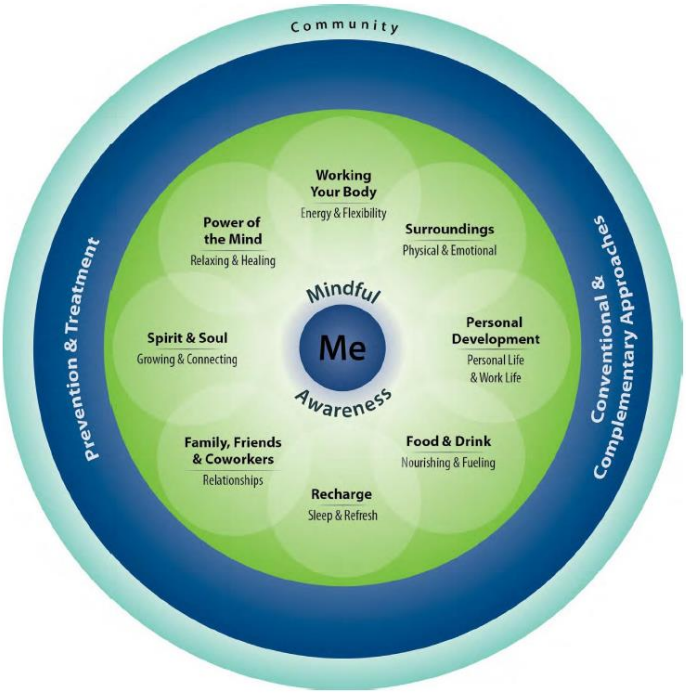
WHOLE HEALTH: CHANGE THE CONVERSATION

Advancing Skills in the Delivery of
Personalized, Proactive, Patient-Driven Care

Food and Drink
Educational Overview



This document has been written for clinicians. The content was developed by the Integrative Medicine Program, Department of Family Medicine, University of Wisconsin-Madison School of Medicine and Public Health in cooperation with Pacific Institute for Research and Evaluation, under contract to the Office of Patient Centered Care and Cultural Transformation, Veterans Health Administration.

Information is organized according to the diagram above, the *Components of Proactive Health and Well-Being*. While conventional treatments may be covered to some degree, the focus is on other areas of Whole Health that are less likely to be covered elsewhere and may be less familiar to most readers. There is no intention to dismiss what conventional care has to offer. Rather, you are encouraged to learn more about other approaches and how they may be used to complement conventional care. The ultimate decision to use a given approach should be based on many factors, including patient preferences, clinician comfort level, efficacy data, safety, and accessibility. No one approach is right for everyone; personalizing care is of fundamental importance.

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One of the very nicest things about life is the way we must regularly stop whatever it is we are doing and devote our attention to eating. —Luciano Pavarotti

Vignette: Erin

Erin is a 35 year-old Veteran and mother of two. She currently is overweight, with a body mass index (BMI) of 29. She often feels tired, struggles with constipation, and has some symptoms of gastritis; she also tends toward migraines and sinusitis. Erin does not have diabetes, but her doctor is concerned because her fasting glucose is elevated and she has a strong family history of type 2 diabetes. Most mornings, she has a bagel or granola bar for breakfast. For lunch, she has leftovers from dinner the night before and may have an afternoon snack of chips or popcorn. She eats out with her family three or four times a week, mostly fast food. They might eat vegetables a few times a week, and her children like vegetables. When they eat at home, they usually eat while watching television. She tries to drink mostly water and has cut out beers to cut down on calories, but she keeps juice around for her children. Her teenage son likes fruit drinks.

Erin knows she needs to lose weight, but she does not know how. She has the following questions and concerns:

- What is the best diet for me to follow? Should I follow a low-fat diet?
- What is fiber, and why is it good for me?
- What are some good options for protein?
- Eating healthy costs too much, and I am not sure I can afford it. Any suggestions?
- Juice is high in calories, but it is healthy, right, since it comes from fruit?
- Water is boring; are there other things to drink that are good for me?
- Sometimes I eat when I am bored or sad, and I know it is not a good way to deal with my feelings, but it makes me feel better. Any ideas?
- How do I eat well, but still feel satisfied? I hate dieting because I always feel like I am starving.
- Should I take a multivitamin?
- What minerals do I really need?

Nutrition: An Unpalatable State of Affairs

The prevalence of obesity and overweight in Veterans matches that of the general U.S. population. Seventy-three percent of male Veterans and fifty-four percent of females are overweight (BMI>25). Twenty-five percent of male Veterans and twenty-one percent of female Veterans are obese (BMI>30).[1] A 2004 *Journal of the American Medical Association* study concluded that, in the year 2000, at least 16.6% of all deaths (over 385,000) were

ultimately caused by being overweight, i.e., because of poor diet and, to a lesser degree, physical inactivity.[2] Because the prevalence of overweight and obesity increases every year, the number of people being killed by their dietary choices is climbing.

What can be done about the epidemic of unhealthy eating? Many people look to their physicians or other clinicians for nutritional guidance. Little do they know, most clinicians receive limited—even negligible—nutrition training. According to a 2010 survey of 109 medical schools, current requirements for nutrition average just 19.6 hours (down from 22.3 hours in 2004) through the *entirety* of medical school.[3] Even more disappointing, most of the training is not relevant; rather than reviewing research on how to eat well, much of the nutrition curriculum for health professions students focuses on biochemistry. Courses tend not to offer clinically relevant information that can be applied to patient care.

Of course, everyone agrees that nutrition is an important topic. Many people tend to fixate on it, even while struggling unsuccessfully with making good dietary choices. Most people know what they should or should not eat. However, they also have a difficult time changing their behaviors in accordance with that knowledge.

As clinicians, the so-called Standard American Diet (SAD) is our nemesis. Erin's family's diet is an example of a SAD; it is not a healthy way to eat. The SAD is characterized by:[4]

- Excessive calorie intake
- Too many refined carbohydrates
- High consumption of fatty meats
- Unhealthy levels of added fats
- Limited nutrition from nutrient-dense foods such as whole grains, fruits, and vegetables.

What Can Be Done?

The goal of this module is to "serve up" practical information about nutrition to guide both your own food choices and the nutrition suggestions you offer to your patients. Even if you are pressed for time, it can be beneficial to suggest at least one or two of the nutrition tips offered below during a Whole Health visit. It only takes a few moments, and you can always provide patients with written information they can review in more detail after their visit.

