Nutrition Chapter Questions and Critiques

1. A 30 year-old man had resection of 120 cm of ileum following a gunshot wound to the abdomen. He is least likely to become deficient in which of the following nutrients:

   A. Iron
   B. Vitamin D
   C. Vitamin A
   D. Vitamin B₁₂
   E. Magnesium

   The recommended response is A.

   Vitamin B₁₂ is absorbed in the ileum, and resection of 120 cm will result in vitamin B₁₂ malabsorption. The ileum is the site of bile salt malabsorption, and resection of 100 cm would result in bile salt deficiency, steatorrhea, and fat soluble vitamin (A, D, E, K) malabsorption. Magnesium will bind to malabsorbed fatty acids and be lost in the stool. Iron is absorbed mainly in the duodenum, and would not be affected by an ileal resection.


2. A 30 year-old woman is diagnosed with celiac disease and placed on a gluten-free diet. After 2 months on the diet, she continues to have diarrhea and has not gained weight. Which of the following is the most likely explanation for her failure to respond to the diet?

   A. She has combined variable immunodeficiency.
   B. She has an intestinal lymphoma
   C. She has ulcerative jejunoileitis
   D. She has pancreatic insufficiency.
   E. She is inadvertently consuming gluten in her diet.

   The recommended response is E.

   The most common cause for apparent failure to respond to a gluten-free diet is inadvertent consumption of gluten. Many foods, medications, and supplements contain gluten in forms that may not be recognized by the patient. The diet must be carefully reviewed to attempt to identify hidden gluten. Intestinal lymphoma and jejunoileitis are rare late complications of celiac disease. Patients with celiac disease can have pancreatic insufficiency, but this is not the most likely cause of
failure to respond to a gluten-free diet. Common variable immunodeficiency is an unusual disorder that can be associated with villus atrophy.

Ciclitira PJ. AGA technical review on celiac sprue. Gastroenterology 2001; 120: 1526-1540.

3. Which of the following metabolic changes is most likely to occur in a patient with sepsis who is not eating?

A. Reduced resting metabolic rate  
B. Increased resting metabolic rate  
C. Respiratory quotient of 1.5  
D. Very low rate of protein turnover  
E. Increased thermic effect of food

The recommended response is B.

Fasting by healthy individuals causes a decrease in the resting metabolic rate, but the resting metabolic rate is increased with sepsis and other critical illnesses. Protein turnover is increased in infection. The thermic effect of food refers to the increased energy expenditure associated with food consumption. Oxidation of fat, protein, and carbohydrate result in respiratory quotients of 0.7, 0.85 and 1.0 respectively. An RQ of 1.5 would occur with feeding excessive carbohydrate that is stored as fat.


4. Pancreatic exocrine insufficiency does not cause malabsorption of:

A. Fat  
B. Protein  
C. Carbohydrate  
D. Vitamin D  
E. Niacin

The recommended response is E.

Insufficiency of pancreatic lipase, proteases, and amylase causes malabsorption of fat, protein, and carbohydrate. Absorption of vitamin D, a fat-soluble vitamin, may be impaired in a patient with steatorrhea. Niacin is a water-soluble vitamin whose absorption will not be affected by pancreatic insufficiency.

5. Production by intestinal bacteria of which of the following vitamins significantly contributes to nutritional intake?

   A. Vitamin E  
   B. Vitamin D  
   C. Vitamin A  
   D. Vitamin K  
   E. Vitamin B₁₂  

   The recommended response is D.

   Vitamins E, A, and B₁₂ are not produced in significant amounts by intestinal bacteria. Vitamin D is produced in human skin, but not by gut bacteria. Vitamin K (menaquinone) synthesis by intestinal bacteria and absorption by the small intestine and colon significantly contributes to vitamin K nutrition. Abnormal prothrombin time and clotting is often observed in malnourished patients treated with antibiotics.


6. Immunochemical measurement of fecal excretion of which of the following would be most useful in the diagnosis of protein-losing enteropathy?

   A. Albumin  
   B. Pre-albumin  
   C. Alpha 1-antitrypsin  
   D. Fat  
   E. Transferrin  

   The recommended response is C.

   Albumin, pre-albumin, and transferrin are serum proteins that will be lost into the intestine in protein-losing enteropathy, but will be digested by pancreatic and intestinal proteases and not detectable in feces. Alpha 1-antitrypsin is a protease inhibitor that resists digestion and can be detected in the stool. Fecal clearance of alpha 1-antitrypsin is, therefore, used to diagnose protein-losing enteropathy. Fecal fat excretion is increased in many diseases associated with protein-losing enteropathy, but is also increased in other malabsorptive disorders.

