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## Heart Health and Celiac Disease



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**Following diagnosis of celiac disease, the focus of dietary modification is on gluten elimination. A person with celiac disease may feel entitled to eat anything gluten-free, even if high in fat, sugar, and calories, in an attempt to compensate for the restrictions of a gluten-free diet. Unfortunately, being gluten-free does not guarantee nutrition principles recommended to protect the heart. Prudent advice for individuals with celiac disease follows public policy initiatives and programs such as the National Cholesterol Education Program and the Dietary Guidelines for Healthy Americans. Considering the focus toward prevention and recognition of multiple risk conditions such as metabolic syndrome, early assessment and intervention is critical to cardiovascular health promotion. Individualized assessment of cardiovascular risk, maintenance of gluten-free diet principles and appropriate addition of heart healthy diet recommendations are critical to successful nutrition intervention, often requiring consultation with a registered dietitian.**

### INTRODUCTION

**C**urrently, the only treatment for Celiac Disease (CD) is strict adherence to a gluten-free (GF) diet. Individuals on a GF diet quickly become adept at scrutinizing foods for hidden gluten. With dietary adherence, the damaging effect of gluten on the intestines is halted. Intestinal healing is followed by improved nutrient absorption and frequently weight gain. Once gastrointestinal function is normalized, the person with CD should be evaluated for risks that

plague the population in general. With improved absorption and possibly weight gain, previously masked risk factors may appear. Even more CD specific evidence echoes the risk warning identifying cardiovascular diseases as the leading cause of death in both men and women with CD (1). Early cardiovascular risk identification and preventive nutrition efforts are an investment in health maintenance as well as a mechanism to control future healthcare costs.

### ASSESSING CARDIOVASCULAR RISK

Risk factors for cardiovascular disease are well documented and listed in Table 1.

Control of the first four modifiable risk factors can be improved with diet modification. In individuals

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who are overweight, even small weight loss (5%–15%) can improve blood glucose control, blood pressure and serum lipids (3–6). Cardiovascular disease risk evaluation should be based upon established assessment guidelines for blood lipids, blood pressure, and blood sugar as listed in Table 2.

In addition, weight and waist measurements assist in assessment of weight excess. Weight classification using Body Mass Index (BMI) should also include a waist measurement that will evaluate abdominal obesity as seen in Table 3.

This cumulative evaluation also enables assessment of metabolic syndrome, which is associated with

**Table 1**  
**Risk Factors for CHD**

<i>Modifiable Risk Factors</i>	<i>Non-modifiable Risk Factors</i>
Dyslipidemia	Age
Hypertension	Male Sex
Diabetes	Family History of Premature
Obesity	CHD
Physical Inactivity	
Cigarette Smoking	

Source: Adapted from reference 2

**Table 2**  
**Assessment Guidelines for Blood Lipids, Blood Pressure and Blood Sugar**

**Blood Lipids**

<i>Total Cholesterol (mg/dL)</i>		<i>HDL Cholesterol (mg/dL)</i>	
<200	Desirable	<40	Low
200–239	Borderline high	≥60	High*
≥240	High		

\*High HDL is associated with reduced risk for coronary heart disease

<i>LDL Cholesterol (mg/dL)</i>		<i>Triglyceride (mg/dL)</i>	
<100	Optimal	<150	Normal
100–129	Near optimal/above optimal	150–199	Borderline high
130–159	Borderline high	200–499	High
160–189	High	≥500	Very High
≥190	Very High		

Source: Adapted from reference 2.

Also see <http://www.nhlbi.nih.gov/guidelines/cholesterol/dskref.htm> for an At-A-Glance Quick Desk Reference for cholesterol.

**Blood Pressure**

**Classification of Blood Pressure for Adults**

<i>Blood Pressure Classification</i>	<i>Systolic Blood Pressure (mmHg)</i>	<i>Diastolic Blood Pressure (mmHg)</i>
Normal	<120	and <80
Prehypertension	120–139	or 80–89
Stage 1 Hypertension	140–159	or 90–99
Stage 2 Hypertension	≥160	or ≥100

Source: Reference 7

**Blood Sugar**

<i>Fasting Blood Glucose mg/dL</i>	<i>Diagnosis</i>
≤99	Normal
100–125	Pre Diabetes (impaired fasting glucose)
≥126	Diabetes*

\*Confirmed by repeat testing on a different day. Source: Adapted from reference 8.