> Patients are more likely to follow nutrition recommendations if you, as the clinician, make them.

A 2009 study found, for example, that when a physician endorsed specific nutrition education materials during a visit, patients were much more likely to remember them, show them to others, and feel that the recommendations were specific to them as individuals (OR = 1.35, 95% CI = 1.00-1.84).[5] This was true for other behaviors as well, including increasing exercise and quitting smoking.

Some basic nutrition guidelines

Whether you are discussing food and drink with patients or thinking about your own dietary practices, the following nine general guidelines can serve as a good starting point:

1. In the spirit of personalized, proactive and patient-driven care, remember that it is best to **tailor nutrition recommendations to individual needs**. Collaborate with your patients to create an individualized food and drink plan. One important way to do this is by paying attention to economic status and making recommendations that will be possible for individuals with low incomes to follow. Another way is to be aware how healthy eating suggestions might be tailored for people from different ethnic and cultural groups. See the following two resources:

    - Ethnic cooking guidance from Nutrition.gov. Available at http://www.nutrition.gov/shopping-cooking-meal-planning/ethnic-cooking.
    - United States Department of Agriculture food pyramids for different ethnic and cultural groups. Available at http://fnic.nal.usda.gov/dietary-guidance/past-food-pyramid-materials/ethniccultural-food-pyramids.

2. **Small changes** in eating habits are typically easier to make than complete diet overhauls.[6] If you are wondering what to change, review the components of the Standard American Diet, as listed above. Then, find one specific way to shift one item on that list in a favorable direction. For example, you might encourage someone to decrease soda intake by a specified number of ounces per day, or suggest, if they are willing, that they only eat red meat once a week.

    Meet each patient where he or she is and set SMART (**S**pecific, **M**easurable, **A**ction Oriented, **R**ealistic, and **T**imed goals.[7] Figure 1 summarizes some recommendations from the *2010 Dietary Guidelines for Americans*, from the United States Department of Agriculture.[8]

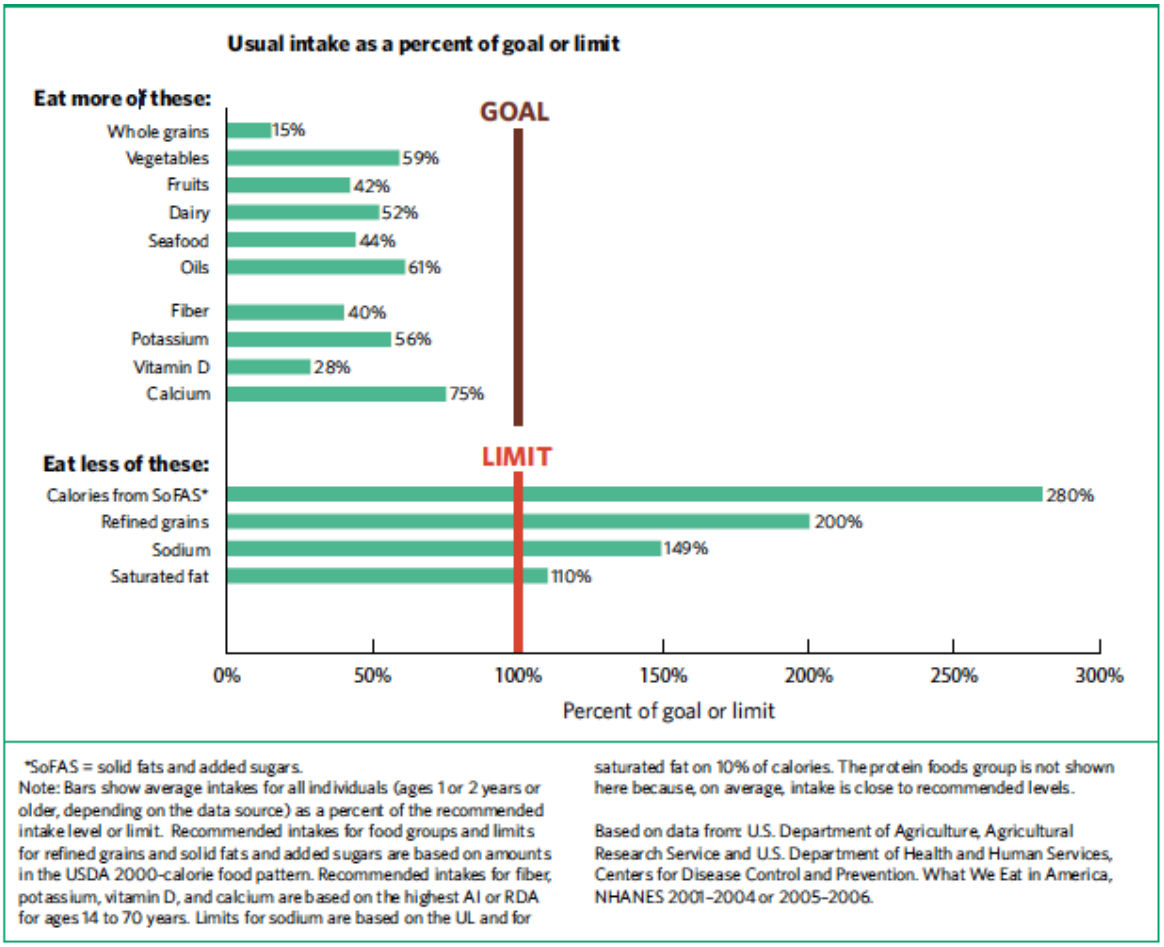

Figure 1. The Standard American Diet Versus the Diet Suggested by the USDA Dietary Guidelines for Americans, 2010.[9]

3. You have probably already been asked many times about which diet is the best one to follow. In general, research tells us that **the diet that works best is whatever one a person is willing and able to stick with long-term.**[10] Be familiar with the eating patterns recommended in popular diets (some of these are described below and in the Choosing a Diet clinical tool).

