B | 10) C | |
| 14) C | | 11) C | |