**Table 3**  
**Classification of Overweight and Obesity by BMI, Waist Circumference and Associated Disease Risk\***

<i>Weight classification by BMI</i>		<i>Disease Risk* Relative to Normal Weight and Waist Circumference</i>	
Classification	BMI* weight (kg) / [height (m)] <sup>2</sup> or weight (lb) / [height (in)] <sup>2</sup> × 703	Men <102 cm (≤40 in.) Women ≤88 cm. (≤35 in.)	Men >102 cm (>40 in.) Women >88 cm (>35 in.)
Underweight	<18.5		
Normal**	18.5–24.9		
Overweight	25.0–29.9	Increased Risk	High Risk
Obesity I	30.0–34.9	High Risk	Very High Risk
Obesity II	35.0–39.9	Very High Risk	Very High Risk
Obesity III (Extreme Obesity)	≥40	Extremely High Risk	Extremely High Risk

\*Disease Risk for Type 2 Diabetes, Hypertension and cardiovascular disease.

\*\*Increased waist circumference can also be a marker for increased risk even in normal weight individuals.

Source: Adapted from reference 2.

increased cardiovascular disease risk. According to criteria listed in the National Cholesterol Education Program’s Adult Treatment Panel III report, when three of the five characteristics listed in Table 4 are present, a diagnosis of metabolic syndrome can be made.

**GENERAL NUTRITION RECOMMENDATIONS  
 IN CARDIOVASCULAR DISEASE**

Nutritional advice is readily available for cardiovascular disease. When a person with CD discovers cardiovascular disease risk, further diet modification becomes necessary. Still it remains ESSENTIAL to maintain the GF diet while incorporating heart healthy diet principles. By tailoring the recommendations to meet individual needs, a person can implement a GF, heart healthy diet.

The most recent advice of the National Cholesterol Education Program promotes the Step I diet for the general public. For those individuals at high risk or with known CVD, the Therapeutic Lifestyle Changes (TLC) diet plan is recommended (2). The approximate combined LDL cholesterol reduction achievable through TLC diet modification is 20%–30%, indicating the significance of diet modification (10). The nutrient composition of the Step I and TLC diets are listed in Table 5.

Both the Step I and TLC diets are specifically geared toward controlling blood cholesterol, and these guidelines should form the basis of a heart healthy diet plan. If blood pressure is a concern, additional specifications regarding blood pressure management as pro-

**Table 4**  
**Adult Treatment Panel III Clinical Identification of the Metabolic Syndrome**

<i>Risk Factors</i>	<i>Measurement</i>
Waist Circumference	Men: >102 cm (>40 in) Women: >88 cm (>35 in)
Triglycerides	>150 mg/dL
HDL Cholesterol	Men: <40 mg/dL Women: <50 mg/dL
Blood pressure	≥130/≥85 mm Hg
Fasting glucose	≥110 mg/dL*

\*The American Diabetes Association established a lower cutpoint of ≥100 mg/dL, above which persons have either prediabetes (impaired fasting glucose) or diabetes.

Source: Adapted from reference 2.

moted by the Dietary Approaches to Stop Hypertension (DASH) diet should be incorporated to complete the recommendations. The DASH study showed that diet modification could effectively lower blood pressure in adults with hypertension (11). DASH diet guidelines specifically promote sodium control and a consistent intake of fruits, vegetables, nonfat dairy products, legumes, nuts and whole grains (12).

These recommendations form an excellent initiation point for general heart healthy diet principles. The diet intervention should be intensified as necessary based on

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**Table 5**  
**Nutrient Composition of Step I and Therapeutic Lifestyle Changes Diet**