4. It is preferable to **meet nutritional needs through foods versus taking them in the form of multivitamins** or other dietary supplements.[11] Invest in healthy, nutrient-dense foods, not the latest trendy diet pill or capsule. These foods have a high ratio of nutrient content relative to how many calories they contain. This is in contrast to energy-dense foods, in which the calories in the food are way out of proportion to how nutritious it is. The 100 foods on the list of the World's Healthiest Foods,[12] were chosen based on being not only nutrient-dense but also because they are familiar, tasty, and affordable. They are also whole foods; that is, they have not been extensively processed or modified from their natural state. Examples in different categories include (and most of these probably will not surprise you) the following:

- **Vegetables** – asparagus, avocados, beets, bell peppers, broccoli, Brussels sprouts, cabbage, carrots, cauliflower, celery, corn, cucumbers, eggplant, fennel, garlic, green beans, green peas, greens (mustard and collard), kale, leeks, mushrooms (crimini and shiitake), olive oil, olives, onions, potatoes, romaine lettuce, sea vegetables, spinach, squash (summer and winter), sweet potatoes, Swiss chard, tomatoes, and turnip greens
- **Fruits** – apples, apricots, bananas, blueberries, cantaloupe, cranberries, figs, grapefruit, grapes, kiwi, lemons, limes, oranges, papaya, pears, pineapple, plums, prunes, raspberries, strawberries, watermelon.
- **Seafood** – cod, salmon, sardines, scallops, shrimp, tuna
- **Nuts and seeds** – almonds, cashews, flaxseeds, peanuts, pumpkin seeds, sesame seeds, sunflower seeds, walnuts
- **Beans and legumes** – black beans, dried peas, garbanzos, kidney beans, lentils, lima beans, miso, navy beans, pinto beans, soy sauce, soybeans, tempeh, tofu
- **Poultry and meats** – grass-fed beef and lamb, pasture-raised chicken and turkey
- **Eggs and dairy –** grass fed cheese, cow's milk, and yogurt. Pasture-raised eggs
- **Grains** – barley, brown rice, buckwheat, millet, oats, quinoa, rye, whole wheat

The list is by no means all-inclusive, and these choices are always subjective to some extent, but it gives you some ideas. A simple food and drink suggestion for a Personal Health Plan (PHP) when you are pressed for time could easily be along the lines of, "How about eating more of…[*insert one of the top 100 foods here*]"

5. **A nutritionist or dietician is a powerful ally** in helping patients with their nutritional needs. **Health coaches, too**, can be invaluable members of someone's Whole Health team.

6. Many patients find it useful to know that **there are roughly 3,500 calories in a pound of body fat.** In other words, decreasing caloric intake by 500 calories a day can allow for approximately one pound weekly of weight loss; dropping by 250 calories a day allows for a pound of loss every two weeks or so.

7. **Choose beverages wisely.** Around 21% of our daily caloric intake comes in the form of beverages.[13] If you are looking for one single piece of advice to give patients who want to lose weight, this may be it: changing what you drink has a powerful effect on weight loss. Cut out or minimize intake of soda, sweetened tea or coffee, juice, alcohol, energy drinks, smoothies, soda or milk, and replace them with water. Total calorie intake will be substantially decreased and overall health will likely improve. For more information on beverages, please see What We Drink clinical tool.

8. **Pay attention to portion sizes**. Many nutrition experts recommend getting five to nine servings of fruit or vegetables daily. A serving is not as big as many people assume. For green leafy vegetables, such as spinach, kale, or lettuce, it is generally one cup. For other vegetables, a typical serving is ½ cup. A serving of fruit is ½ cup, which would

equal a small banana, a slice of melon, ½ cup of juice, or ¼ cup of dried fruit. Fresh fruits and vegetables are best, but if these are not available or affordable, frozen is generally a better option than canned. Look for frozen or canned fruits without added sugars, those which are packed in water or their own juice instead of in syrup.

Figure 2. Serving Sizes Illustrated.[14]
http://www.denvergov.org/Portals/671/images/Wellness2014/Serving-Size-of-Common-Foods13.jpg.

9. **Encourage mindful eating**. This is described in detail in the Mindful Eating clinical tool, and essentially, it involves eating with mindful awareness. See the Mindful Awareness module for more general information. As with all mindful awareness activities, it is not about judging so much as simply paying attention. Here are some general mindful eating guidelines to follow:

    - When you eat, do not do anything else. Do not watch TV or try to work. Focus on your meal.
    - Periodically take time to note how hungry you are. No hunger? Stop eating! Ideally, you can stop just before you are full, since it takes a while for your stomach to signal your brain that it is full.

- Taste every bite. It can help to have a set number of times to chew for each bite you take. Fifteen to twenty chews per bit of food might be a good place to start.
- Never eat while standing. Sit, relax.
- Note if there are other reasons why you are eating. Are you eating to satisfy hunger, or to fulfill an emotional need?

Another excellent resource is the VHA National Center for Health Promotion & Disease Prevention's Mindful Eating Handout.

Mindful Me Awareness	**Mindful Awareness Moment** **Hunger**

Take a moment, right now, to pause and check in with your body.

- On a scale of 1 to 10, with 1 being "starving" and 10 being "overstuffed," how hungry are you right now?
- Where do you feel that hunger (or satiety) in your body? Is it in your stomach area, or somewhere else? What happens to your body when you become really hungry? Does it affect your mood, and if so, how?
- As you make your way through this module, periodically check in and ask, "How hungry am I right now?"

What are the "Right" Things to Eat?

Erin wants your advice regarding what to eat.

In general, it helps to think of nutrients in terms of two general categories:

- Macronutrients include carbohydrates, fats, and proteins.
- Micronutrients are the compounds we need in smaller quantities, including vitamins and minerals.

This section reviews some important macro- and micronutrient tips you can incorporate into PHPs. After that is a discussion of other topics related to eating patterns, including the use of food pyramids, eating to reduce inflammation, and descriptions of some of the other popular diets that inspire patient questions.

Macronutrients: Some key recommendations you can make

One of the important ways to distinguish between different diets is by the proportions of macronutrients they recommend. For example, the Atkins diet promotes, especially in its first phase, very low carbohydrate intake. The South Beach diet focuses, in part, on "sensible" carbohydrates. You will learn more below about eating with close attention to glycemic index and load, which equates to consuming the "best" carbohydrates. And of

course, for better or worse, an entire brand of the food industry has sprung up in the past decade or two because we have placed great value on eating low-fat foods.

For general purposes, it is useful to keep the macronutrient recommendations of the National Research Council in mind:[15]

- Aim for **45-65% of calories from carbohydrates**. Keep added sugars (including those in processed foods) below 25% of total calories.
- Get **20-35% of calories from fat.**
- **10-35% of calories should come from protein**. Their recommendation is 0.8 grams of protein per kilogram of body weight in adults.
- Bring **moderately intense physical activity** into the mix as well. For more information, see the Working Your Body module.