7. Which of the following would be most responsive to a recent change in food intake and nutritional status?

A. Triceps skin fold  
B. Mid-arm muscle circumference  
C. Serum albumin  
D. Serum pre-albumin  
E. Serum transferrin

The recommended response is D.

Anthropometric measurements of fat (triceps skin fold) and muscle (mid-arm muscle circumference) mass will change slowly due to alterations in nutritional status. Pre-albumin has a short half-life of 2-3 days and is a good measure of recent changes in food intake and nutritional status. Albumin and transferrin are also affected by nutritional status, but have longer half-lives, 20 days and 7 days respectively.


8. A 45 year-old woman has primary biliary cirrhosis. Laboratory testing shows that her serum bilirubin is 6.5 g/dl. She would be most likely to have a low serum level of which of the following micronutrients?

A. Manganese  
B. Copper  
C. Folate  
D. Riboflavin  
E. Vitamin A

The recommended response is E.

Vitamin A is a fat-soluble vitamin whose absorption requires intraluminal bile salts and will be impaired in cholestatic liver disease. Riboflavin and folate are water-soluble vitamins that do not require bile salts for absorption. Manganese and copper are trace elements that are excreted mainly in bile. Serum levels of manganese and copper are elevated with cholestasis.

9. A 55 year-old man with alcoholic cirrhosis presents with ascites. He denies any alterations in sleep or cognitive function, and a mental status examination is normal. Laboratory testing shows serum Na 134 mg/dl, fasting serum glucose 98 mg/dl, serum albumin 3.0 g/dl. Which of following dietary changes are indicated?

   A. Low protein diet
   B. Water restriction to less than one L/day
   C. Sodium restriction to less than 2g/d
   D. Low carbohydrate diet
   E. Avoid vegetable protein

   The recommended response is C.

   A patient with cirrhosis and ascites should be restricted to less than 2 g of dietary sodium per day. Water restriction is not needed unless the patient is severely hyponatremic. Protein should not be restricted in cirrhotics, except as a temporary measure in those with hepatic encephalopathy. Some studies have suggested that vegetable protein is better tolerated than animal protein by patients with hepatic encephalopathy. Although glucose intolerance is common in cirrhotics, there is generally no need to restrict carbohydrate, particularly in this patient with a normal fasting serum glucose.


10. Which of the following factors is associated with less symptoms and a favorable prognosis in a patient with the short bowel syndrome?

   A. Resection of ileum rather than jejunum
   B. An ileostomy rather than an ileocolic anastamosis
   C. Short time since surgery
   D. Preservation of the ileocecal region
   E. Recurrent small bowel Crohn’s disease

   The recommended response is D.

   The ileocecal region acts as a brake slowing transit through the stomach and small intestine. This increases the contact time for intestinal absorption, and diminishes post-prandial diarrhea, thus encouraging food intake. Preservation of the ileocecal region, therefore, is a favorable factor in a patient with the short bowel syndrome. Resection of ileum results in more symptoms than resection of a comparable amount of jejunum, as the ileum more readily undergoes intestinal adaptation, whereby the remaining intestine and colon undergoes structural changes and increases absorptive capacity. The ileum is the site of bile salt and vitamin B₁₂ absorption. Preservation of colon diminishes symptoms in a short
bowel patient. The colon absorbs water and electrolytes, decreasing diarrhea, and also can salvage energy, calcium, and other nutrients. Intestinal adaptation takes months after surgery, and diarrhea decreases over time. Disease of the remaining bowel and other digestive organs will increase the symptoms and malabsorption of short bowel patients.


11. A low fat diet would potentially be of value in which of the following:

A. A patient with the short bowel syndrome and a jejunostomy
B. A patient with Crohn’s disease and recurrent calcium oxalate kidney stones
C. A patient with a peanut allergy
D. A patient with pernicious anemia
E. A patient with chronic hepatitis C and early cirrhosis

The recommended response is B.

Enteric hyperoxaluria is caused by excessive absorption of dietary oxalate. In health, most oxalate in the diet binds to calcium, precipitates in the intestinal lumen, and is not absorbed. Malabsorbed fatty acids bind calcium, permitting more oxalate to be in a soluble form. Furthermore, fatty acids increase colonic permeability to oxalate. A low fat diet, therefore, will decrease oxalate absorption and diminish hyperoxaluria. A low fat diet does not decrease diarrhea in a short bowel patient with a jejunostomy, and will limit energy intake. Peanut allergy only requires avoiding the offending allergen. Pernicious anemia is generally not associated with significant fat malabsorption. Cirrhosis can cause mild steatorrhea, but a patient with hepatitis C and early cirrhosis would not likely have significant fat malabsorption.