Nutrient	Recommended Intake	
	Step I Diet	TLC Diet *
Saturated fat	8-10% of total calories for an 1800 calorie diet that is 16–20 grams	No more than 7% of total calories for an 1800 calorie diet that is ≤14 grams
Polyunsaturated fat	Up to 10% of total calories for an 1800 calorie diet that is ≤20 grams	Up to 10% of total calories for an 1800 calorie diet that is ≤20 grams
Monounsaturated fat	Up to 15% of total calories for an 1800 calorie diet that is ≤30 grams	Up to 20% of total calories for an 1800 calorie diet that is ≤40 grams
Total fat	30% or less of total calories for an 1800 calorie diet that is ≤60 grams	25–35% of total calories for an 1800 calorie diet that is 50–70 grams
Carbohydrate	55 percent or more of total calories for an 1800 calorie diet that is ≥248grams	50–60% of total calories for an 1800 calorie diet that is 225–270 grams
Fiber	20–30 grams per day	20–30 grams per day
Protein	Approximately 15% of total calories for an 1800 calorie diet that is ~67.5 grams	Approximately 15% of total calories for an 1800 calorie diet that is ~67.5 grams
Cholesterol	Less than 300 mg/day	Less than 200 mg/day
Total calories (energy)	Balance energy intake and expenditure to maintain desirable body weight/ prevent weight gain	Balance energy intake and expenditure to maintain desirable body weight/ prevent weight gain
Additional options for the Therapeutic Lifestyle Changes Diet	*If reducing saturated fat and cholesterol intakes does not lower LDL cholesterol enough, the amount of viscous/soluble fiber in the diet can be increased (goal 10–25 grams), along with addition of food products that contain <b>plant stanols</b> or <b>plant sterols</b> (goal 2 grams) to boost LDL-lowering power.	

Source: Adapted from reference 3.

the individual's cardiovascular disease risk factor profile. The Adult Treatment Panel III report specifies that effective dietary modification will be facilitated by consultation with a registered dietitian (RD). Considering the combination nutrition therapy for CD and cardiovascular disease, RD counseling helps assure appropriate and individualized application of the recommendations.

### APPLYING HEART HEALTHY DIET PRINCIPLES TO A GF DIET—A CLOSER LOOK AT THE SPECIFICS OF THE RECOMMENDATIONS

When it comes to fat, **type and amount** matters. Often referred to as the “bad fat,” saturated and trans fat raise blood cholesterol and therefore must be limited. Americans are estimated to consume 11% of their

**Table 6**  
**Saturated and Trans Fat Limits**

If you consume	Eat no more than	
	Saturated fat: (<7–10%)	Trans fat: (<1%)
Calories		
1200	9–13 grams	1.3 grams
1500	12–17 grams	1.7 grams
1800	14–20 grams	2 grams
2000	16–22 grams	2.2 grams
2500	19–28 grams	2.8 grams

**Table 7**  
**Food Label “Rule of Thumb”**

**Choose items with no more than:**  
3 grams of **Total Fat** per serving size  
2 grams of **Saturated Fat + Trans Fat** per serving size  
250 milligrams of **Sodium** per serving size

**In addition, try to choose foods with at least:**  
2–3 grams of **Dietary Fiber** per serving

Source: Educational tool developed by Mark Dinga, MEd, RD, LDN.  
Intended for use with RD guidance

**Table 8**  
**At a Glance—Heart Healthy, Gluten-Free Diet Guide**

<i>Food Groups &amp; Examples</i>	<i>Daily Servings</i>	<i>Estimated Serving Size</i>
<b>PROTEIN</b>		
Lean Meats, Poultry without skin, Fish, Low-fat Cheese, Dried beans/lentils/peas, GF peanut butter, GF soy protein, Eggs	6 or less Amount adjusted to calorie needs	1 oz meat/poultry/fish/cheese/soy protein alternative 1–2 Tbsp peanut/nut butter 1 egg ½ cup dried beans ½ cup tofu
<b>DAIRY</b>		
Fat-free Milk, Fat-free Yogurt, Fat-free Cheese	2–3 Amount adjusted to calorie needs	1 cup milk 1 cup yogurt 1 oz cheese ¼ cup cottage cheese
<b>FATS</b>		
Liquid vegetable oil, Soft tub margarine, GF low fat salad dressing, Nuts	4–9 Amount adjusted to calorie needs	1 tsp oil 1–2 tsp soft tub margarine 2 Tbsp low fat salad dressing 1 Tbsp nuts or seeds
<b>FRUIT</b>		
Fresh, canned, juices, and frozen	3–6 Amount adjusted to calorie needs	1 medium piece ½ banana 1 cup berries or melon ½ cup canned ¼ cup dried ½ cup juice
<b>VEGETABLES</b>		
Plain fresh, frozen, and no added salt canned vegetables	2–4+	1 cup raw ½ cup cooked ½ cup juice
<b>STARCH</b>		
GF products made from GF grains such as amaranth, arrowroot, buckwheat, corn, legume, millet, potato, quinoa, sorghum, tapioca, teff	6–11 Amount adjusted to calorie needs	1 slice GF bread 1 oz dry GF cereal ½ cup cooked beans, rice, GF pasta, or GF noodles ½ cup potato
<b>DESSERTS/SWEETS</b>		
	≤5 servings per week	½ cup fat free frozen dessert, GF plain cookie, ½ cup fat free GF pudding.