And remember this important comment from the report: **"The report doesn't set maximum levels for saturated fat, cholesterol, or trans fatty acids, as increased risk exists at levels above zero. However, the recommendation is to eat as little [of them] as possible while consuming a diet adequate in important other essential nutrients."**

Mindful Awareness Moment
Your Own Diet

Take a moment to consider the quality of your own diet, based on what you have eaten in the past week.

- How many of the "World's Healthiest Foods" have you eaten?
- How many calories would you estimate you have been eating daily?
- What proportion of fats, proteins, and carbohydrates do you normally eat each day?

The following sections will provide some more specific suggestions about carbohydrates, fats, and proteins for you to incorporate into PHPs.

- **Carbohydrate tips**
  Most of the calories in the American diet come from carbohydrates. In plant-based foods, such as fruits, vegetables, grains, cereals, legumes and beans, 90-95% of the calories come from carbohydrates. Carbohydrates include

  - Simple sugars such as fructose and glucose
  - Oligosaccharides including fructo-oligosaccharides (which are "food" for the good bacteria in our intestines)
  - Starches, which are energy storage molecules for plants

- Dietary fiber. Fiber is a carbohydrate, but our bodies cannot digest it. Fiber adds volume—but not calories—to food, and it may provide satiety as well.

The United States Department of Agriculture (USDA) recommends eating between five and eight portions of carbohydrate-rich foods per day (one ounce each), suggesting that half of that daily intake come from whole grains.[16] In terms of how they affect satiety, carbohydrates fall between protein and fat, with protein being the most satiating of the three macronutrients.[17] Carbohydrates provide four kcalories/gram (kcal/g) in energy. This is roughly equal to the energy of protein, but less than fats, which contain 9 kcal/g. Carbohydrate that is eaten but not immediately needed is stored as glycogen, but the average person can only store about 1,200 calories as glycogen. The rest is ultimately stored as fat.

- ***Pay attention to fructose.*** Fructose is a simple sugar found in fruit, honey and some vegetables. It is the sweetest of the simple sugars, and its cousin, high fructose corn syrup (HFCS), is under considerable scrutiny these days. Fructose, on its own and *in small quantities,* may be a better carbohydrate choice than glucose in patients with pre-diabetes or diabetes due to its attenuating effects on blood sugar[18] (think of a serving of fruit, not a serving of juice drink, as the source). High fructose corn syrup is typically 50% fructose and 50% sucrose (table sugar), which is not an ideal combination.

  Most Americans consume about 40 grams of fructose daily, mostly in the form of HFCS. Whether HFCS is worse than pure fructose or sucrose remains to be seen; evidence is conflicting. We do know that fructose consumption from processed foods has significant effects on, for example, all the components of metabolic syndrome.[19] (For more information, you can see module, Endocrine Health and the clinical tools, Hypertension and Lipids, the main components of metabolic syndrome.) It is important to keep in mind that fruit is an important source of fructose (hence the similarity in their names), but the fructose in fruit is accompanied by fiber, which is known to attenuate rises in blood sugar. In contrast, HFCS is rarely consumed with fiber. In fact, it is often consumed as a carbohydrate in isolation; for instance, it is practically the only ingredient in soda and other sugar-sweetened beverages.

- ***Do not get too bogged down in simple versus complex carbohydrates.*** It is frequently suggested that complex carbohydrates are better than simple ones. Many experts tell patients to eat complex carbohydrates, because they believe it is better for overall health. Unfortunately, this topic, like the carbohydrates under discussion, is more complex than simple.

  By definition, simple carbohydrates are composed of mono- or disaccharides (they have just one or two sugar molecule groups in them). Complex carbohydrates are polysaccharides (they have a lot of simple molecules

linked up). Based on this structural definition, bread, fruits, and vegetables are composed mostly of simple carbohydrates. However, those foods tend to be healthier (more nutrient dense) than other foods that contain simple carbohydrates, such as table sugar. In short, it is not only whether or not carbohydrates are simple or complex, but the foods they come from, that matters. It is best to advise patients to eat whole grains and products made from them, as well as fruits, vegetables, and legumes, while minimizing foods with made with sugar or refined white flour.

For more information on eating whole grains, see the USDA Whole Grain Tips.

- ***Choose carbohydrates based on glycemic index and glycemic load.*** Rather than focusing on whether a carbohydrate is simple or complex, it may be more helpful to choose which carbohydrates to eat based on how they are metabolized. Glycemic index and glycemic load take into account how much a given food raises blood sugar levels. Glycemic index (GI) compares how much a particular food that contains 50 grams of carbohydrates will raise blood glucose levels two hours after eating, relative to an equivalent amount of glucose (or white bread). The problem with the GI is that different foods have different amounts of carbohydrate by weight. For example, in order to get 50 grams of carbohydrates from carrots, you would have to eat at least five cups of them. To allow for more realistic comparisons, glycemic load (GL) is used instead. Glycemic loads are like GIs, but they account for serving size.[20] GL is ultimately the GI multiplied by the amount of carbohydrate per serving of a given food. For more information, please see Glycemic Index clinical tool.

  High glycemic index and load are clearly associated with increased risk of type 2 diabetes. In a 2014 pooled study that included 3.8 million person-years of follow- up, the quintile of patients with the highest food measures of GI and GL had a 33% higher risk of developing the disease.[21] There is also a correlation between high-GL diet and ischemic (but not hemorrhagic) stroke risk,[22] as well as with obesity[23] and chronic inflammation.[24] A 2008 meta-analysis found that high GI and GL diets correlated with higher risks of certain cancers, including colon and ovarian cancer (but not pancreatic or breast cancers).[25] A low GI/GL diet also reduces gall bladder and coronary artery disease risk.[26]

  An interesting area of recent research on glucose tolerance is the "second meal effect." If you eat a low GI/GL breakfast, your blood sugar will not climb as high after eating lunch. The same thing occurs with the glycemic response to breakfast the morning after you eat a low GI/GL dinner.[27,28] It is in part because of the second meal effect that diabetics are encouraged to eat fewer small meals during the day. Carbohydrates are absorbed more slowly and

sugars stay lower on average if multiple small meals are eaten, rather than just a few large ones.[29]

- ***Eat your fiber.*** The metabolic fate of carbohydrates is largely determined by the company they keep. Fiber, which is composed of carbohydrates the body cannot digest, influences carbohydrate absorption in the gut, decreasing the rise in blood levels of glucose, insulin, and lipids that normally occurs after eating.[30-32] There are two main kinds of fiber. Soluble fiber has beneficial effects on digestion of glucose, insulin, and lipids. Insoluble fiber acts as a laxative and bulking agent. Few Americans get the recommended daily amount of fiber, which is a total 25-30 grams daily, and perhaps should be as high as 50 grams a day for those with diabetes.[33] Because fiber has important health benefits but is often neglected in the American diet, a discussion about fiber can be another potentially good starting point for the "Food and Drink" section of a PHP.