12. Which of the following statements about medium chain triglycerides is true?

A. Can be absorbed without digestion
B. Is a good source of essential fatty acids
C. Is the major type of dietary fat
D. Is the major type of fat in standard polymeric tube feedings
E. Is a major fuel for the colonic mucosa

The recommended response is A.
Medium chain triglycerides can be absorbed by the intestine without prior digestion by pancreatic lipase. Essential fatty acids are derived from dietary long chain triglycerides. Long chain triglycerides are the major type of fat in the diet and in standard polymeric tube feedings. Short chain fatty acids produced from unabsorbed fiber and starches by colonic bacteria are a fuel source for the colon.


13. A 26 year-old woman in her 9th week of pregnancy is admitted because of intractable nausea and vomiting. She is begun on intravenous fluids with 5% dextrose, half normal saline, and supplemental potassium. Three days after admission she is noted to be confused and disoriented with abnormal eye movements. Deficiency of which of the following is most likely the cause of her symptoms?

A. Thiamine
B. Riboflavin
C. Vitamin E
D. Vitamin B₁₂
E. Copper

The recommended response is A.

Women with hyperemesis gravidarum may develop thiamine deficiency. Administration of glucose containing intravenous solutions without supplemental thiamine can precipitate thiamine deficiency and neurologic symptoms. Vitamins E and B₁₂ can cause neurologic abnormalities, but deficiency would not develop acutely. Riboflavin deficiency causes skin rash and oral mucosal abnormalities. Copper deficiency causes anemia and neutropenia.


14. Which of the following measures should be considered to decrease the risk of aspiration in a patient receiving tube feeding?

A. Administration of morphine
B. Keeping the patient supine
C. Stopping tube feedings for a gastric residual of 50 ml
D. Elevating the head to at least 30° during feedings
E. Using an elemental formula

The recommended response is D.
Elevating the head of the bed rather than keeping the patient supine during feeding decreases the risk of aspiration. Small gastric residuals do not increase the risk of aspiration and do not necessitate interrupting tube feedings. Morphine would slow gastric emptying, promoting aspiration. Elemental diets are used for patients with malabsorption and do not alter the aspiration risk.


15. An alcoholic patient presents for his yearly physical examination and is found to have anemia with decreased vibratory and position sensation in the lower extremities. Which vitamin deficiency most likely accounts for these findings?

A. Thiamine  
B. Folate  
C. Cobalamin  
D. Niacin  
E. Ascorbic acid

The recommended response is C.

Deficiency of this vitamin leads to megaloblastic anemia with decreased vibratory and position sensation. Deficiency of thiamine is associated with beriberi and Wernicke’s encephalopathy. Deficiency of folate is associated with megaloblastic anemia but intact vibration and position sensation. Niacin deficiency leads to pellagra, and ascorbic acid deficiency leads to scurvy.


16. A 25 year-old female with a 5-year history of stable Crohn’s colitis presents with fatigue. She denies bowel irregularity, abdominal pain, fever, melena, or rectal bleeding. Her labs are remarkable for Hct 32 with MCV 108. Which of the following is most likely the cause of her anemia?

A. occult GI blood loss  
B. budesonide use  
C. mesalamine use  
D. sulfasalazine use  
E. heavy menses

The recommended response is D.
This medication is an inhibitor of folate absorption. Chronic use may result in folate deficiency causing megaloblastic anemia. Mesalamine does not affect folate absorption. Budesonide use is not associated with anemia. Occult GI bleeding or excessive menstrual blood loss may lead to iron deficiency (microcytic) anemia.


17. A 34 year-old patient with history of Crohn’s disease and ileocecectomy presents with acute flank pain and is diagnosed with a kidney stone. What supplement is most likely to lessen his chance of recurrent stone formation?

A. Zinc  
B. Calcium  
C. Phosphorus  
D. Potassium  
E. Magnesium

The recommended response is B.

Calcium oxalate stones are common in patients with Crohn’s disease and ileal resection. Steatorrhea from bile salt malabsorption leads to increased oxalate absorption which occurs by two mechanisms: (1) Unabsorbed fatty acids bind calcium leading to a reduction in the formation of insoluble calcium oxalate, which leaves more oxalate free in solution for absorption. (2) Fatty acids and bile salts increase colonic permeability to oxalate. A reduced fat diet and calcium supplementation is recommended to diminish oxalate absorption and prevent hyperoxaluria and nephrolithiasis.


18. Celiac sprue can be complicated by all of the following except:

A. osteoporosis  
B. dermatitis herpetiformis  
C. porphyria cutanea tarda  
D. ulcerative jejunitis  
E. small bowel lymphoma

The recommended response is C.
This rash is most commonly associated with hepatitis C and not with celiac disease. The remaining choices are all well-known complications of celiac disease.