*Food Group—Choose ♥*

- ♥ Lean meats trimmed of visible fat e.g., loin, round
- ♥ Only extra lean ground meat
- ♥ Poultry without skin
- ♥ Cheese with no more than 2 grams saturated fat per 1 oz
- ♥ Egg yolks limited to 2–3 per week
- ♥ Fish or beans 2–4+ meals per week
- ♥ Avoid deep frying
- ♥ GF, low fat, low sodium deli meats
- ♥ GF soy protein
  
- ♥ Fat free, ½ or 1% milk
- ♥ GF soy milk (check labels)
- ♥ Fat free yogurt (no added sugar if calorie control)
- ♥ Fat free cheese (watch sodium)
  
- ♥ Vegetable oils such as olive or canola
- ♥ Vegetable oil sprays
- ♥ No added salt nuts such as almonds, pecans or walnuts (watch portion)
- ♥ Low fat salad dressing (watch sodium)
- ♥ For Fat free salad dressing, watch calories and sodium
  
- ♥ Choose fresh fruit more often
- ♥ Choose canned fruit without syrup
- ♥ Control portion of juice and dried fruit
  
- ♥ Choose fresh or plain frozen vegetables more often
- ♥ Watch sodium in canned vegetables and juices
  
- ♥ Choose GF whole-grains for ½ of the daily starch selections. e.g., wild rice, brown rice, quinoa, buckwheat, sorghum, whole grain corn
- ♥ Choose dried beans, peas and lentils to help increase fiber intake
- ♥ Use the food label “rule of thumb” to guide selection
  
- ♥ Aim for ≤125 calories per serving
- ♥ Amount adjusted to calorie level
- ♥ Use the food label “rule of thumb” to guide selection

*Food Group—Avoid ⊗*

- ⊗ High fat meats such as steak and ribs
- ⊗ Regular processed meat e.g., hot dogs, bologna, sausage, bacon
- ⊗ Deep fried: meat, poultry and fish
- ⊗ Regular cheese
- ⊗ Egg yolks in excess of 3 per week
- ⊗ Organ meats such as liver
  
- ⊗ Whole and 2% milk or chocolate milk
- ⊗ Milkshakes
- ⊗ Cream and half & half
- ⊗ Regular cheese
- ⊗ Regular sour cream
- ⊗ Regular cream cheese
  
- ⊗ Butter
- ⊗ Lard
- ⊗ Shortening
- ⊗ Hydrogenated fat
- ⊗ Stick margarine
- ⊗ Coconut, Palm and Palm kernel oil
- ⊗ Excess margarine of any type
  
- ⊗ “Fruit” drinks
- ⊗ Fruit canned in syrup
- ⊗ Coconut
  
- ⊗ Vegetables with butter or cheese sauce
- ⊗ Deep fried vegetables
- ⊗ High sodium vegetables e.g., sauerkraut, regular canned
  
- ⊗ **Wheat, Rye and Barley**
- ⊗ High fat, GF breads
- ⊗ GF sugar sweetened cereals
- ⊗ Deep fried potatoes
  
- ⊗ High fat/high sugar/high calorie GF desserts and baked goods e.g., cakes, pies, cookies, ice cream, chocolate, etc.
- ⊗ Candy and candy bars

*(table continued on page 80)*

calories from saturated fat and 2.5% from trans fat (13). The limits should be <7%–10% saturated and <1% trans fat (2,14) (Table 6).