  Healthy fiber intake significantly improves health. It reduces all-cause mortality after myocardial infarction.[34] It decreases esophageal cancer incidence,[35] stroke risk,[36] and cardiovascular disease.[37] Fiber should be used with caution in people with functional bowel problems, such as irritable bowel syndrome, because it can exacerbate bloating, constipation, and diarrhea.[38]

  See the two VA Nutrition and Food Services Patient Education Handouts "Types of Fiber" and "Increasing Fiber Intake" (Tips to Increase Dietary Fiber). These are available at http://www.nutrition.va.gov/Nutrition_Handouts.asp.

- **Tips regarding dietary fats**
  - ***The types of fats you eat make a difference***. For quite some time, the popular belief has been that fats are "bad" for us. In the past twenty or so years, fat-free foods have been touted as the solution to all our nutritional ills. However, fat-free eating requires that the calories be replaced with calories in another form. If this "other form" is carbohydrates, eating them may not be as helpful as we assume.[39] As noted above, when large quantities of carbohydrates are eaten, those that are unneeded are stored as fat.

    In excess, fats can cause problems, but they are essential to healthy functioning, providing us the necessary building blocks for cell membranes, myelin coats around nerves, and steroid hormones. Fats are also essential for absorption of the fat-soluble vitamins, A, D, E and K. Many people's bodies are genetically programmed to hold on to fat; for our ancestors, this could be an advantage during times when food was scarce.

There are a few main categories,[40] and knowing about them can help patients make good food choices:

- **Saturated fats (SFAs)** are those without any double bonds. They are solid at room temperature and include animal fat, butter fat, coconut oil, palm oil and kernel oils. Most experts recommend keeping saturated intake to a minimum.
- **Monounsaturated fats (MUFAs)** are liquid at room temperature and can be found in avocado, peanut, olive and canola oils. They have one double bond in their molecular structure.
- **Trans-fats** replace the cis-double bonds in MUFAs and PUFAs with trans- bonds, which are found in processed food sources.[41] Trans-fats were created to allow foods to have a longer shelf life; unfortunately, they may decrease the duration of human life, because they are known to increase cholesterol levels and coronary artery disease.[42,43] Partially hydrogenated oils, also in processed foods, come from heating the oils to high temperatures with hydrogen and a metal catalyst for 6-8 hours, leading to a mixture of cis- and trans-fats. It is best to avoid all foods made with trans-fats and partially hydrogenated oils of any kind.
- **Polyunsaturated fatty acids (PUFAs)** are also liquid at room temperature. They have more than one double bond and include fish oil, sesame oil, sunflower oil, walnut oil and corn oil. There are two **essential PUFAs**; we must obtain them through the diet, for our bodies cannot synthesize them.
    - **Linoleic acid (LA)**, an omega-6 fatty acid, is plentiful in our diets. It is found in many nuts and seeds and in the fat of some animals, like pigs.
    - **Linole*n*ic acid (LNA)**, an omega-3 fatty acid, can be metabolized to docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), but the efficiency with which humans convert LNA to DHA and EPA is variable. Linolenic acid is more difficult to come by, but can be found in flaxseeds, hemp seeds, pumpkin seeds and walnuts, as well as canola oil and soybean oil.

The essential PUFAs are found in vegetables such as dark, leafy greens and purslane. They also come from animals that were fed LA- or LNA-rich algae and plant foods. Ideally, one should try to meet daily requirement of omega-3s PUFAs through diet, such as through fatty deep sea fish (e.g., salmon and sardines), walnuts, flaxseeds, and organic soy products. DHA and EPA are the key omega-3 fatty acids found in fish oil, and if one is taking supplemental PUFAs, it is preferable to take them rather than LNA.

For more information about how to choose the proper fats and oils in the diet, entitled, "Why is it Important to Consume Oils?" It is available at http://www.choosemyplate.gov/food-groups/oils-why.html. Another useful patient education handout is entitled, "Common Oils and Fats," available through the VA Nutrition and Food Services website at http://www.nutrition.va.gov/Nutrition_Handouts.asp.

- ***Ensure you get enough omega-3's.*** The essential PUFAs are precursors to prostaglandins, leukotrienes, and other compounds that control levels of inflammation in the body. With the rise in popularity of the standard American diet, the ratio of pro-inflammatory omega-6 fats to anti-inflammatory omega-3 fats in the diet has steadily increased, increasing the number of people whose bodies are in a state of chronic inflammation. Current ratios of omega-6's to omega-3's range from 15:1 to 25:1. The ideal ratio is the subject of some debate, but most sources suggest it should be more in the 2:1 or 4:1[44] range, if it is to be consistent with the diets of our Paleolithic ancestors. Inflammation has an important physiological role, but a system of checks and balances is needed; many of today's chronic diseases are associated in some way with chronic inflammation.[45] It is worth discussing whether or not to supplement omega-3's in many patients.

Note: *Please see the module on Dietary Supplements for more information about how to determine whether or not a specific supplement is appropriate for a given individual. Supplements are not regulated with the same degree of oversight as medications, and it is important that clinicians keep this in mind. Products vary greatly in terms of accuracy of labeling, presence of adulterants, and the legitimacy of claims made by the manufacturer.*

- ***Eat to improve your cholesterol panel.*** Many people have abnormal lipid panels and struggle to improve them. Here are a few general points to consider:
  - Triglycerides account for 95% of the fats we eat. Their levels increase primarily due to eating foods with a high GI; that is, they are closely linked to carbohydrate intake. Diabetics and those with thyroid disorders often have triglyceride elevations.[46,47]
  - High density lipoproteins (HDLs) transport excess triglycerides and cholesterol back to the liver from outlying cells, and low-density lipoproteins do the reverse. For this reason, HDL is often labeled as "good cholesterol," and LDL is labeled as bad.
  - Foods that raise "bad" cholesterol levels (LDL) most are 1) those high in saturated fats and 2) foods with a high GI. They have more of a negative effect than foods that are specifically high in cholesterol, such as eggs, shrimp, shellfish, and caviar.

