

Part IV: Interpretation

1. Energy intake and intake of most nutrients based on the three-day menu met or exceeded DRI goals. Total kilocalorie intake was 115% of the DRI goal. Intake of carbohydrate and fat were within the goal range, but protein intake was considerably higher. Intake of most vitamins and minerals exceeded DRI goals. However, intakes of vitamin D, vitamin E and potassium were less than the recommended goals.
2. The Acceptable Macronutrient Distribution Range (AMDR) for fat is 20-35% of total calories. The three-day average fat intake was 28% of total calories, which is within the AMDR.
3. Intake of all nutrients was above 50% of the DRI goal. However, intake of two important vitamins was less than recommended. Intake of vitamin D was only at 54%. Vitamin D is important for bone maintenance, which is of particular concern for people with Crohn's disease due to impaired absorption and increased rate of bone loss as a result of using steroid medications to treat the disease. Intake could be increased by the increasing consumption of eggs, fatty fish such as salmon, and calcium and vitamin D fortified orange juice. In addition, intake of vitamin E was only 59% of the recommended goal. Vitamin E is an important antioxidant which also has a role in immune function. As a fat soluble-vitamin, people with Crohn's disease are at increased risk for vitamin E deficiency, so adequate intake is important. Intake could be increased by adding nuts such as almonds, peanuts or hazelnuts, or by substituting sunflower or safflower oil for other oils. While certain seeds and green vegetables are also good sources, these foods

may worsen symptoms of Crohn's disease and consumption should be limited, especially when the disease is active.

4. The DRI goal for sodium was 1,300mg, and actual intake was 2,485.7mg. This is well over the goal, and intake should be reduced. The greatest sources of sodium in the three-day menu were turkey bacon, canned tuna and canned tomato sauce. It may help to choose low-sodium varieties of certain foods or to limit consumption of canned goods, which are often high in sodium. However, canned goods are often less expensive and potentially more convenient than fresh foods, so this would also need to be considered.
5. The three-day average for fiber intake was 100% of the DRI goal. It is not necessary to improve fiber intake; in fact, it may be necessary to decrease intake of fiber because high fiber foods tend to worsen symptoms in people with active Crohn's disease.
6. Based on DRI goals, intake of calories, protein and many vitamins and minerals were well above recommended intakes. However, because malabsorption leading to nutrient deficiencies and weight loss is a symptom of Crohn's disease, higher intakes may be beneficial. For example, intake of protein based on this menu is almost double the DRI goal. However, protein provides a framework for bones and stimulates the production of insulin-like growth factor, which is necessary for bone formation. Because people with Crohn's disease are already at risk for impaired bone maintenance and malabsorption, increased protein consumption may be beneficial depending on whether or not the disease is active (Crohn's and Colitis Foundation of America, 2012).

Part V: Food Selection

1. Including a variety of colors in a diet plan for someone with Crohn's disease is a bit of a challenge due to the dietary restrictions that may be necessary. Many leafy green

vegetables and raw fruits and vegetables can worsen symptoms of the disease, and these foods provide a great deal of the color variation in a given meal. The meal with the greatest variety of colors includes Hoisin glazed salmon, white rice, a baked sweet potato without skin, and steamed green beans.

2. Variety in taste and flavor can be difficult to achieve in designing a menu for this population but is not impossible. I tried to include different types of taste sensations in most meals to keep the menu interesting. For example, one night's dinner consists of apple Dijon encrusted pork tenderloin, which would provide some sweetness with the mashed potatoes and steamed asparagus.
3. Aroma is an important component of flavor. Foods included in the menu with the most pronounced aroma would include turkey bacon, apple cinnamon waffles and apple Dijon encrusted pork tenderloin.
4. Because soft, tender foods are often recommended for people with Crohn's disease, it is difficult to achieve a variety of textures in a menu for this population. However, bacon, baby carrots and hard pretzels add some harder textures to the menu.
5. The breakfast options for all three days provide a variety of temperatures. Each breakfast consists of a hot entrée with either cold orange juice or soy milk. Two of the three days also include fruit in addition to the hot entrée.
6. Although the sizes of meals do not vary greatly from day to day, I tried to include a variety of shapes in the menu. For example, while all three lunches include some kind of sandwich, the type of sandwich, shape and temperature differ. In addition, I tried to vary the way the vegetables were served by preparing them differently.