A look at the Nutrition Facts panel on food labels will help in assessment of these numbers. In addition, the ingredient panel will list ingredients in descending order of content, providing important information about fat sources. Saturated fat is usually solid at room temperature and is found in foods containing animal fat such as fatty meat, poultry with skin, whole milk dairy products and tropical oils such as coconut and palm. Saturated fat can add up quickly; for example, 1 ounce of regular cheese contains about 5 grams of saturated fat. Trans fatty acids, referred to as trans fats, are found mainly in foods containing hydrogenated oils such as stick margarine and shortening (13). Studies indicate that trans fat increases LDL cholesterol (the bad cholesterol, L = Lethal) and may decrease HDL cholesterol (the good cholesterol, H = Healthy) (2). Since January of 2006, trans fat content must be listed on food labels. Cholesterol, in addition to saturated fat, is also limited by heart healthy diet recommendations. Cholesterol is contained in foods from animal sources such as meat, poultry, fish and dairy products. Limitation of high cholesterol items such as egg yolks and organ meats along with a total meat/fish/poultry/cheese limit of 5–6 ounces per day helps maintain the cholesterol and saturated fat limit.

The better fat, unsaturated fat (monounsaturated and polyunsaturated), is liquid at room temperature and found in foods such as vegetable oils, nuts, seeds, avocado, and higher fat fish including salmon, trout and herring. The overall goal is to include *some* heart healthy fat daily, but limit the total amount to prevent undesirable weight gain (13). Monounsaturated fats and omega 3 fatty acids have actually been associated with reduced cardiovascular disease risk (2). Two servings of fish, about 8 ounces total, is recommended per week to possibly reduce cardiovascular disease risk. Since the toxin methylmercury is found in varying levels in nearly all fish and shellfish, caution should be taken when increasing fish consumption. Some individuals (e.g., pregnant women, nursing mothers, young children) should avoid certain types of fish and shellfish. For specific guidance call FDA's food information line toll-free at 1-888-SAFEFOOD

or visit the web site: <http://www.cfsan.fda.gov/~dms/admehg3.html> (15).

Fat that is hidden in baked and fried products must also be considered. Using the food label information can help. The Food Label "Rule of Thumb" is a general guide for product selection (Table 7). This basic guide will help you to evaluate foods with hidden fat and sodium. As a general rule, the fiber contribution will enhance the product nutritionally. *Remember to always check the serving size listed on the product and how many servings you are actually eating.*

### FIBER—FOCUS ON SOLUBLE

The 2005 Dietary Guidelines for Americans recommends a dietary fiber intake of 14 grams per 1000 calories consumed (15). For enhanced cholesterol control, a specific type of fiber, soluble fiber, is promoted (Table 5). Soluble or viscous fiber forms a gel like substance in the intestines helping to block cholesterol absorption. A 5–10 gram increase in soluble fiber intake is associated with a 5% LDL cholesterol reduction (2). Good GF soluble fiber sources are fresh fruits (~1–2 grams per medium piece), vegetables (~1–3 grams per ½ cup), and legumes (~1–4 grams per ½ cup) (2). The grain sources of soluble fiber are limited by the GF diet; however, seeds such as ground psyllium are an excellent supplemental option with 5 grams soluble fiber per 1 Tbsp ground seeds (2). When selecting GF grains, the whole-grain variety should be chosen whenever possible (e.g., brown rice, sorghum, whole grain corn and millet). This will help enhance the nutrient density of the diet, particularly due to the limitation of certain grains in a GF diet regimen.

### PLANT STANOLS/STEROLS—ANOTHER OPTION

Plant sterols are structurally similar to cholesterol, but are poorly absorbed. The plant sterol and stanol ester forms can be used to decrease LDL cholesterol 6%–15% by inhibiting cholesterol absorption from the digestive tract (2). For this reason, plant stanols/sterols provide another therapeutic option for enhanced cholesterol control (Table 5). Plant stanol/sterol ester containing foods and beverages are available (e.g., margarine, orange juice). Since the addition of stanol/sterols does not add gluten, if the product is GF,

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**Table 8 (continued)**  
**At a Glance—Heart Healthy, Gluten-Free Diet Guide**

<i>Food Groups &amp; Examples</i>	<i>Daily Servings</i>	<i>Estimated Serving Size</i>
<b>SNACK FOODS</b>	Count as a part of Starch group, especially for calorie control	1oz GF crackers 3 c plain popped popcorn