For more information, see the clinical tool, Lipids.

- **Guidance with eating protein**
  - ***Get enough protein (and not too much) each day, from healthy sources.*** Adults are encouraged to obtain 10-35% of their daily calories from protein. That equates to 56 grams for men and 46 grams for women.[48] Eating two or three servings of protein rich foods a day seems to cover needs. These can include[48]
    - A 3 ounce piece of meat, which has about 21 grams of protein; a typical 8 ounce serving has over 50 grams
    - 8 ounces of yogurt, which has about 11 grams, and 8 ounces of milk has 8 grams
    - Legumes— a cup of dry beans has roughly 16 grams.

    Animal protein (especially red meat) is a source of significant amounts of protein, but it comes with a fair amount of saturated fat and is best eaten in moderation. Calorie for calorie, protein is the most satiating or filling of the macronutrients.[49] The average American consumes roughly 100 grams of protein daily, despite the fact that recommendations encourage a lower quantity,[50] as noted above. If one has a diet very high in protein, it can be taxing for the liver and kidneys.

  - ***Eat all of your essential amino acids*.** There are certain amino acids that must come from the diet; our bodies cannot synthesize them. These amino acids have critical antioxidant and anti-inflammatory properties and are key chemical ingredients for many of the body's chemical reactions. It helps to vary protein sources in your diet. Meats, legumes (beans, lentils), grains, rice, egg whites, soy, and mushrooms can all be brought in to add variety.

    Vegetarians can get the full spectrum of amino acids in the diet if they eat a variety of the foods listed above. Bacteria that live in our digestive tract also serve as a protein source. Of course, "vegetarian" is not synonymous with "healthy." A diet of sports drinks and corn chips may even be vegan, but it is not nutritious. Epidemiologic studies show that those who eat a nutritious, primarily vegetarian diet derive health benefits from it.[51]

<u>Micronutrients: vitamins and minerals</u>

Though perhaps not quite as vital to survival as *macro*nutrients, *micro*nutrients are, in small quantities, important for optimal health. They include vitamins and minerals. One can become deficient in micronutrients in the absence of a well-balanced diet. Specific clinical findings related to various deficiencies, while beyond the scope of this overview, can be found at http://www.publichealthreviews.eu/upload/pdf_files/7/13_Micronutrient.pdf.[52]

- ***Eat* your vitamins**

  Vitamins were discovered in the early 1900s and were originally called "vitaminos" because it was initially thought that they all contained amino (nitrogen) compounds. The name was changed to "vitamins" after it was discovered this wasn't true.

Vitamins are generally classed as water-soluble (B-vitamins, vitamin C, folate) and fat-soluble (vitamins A, D, E, and K). Many people follow the recommended dietary allowance (RDA) created by the Institute of Medicine to determine if they are getting the optimum amount of a vitamin. However, RDA focuses on the **minimum** amount of vitamin required to prevent deficiency. Dietary Reference Intake (DRI) is probably a more reliable number to follow, if possible. The DRI of a given micronutrient depends on many things such as sex, age, overall health status, and, for women, whether or not they are pregnant or lactating.

Most people can get all of the vitamins they need through a balanced diet. Vitamin B12 is the only vitamin that is available solely through animal sources, putting vegans at risk for deficiency; for this reason, vegans should always be asked about B12 supplementation. If people have a very poor diet (e.g., they live in an urban "food desert") or they absolutely insist on taking a multivitamin supplement, it is important to be able to offer good advice on how to select an appropriate one.

- **Eat your minerals, too**
  There are approximately 18 minerals that are necessary for our physiologic functioning. Table 1 briefly summarizes information about several of the minerals that are most likely to be discussed in a clinic visit—iron, calcium, zinc, selenium, and magnesium. In general, these are available in the VA formulary.

Table 1. Micronutrients: Functions, Sources, and Clinical Tips[53-55]

Micronutrient	Main functions	Comments
Iron	• Part of hemoglobin and myoglobin • Necessary for red blood cell development • Aids with immune function	• Found in meat, and is more absorbable in this form • Plant sources include brewer's yeast, pumpkin seeds, blackstrap molasses, sunflower seeds, almonds, and raisins. • Levels increase more if it is taken with vitamin C • Can increase daily intake by cooking with non-coated iron pans. • If taking an iron sulfate supplement and constipation is a problem, try using a different salt (e.g., iron bisglycinate)
Calcium	• More than 95% of body calcium is in bone • The rest is used for muscle contractions, nervous system function, and blood	• Dairy is a major food source • Non-dairy sources include dark leafy greens (collards, mustard greens, turnip greens, bok choy), sesame seeds, tahini, almonds, soybeans, tofu, and garbanzo beans. Sardines and mackerel (canned with bones), salmon with bones and raw oysters also have it as do fortified fruit juices and soy

	clotting • Most people get 1200-1500 milligrams daily. If not, taking a supplement with added vitamin D can be helpful to bring levels up to the DRI.*	milk • Excess fat in the diet can limit calcium absorption • Ethanol, caffeine, and fiber can increase fecal excretion[56] • Aspartame, glucose, and excess protein increase urinary excretion • Absorbed more with ascorbic acid, citric acid, and higher stomach acidity • Recent trials indicate that calcium levels may modestly negatively influence cardiovascular risk and must be considered in advising patients.[57] Note that a 2014 prospective cohort study of data from the Nurses' Health Study (n=74,245) did not find a link between calcium supplement intake and cardiovascular risk in women[58]
Zinc	• Critical to immune function, wound healing and prostate health • Consider if symptoms of poor wound healing, frequent infections, irritable bowel disease (IBD), acne, or psoriasis exist • Most experts recommend 15 milligrams per day	• Sources include oysters, beef round, and egg yolk • Also found in legumes, nuts and whole grains • Suggested to take with a supplement that contains copper as well, as zinc and copper compete for absorption in the small intestine
Selenium	• Antioxidant that works with vitamin E • Can be helpful for patients with hypothyroidism	• Found in meats and whole grains, but also specifically in Brazil nuts. Eating two nuts daily is sufficient to maintain healthy selenium levels. The levels of selenium in nuts and grains depends on the levels of selenium found in the soil. • A Cochrane review of selenium and cancer prevention showed that those in the highest quartile of selenium intake compared to those in the lowest quartile of selenium intake had 31% lower cancer risk and 45% lower cancer mortality risk as well as a 33% lower risk of bladder cancer and, in men, 22% lower risk of prostate cancer.[59]

