

Case Study

1. The small bowel biopsy results indicate that the patient has celiac disease and exposure to gliaden in gluten results in an inflammatory response damaging the intestinal mucosa. This results in malabsorption, and maldigestion similar to Mrs. Gaines's case. *1
2. Celiac disease is a genetically inherited autoimmune disorder triggered by the body's abnormal reaction to gluten (*1 and *3). Mrs. Gaines's mother and grandmother have suffered from diarrhea as well. This means that her Celiac Disease may have been genetic.
3. With Celiac Disease, when the small intestine is exposed to gliadin found in gluten, the T-Lymphocytes produce cytokines which causes inflammation. The innate immune response is triggered as well which causes damage to the enterocytes, resulting in reduced absorptive surface area and loss of digestive enzymes. Together, the inflammatory and innate immune response damages the villi, resulting in malabsorption and maldigestion (*1).
4. The AGA and EMA antibodies specific to gluten are present in patients with Celiac disease. The patient is tested for these antibodies when their symptoms and biopsy results of the small intestine are similar to that of Celiac disease (*1).
5. A 72-hour Fecal Fat test is testing the patient's fecal matter for fat every 24 hours for 3 days, while putting the patient on a 100 gram fat diet. A normal result of 2-6 grams/24-hours shows there is no malabsorption of fat (*2).
6. Mrs. Gaines's abnormal laboratory results of the fecal fat test, indicates fat malabsorption. This confirms that there is damage to the small intestine resulting in malabsorption and/or maldigestion. When people with CD eat foods that contain gluten, it creates an immune reaction that causes damage to the small intestine and does not allow food to be properly absorbed and/or digested (especially fat).
7. Mrs. Gaines was placed on a 100 gram fat diet in order to complete the fecal fat test despite her worsened symptoms. This test will show whether fat is properly being digested and absorbed or not.
8. Gluten consists of gliadin and other proteins, which is found in wheat, barley and rye (*3).
9. It is unlikely that patients on a gluten-free diet can tolerate oats because many of cross-contamination. Oats are often manufactured in the same place products containing gluten are manufactured; however, if it is specified on the packaging of oats that they are manufactured in a separate place from gluten-containing products and the packaging

doesn't contain gluten either, then Celiac patients are likely to tolerate oats (lower GI lecture).

10. Gluten hides in frozen French fried potatoes, soy sauce, rice cereal, cosmetics, household cleaners, toothpaste, oats (cross-contamination), any product made with WBRO, and more (*3).
11. Patients with celiac disease can also be temporarily lactose intolerant due to the damage of the small intestines and loss of lactase.
12. $UBW = 92/112 \times 100 = 82\%$ Moderate Weight Loss
=18% Severe Weight Loss

$BMI = 92/63/63 \times 703 = 16.3$ Underweight-Mildly Depleted Energy Stores (IBW)

13. $BEE = 655 + (9.6 \times 41.8 \text{ kg.}) + (1.8 \times 160 \text{ cm.}) - (4.7 \times 36\text{yrs.}) = 1175 \text{ kcals}$
 $TEE = 1175 \text{ kcals} \times 1.3 + 350\text{kcal} = 1878\text{kcal}$
 $\text{Protein} = 41.8\text{kg} \times 1.3\text{g/kg./day} = 54.3\text{g prot./day}$
14. Mrs. Gaines's 24-hour recall shows her estimated calorie intake is 637 kcals and her estimated protein intake is 8 grams/kilograms.
15. Within the intake domain, Mrs. Gaines has inadequate energy intake (NI-1.4), inadequate protein intake (NI-52.1), and inadequate oral food/ beverage intake (NI-2.1).
16. Mrs. Gaines's laboratory measures nutritional significance:
 - a. HGB (9.5L-low)- iron deficiency anemia (*6)
 - b. HCT (34L-low)- microcytic hypochromic anemia (*6)
 - c. Ferritin (12L-low)- severe protein deficiency, iron deficiency anemia (*2)
 - d. B12 (21.2-low)- **pernicious anemia**, malabsorption (*2)
 - e. Folate (3)- hemolytic anemia, malnutrition, malabsorption (*2)
 - f. Albumin (2.9-low)- protein energy malabsorption, poor intake secondary to pain (*6)
 - g. Pre-albumin (13-low)- protein energy malabsorption, poor intake secondary to pain (*6)
 - h. Total Protein (5.5L-low)- malabsorption
 - i. Osmolality (275-low)- diarrhea
 - j. Magnesium (1.6-low)- malabsorption, malnutrition (*2)
17. It seems that all of the abnormalities of Mrs. Gaines's laboratory results are related to the consequences of Celiac Disease. Flattened villi lead to malabsorption of many of these nutrients which leads to anemia, protein malabsorption, and her diarrhea. Also, her decrease in intake is due to the symptoms caused by the disease, which results in further malnutrition.
18. Some of Mrs. Gaines's physical examination is consistent with her laboratory results. Her fatigue, weakness, and pale skin are related to anemia and protein malabsorption.
19. Mrs. Gaines's anthropometric values such as her BMI of 16.3 shows that she is underweight. Her ideal body weight of 80% shows that she has mildly depleted energy