7. While overall variety is difficult to achieve when preparing a menu for this population, creative solutions can make the menu more interesting. Different proteins, vegetables and starches were provided for each dinner. In addition, fruit smoothies made with soy milk and tofu can help increase consumption of calcium and protein. Consuming fruit in a smoothie rather than whole also ensures adequate intake of nutrients found in these foods while reducing the fiber content; this is important because too much fiber can worsen symptoms of the disease.

Part VI: Resources

Cost and availability of food should not be a major issue in implementing this menu. The most expensive items would be salmon and pork tenderloin, and possibly fresh produce. It may be possible to substitute frozen vegetables for the asparagus and green beans to cut down on produce costs. This would also help improve availability. The only foods that may not be available year-round would be fresh produce, so replacing them with frozen would ensure availability at any time.

Other issues that must be considered when implementing a new menu include preparation time and equipment necessary to prepare the food. These should not affect implementation of the menu in any significant way. Most of the meals and recipes are simple to prepare and include a limited number of ingredients. Because fatigue is a symptom of Crohn's disease, ease of preparation is important when designing a menu for this population. In addition, very little equipment is needed for the meals and recipes provided. The only equipment needed is common kitchen appliances like an oven, stove top and blender.

Part VII: Reflection

Overall, most of the goals set forth when creating this menu have been met. The first goal involved providing meals which include high amounts of the nutrients most at risk for deficiency in people with Crohn's disease while still avoiding foods that may worsen symptoms. The most common nutrient deficiencies associated with the disease are deficiencies of the fat soluble vitamins, vitamin B12, folate, magnesium, zinc, potassium and calcium. Calcium and vitamin D, which are necessary for bone health, are particularly important because people with Crohn's disease often take medications which accelerate bone loss. Intake goals for all of the nutrients commonly deficient with this disease were met or exceeded, with the exception of vitamins E and D. Intakes of these nutrients were at 59% and 54%, respectively, of the DRI goals.

Another goal in preparing this menu was to provide variety and enjoyability while limiting foods that may cause inflammation. It is often necessary to avoid many leafy green vegetables and raw fruits and vegetables, particularly with skins, as well as high-fat and sugar foods, seeds, raw foods and beans. For this reason, many people with Crohn's disease feel that their diets are often boring and bland (Crohn's and Colitis Foundation of America, 2011). Despite these restrictions, the menu set forth provides a variety in flavor, texture, type of food consumed from day to day and preparation method while still avoiding many foods known to be problematic.

Another important goal when designing a menu for this population is ease of preparation. Because fatigue is commonly associated with Crohn's disease, providing complicated meals and recipes with many ingredients would not be realistic or appropriate. All of the meals provided in this menu have relatively few ingredients, require little active preparation time and utilize common preparation methods.

Despite the merits of the menu designed, there are changes which could be made to make it more nutritionally adequate and aesthetically appealing. For example, vitamins E and D, which are especially important for people with Crohn's disease, were not present in adequate amounts in this menu. Including more calcium and vitamin D fortified orange juice or soy milk as well as yogurt, eggs and salmon could improve vitamin D intake, and the addition of certain nuts and substituting safflower or sunflower oil for other oils would improve vitamin E intake. To make the menu more aesthetically appealing, it might help to add a greater variety of fruits and vegetables. Any type of ripe melon, as well as most canned fruits, are recommended. Other vegetables which could be included, provided they are cooked, include beets, summer squash, mushrooms, peas, lighter colored lettuces, rutabagas and turnips. While there are minor changes which could improve the nutritional profile and aesthetic qualities of the menu, overall it provides varied, interesting foods that are unlikely to worsen symptoms of the disease, and in most cases provides adequate levels of the nutrients most at risk of deficiency in people suffering from Crohn's disease.

References

Crohn's and Colitis Foundation of America. (2012). *Eating the right foods: Strategic nutrition for healthy bones*. Retrieved from: <http://www.ccfa.org/resources/eating-the-right-foods.html>.

Crohn's and Colitis Foundation of America. (2011). *Diet and nutrition*. Retrieved from: <http://www.ccfa.org/resources/diet-and-nutrition.html>.