Magnesium	• Necessary for muscles and blood vessels, protein and fat synthesis, energy production, and the synthesis of urea	• Found in large amounts in green vegetables, but can also be found in whole grains, nuts, and legumes • In supplement form, magnesium citrate and magnesium glycinate are the most absorbable forms • Toxicity may develop in patients taking high doses of magnesium-containing antacids and laxatives. The first sign of magnesium toxicity is diarrhea • The maximum recommended amount of magnesium is 1000 milligrams per day before patients develop symptoms of toxicity. • Can be taken to help patients with constipation, muscle cramps, headaches, kidney stones and diabetes. It may also be helpful for patients with hypertension[60]
*DRI = dietary reference intakes		

- **Keep sodium (salt) and potassium balanced**
  In terms of electrolytes, potassium is mostly intracellular, and sodium and chloride (the electrolytes in table salt) are mostly extracellular. Sodium deficiency is rarely a problem in the United States, given that so much of our food is processed, pre-seasoned, and over-salted, but it can occur with starvation, diarrhea or vomiting. See the clinical tool, The DASH Diet, in the educational overview, Digestive Health, for more information on how to eat less sodium. For more information on salt, see the USDA handout on salt and sodium at http://www.choosemyplate.gov/food-groups/downloads/TenTips/DGTipsheet14SaltAndSodium.pdf. There are also handouts entitled "20 Ways to Lower Sodium" and "Low Sodium Diet Tips" available through VA Nutrition and Food Services at http://www.nutrition.va.gov/Nutrition_Handouts.asp.

  Consider having people replace table salt with health-promoting spices, such as turmeric. See the MOVE! patient education handout, "Spice It Up," at http://www.move.va.gov/download/NewHandouts/Nutrition/N27_SpiceItUp.pdf.

  Potassium, in contrast, is often depleted due to medications or for other reasons. It is important for nerve transmission, muscle contraction, glycogen and glucose metabolism, and cellular integrity. Potassium can be found in potatoes with skin, broccoli, bananas, almonds, raisins and peanuts. Potassium deficiencies can occur with diarrhea, vomiting, starvation, certain diuretics, and magnesium deficiency. Of course, it is important to remember that that for certain medical conditions (e.g., chronic kidney disease) there may be dietary restrictions for potassium. For more

information on foods' potassium content, see http://www.health.gov/dietaryguidelines/dga2010/DietaryGuidelines2010.pdf .

Food Pyramids as a Nutritional Tool?

After its creation in 1992, the USDA food pyramid was used by many as a guide for how to eat. As additional nutrition research was done, it changed forms. "Choose My Plate," the USDA's most recent guidance related to portion size, was introduced in 2011 and has largely replaced the USDA Food Pyramid. It shows a plate divided into four unequal sections, with vegetables and grains being assigned to the two larger ones. (See Figure 3.) The other two sections of the plate are labeled "Fruits" and "Protein." There is a glass of dairy to the side. In Choose My Plate, there is no distinction between healthy and unhealthy oils and fats, or healthier grains versus refined ones. For more information about these tools, see http://www.choosemyplate.gov/food-groups/downloads/MyPlate/UsingMyPlateAlongWithMyPyramid.pdf . To learn more about using ChooseMyPlate, go to http://www.cnpp.usda.gov/Publications/MyPlate/GettingStartedWithMyPlate.pdf.

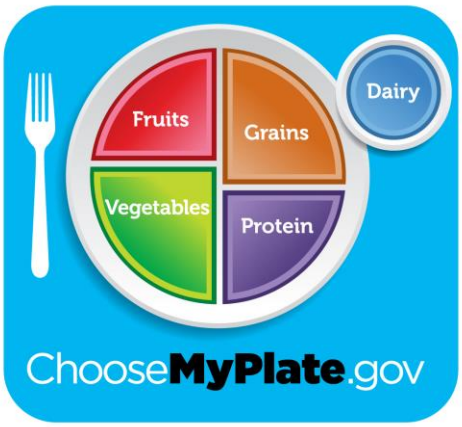

Figure 3. Choose My Plate. [61]
http://www.choosemyplate.gov

It is worth mentioning that a number of other food pyramids have been created over the years, including the University of Michigan's Healing Foods Pyramid, which emphasizes plant-based choices, variety, and balance. Other increasingly popular pyramids include the Anti-Inflammatory Pyramid created by Dr. Andrew Weil, and the Oldways Mediterranean Diet Pyramid. These are all shown below.