NOTES: ☺ Aim for “balanced” meals, ☺ Watch portions, ☺ Read labels, ☺ Drink more plain water when increasing fiber, ☺ Avoid second helpings, ☺ Watch excess carbohydrate in GF cookies, desserts, sweets, sugar, jelly, candy, sugar sweetened beverages, etc., ☺ Avoid added salt and avoid excess sodium in processed foods, ☺ Watch high sodium spices and condiments such as pickles, olives, soy sauce, MSG, garlic salt, onion salt, sea salt, etc., ☺ Choose low sodium spices such as plain herbs, garlic powder, onion powder, lemon juice, lime juice, and vinegars. ☺  
 Source: Educational tool developed by Mark Dinga, MEd, RD, LDN (Intended for use with RD guidance).

the stanol/sterol variety will likely remain GF; however, label scrutiny is always prudent.

**ANTIOXIDANTS AND PHYTOCHEMICALS—  
 HIDDEN BENEFIT IN FOODS**

The “don’t forgets” in a diet are those foods encouraged because of the positive benefit they impart. The fruit and vegetable groups meet these criteria, providing a variety of nutrients, fiber, phytochemicals and antioxidants associated with cardiovascular benefit. Fresh fruit is GF as are pure fruit juices. However, both fruit and juice portions should be limited if calorie and carbohydrate intake needs to be limited. As a general rule, 1 serving of fruit is equal to 15 grams of total carbohydrate. This will help guide appropriate portion control, particularly for weight and blood glucose management. Fresh fruit is always preferred over juice due to the increased fiber content.

Vegetables provide nutrients similar to the fruit group, but as a general rule are lower in carbohydrate and calories. Fresh and plain frozen vegetables are GF, controlled in sodium and encouraged in a heart healthy diet plan. Canned vegetables are often high in sodium; however low sodium or no added salt varieties offer a sodium-controlled alternative. The danger with vegetables is added fat in the form of toppings such as butter, dressings, cheese and other sauces. Vegetables are usually not strictly limited, but “starchy” vegetables with more than 10 grams of carbohydrate per ½ cup serving such as potatoes, corn, and peas should be portioned more carefully.

**LOOK BEYOND THE GF LABEL—  
 CHECK FAT, SUGAR AND SODIUM TOO**

It is essential to carefully evaluate starch choices in both GF and heart healthy diets. Assuring that foods in the starch group are GF is the primary focus of the dietary management of CD, resulting in a very restricted bread and starch group. The heart healthy diet recommendations restrict this group further by placing limits on fat and sugar, while promoting fiber.

Desserts and sweets labeled as GF must be evaluated based on saturated fat, trans fat, and total carbohydrate content. The Food Label “Rule of Thumb” referred to previously will provide a general guide to promote appropriate total fat, saturated and trans fat control (Table 7). In addition, portioning based on the 15 grams of total carbohydrate per serving assessment will help control calories and carbohydrate as necessary. The DASH diet plan recommends ≤5 servings from the dessert/sweet group per week. Guidance such as this will help direct moderation recommendations. Finally, avoiding added salt, limiting processed foods, and adding fresh herbs for flavor, helps limit excess sodium intake.

When diet modification considerations are extensive, such as in the case of CD and cardiovascular disease risk factors, it is helpful to “pull things together;” therefore Table 8 provides a summary of recommendations promoting GF, heart healthy diet principles. Note that the recommendations are general and should be interpreted according to risk factors, nutrient needs, and individual modification goals.

## Food Group—Choose ♥

♥ Use the food label “rule of thumb” to guide selection

## Food Group—Avoid ⊗

- ⊗ Buttered and sugar coated popcorn
- ⊗ Fried GF snacks e.g., potato chips, corn chips
- ⊗ Cheese snacks
- ⊗ Regular: soft drinks, iced tea, lemonade, etc.

## CONCLUSION

Once an individual with CD has adjusted to a GF diet, attention toward heart health is warranted. Considering the prevalence of cardiovascular disease in the general population, a look toward assessment of personal cardiovascular risk and appropriate heart healthy diet modification is an investment in health maintenance and cost containment. Heart healthy diet guidelines for all Americans recommend weight management, nutritional variety, control of fat, sugar, and sodium, along with increased use of whole-grains, fresh fruits and vegetables (15). With a combined gluten free and heart healthy diet, in addition to recognition that portion size matters, a person with CD can protect their gut *and* heart; both of which are necessary for good health. ■

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