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19. A 70 year-old male with a history of celiac disease diagnosed in his forties reports abdominal pain, dark stools, and 20-pound weight loss. He reports complete compliance with a gluten free diet. Tissue transglutaminase is normal. What test would you order next to evaluate his complaints?

A. Repeat tissue transglutaminase
B. Anti-gliadin antibodies
C. Antiendomysial antibodies
D. EGD with small bowel biopsy
E. Small bowel series

The recommended response is E.

The patient’s symptoms (especially the 20-pound weight loss) are worrisome for small bowel lymphoma. This is a rare complication that usually occurs after 20-40 years of disease. An evaluation of his small bowel should be ordered to rule out this complication. The other choices would not be helpful in ruling out small intestinal lymphoma.

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20. A 64 year-old male with a 15-year history of type II diabetes mellitus presents with nausea, vomiting, and early satiety associated with meals. You suspect gastroparesis, which you confirm with a delayed gastric emptying scan. All of the following are recommended except:

A. Eat smaller meals
B. High fiber diet
C. Increase liquid nutrition
D. Eat more frequent meals
E. Reduced fat diet

The recommended response is B.

You would advise the patient to decrease, not increase the fiber in his diet because high fiber foods lead to delayed gastric emptying. High fat foods lead to delayed gastric emptying as well, so you would recommend a low fat diet. Patients should
be advised to eat smaller meals more often throughout the day. Liquid emptying is often normal in patients with gastroparesis, so increased liquid nutrition is recommended.


21. You receive a call from a nurse who is caring for a patient receiving PEG tube feeding. She has just measured a gastric residual volume of 350mL and wants to know what to do. You should advise her to:

A. Raise the head of the bed and re-check gastric residuals
B. Increase the rate of the tube feeds
C. Decrease the rate of the tube feeds
D. Stop the tube feeds immediately
E. Increase the patient’s sedation

The recommended response is A.

Tube feeding should not be withheld for a gastric residual volume of less than 400-500mL or for one high gastric residual volume. Instead of stopping the tube feeds or changing the rate, other interventions such as raising the head of the bed, adding a prokinetic agent, and reducing (not increasing) sedation should be tried. The gastric residual volume should always be r-checked to look for a trend towards increasing gastric residuals.


22. Indications for jejunal placement of a feeding tube include all of the following except:

A. Severe gastroesophageal reflux
B. Dementia
C. Gastroparesis
D. Aspiration
E. Severe head injury

The recommended response is B.
The most common indications for jejunal placement of a feeding tube include aspiration, gastroesophageal reflux, and significant gastroparesis. Patients with severe head injury have a high risk of impaired gastric motility and a jejunal tube should be considered initially. Dementia does not increase one’s risk of aspiration and is therefore not an indication.


23. All of the following are possible causes of gastroparesis except:

A. H-pylori gastritis
B. Idiopathic
C. Anticholinergic medications
D. Roux-en-Y gastric bypass
E. Narcotics

The recommended response is A.

This has not been shown to be associated with gastroparesis. Idiopathic is the most common form of gastroparesis. Both anticholinergic and narcotics can cause gastroparesis. Various surgeries including Roux-en-Y are linked with gastroparesis.


24. Which one of the following statements about nutritional aspects of pancreatitis is correct?

A. Nutritional support should begin on the first day during acute pancreatitis
B. Pancreatic secretions need to be reduced by 40% in order to result in maldigestion
C. Pancreatic enzyme replacement should include at least 30,000 units of lipase with each meal
D. Enteric coated formulations of pancreatic enzyme replacement require PPI or H$_2$ blocker therapy for maximal efficacy
E. Hypercalcemia is often seen in acute pancreatitis

The recommended response is C.

Nutritional support is not necessary if the patients is expected to eat within 7 days. Pancreatic secretions need to be decreased by 90% to result in maldigestion. The non-enteric coated pancreatic enzyme formulations require PPI or H$_2$ blocker therapy to prevent acid induced inactivation of the lipase. Hypocalcemia can be
seen in acute pancreatitis because of saponification of calcium with free fatty acids due to fat necrosis.


25. The body mass index (BMI) is calculated by:

A. Weight (kilograms)/Height (meters²)
B. Weight (pounds)/Height (inches²)
C. Weight (kilograms)/Height (centimeters³)
D. Weight (kilograms)/ [Height (meters) x 2]
E. Weight (kilograms)/Height (meters)

The recommended response is A.

The body mass index (BMI) is very useful in characterizing nutritional status. It is calculated by dividing the patient’s weight in kg by the height in meters². A BMI of less than 14 kg/m² is indicative of severe malnutrition with a high risk of death. Conversely, a BMI of greater than 40 kg/m² is considered severe obesity.