stores (mild malnutrition). Her percent usual body weight of 82% shows that she has moderate weight loss, but with 18% weight loss shows that she has severe unintentional weight loss. All of these measurements relate to Mrs. Gaines's malnutrition and malabsorption as a result of the damage from her disease state.

20. Within the Clinical domain, Mrs. Gaines has an altered GI function (NC-1.4), impaired nutrient utilization (NC-2.1), is underweight (NC-3.1), and has involuntary weight loss (NC-3.2).
21. Nutrition level 3 (moderate)- see Nutrition Status Classification Worksheet.
22. PES Statements:
 - a. Altered G.I. function (NC-1.4) related to damage to the small intestine, as evidenced by diarrhea/steatorrhea and abnormal lab values: **glucose (347 mg/dl), TC (265 mg/dl), LDL (170 mg/dl), ALT (38 U/L), BUN (26 mg/dl), Na (147 mEq/L), TG (350 mg/dl), HbA1c (12.2%), HDL (25 mg/dl).**
 - b. Food and nutrition-related knowledge deficit (NB-1.1) related to being recently diagnosed with celiac disease, as evidenced by the patient's continuous consumption of gluten-containing products within her 24-hour recall and no prior education.
23. Ideal goal:
 - a. Eliminate diarrhea/steatorrhea and normalize lab values: **?**
 - b. Patient demonstrates good understanding of the new diet.
24. The type of diet to initiate in Mrs. Gaines's case would be gluten-free, lactose-free, low fat, and low oxalate.
25. I would recommend Ensure Plus, water-miscible vitamins, and MCT oil.
26. I would recommend a glutamine supplementation in the form of a tablet or capsule to help Mrs. Gaines during the healing process and avoid further decrease in osmolality.
27. Mrs. Gaines can expect her diarrhea to clear up, her lab values to improve, her fatigue and weakness to get better, and to gain some weight. She will have to be on a gluten-free diet for her entire life.
28. Substitutes: (*4)
 - a. Cornflakes- Ceralvit Organic Cornflakes Gluten-Free
 - b. Bologna Slices- Fat-free all beef bologna
 - c. Lean Cuisine-Ginger Garlic Stir Fry with Chicken- Amy's Chicken Stir Fry
 - d. Skim Milk- Tolerated
 - e. Cheddar cheese spread- Safeway Cheese Spread
 - f. Green Bean Casserole (mushroom soup, onions, green beans)- Progresso mushroom soup, Funyons, Frozen French cut Green Beans
 - g. Coffee- 100% plain coffee
 - h. Rice crackers- Crunchmaster Baked Rice Crackers
 - i. Fruit cocktail- Del Monte Fruit Cocktail Snack Cup
 - j. Sugar- Agave or Honey

- k. Pudding- Gluten-free instant pudding
- l. V8 juice- Tolerated
- m. Banana- Tolerated
- n. Cola- Coca-Cola Classic

Reference Page

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