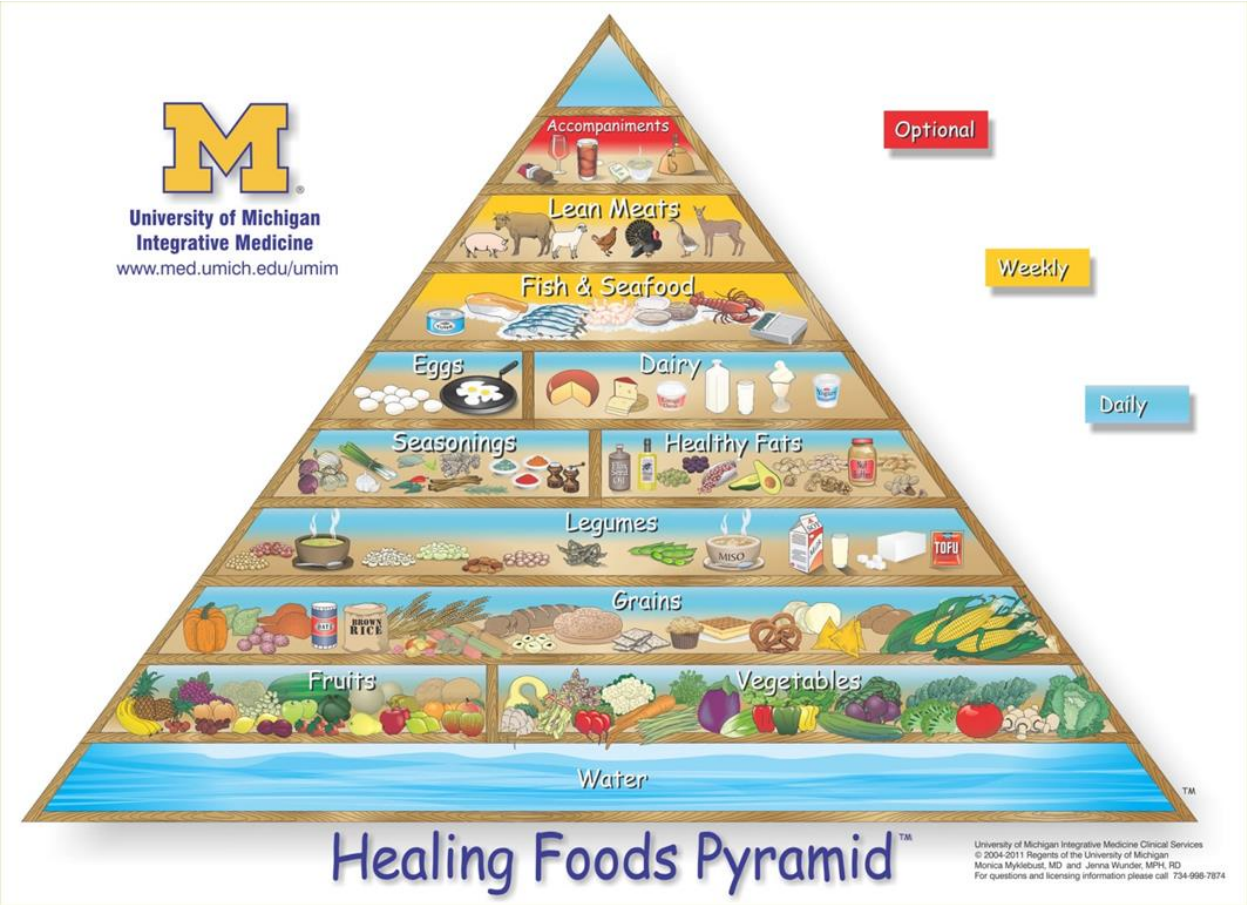

Figure 4. University of Michigan Healing Foods Pyramid.[62] *Reprinted with permission from University of Michigan.* http://www.med.umich.edu/umim/food-pyramid/index.htm

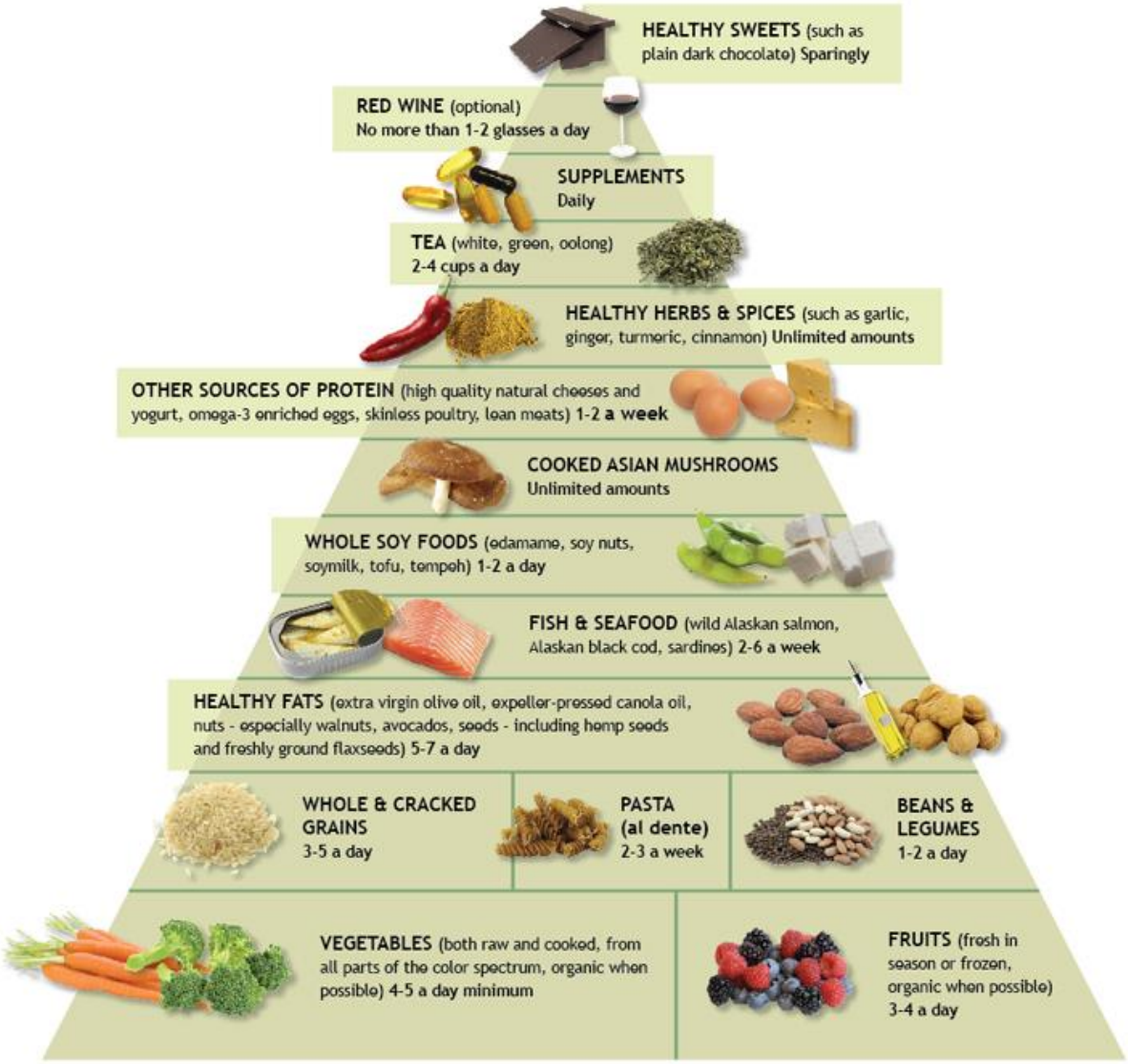

Figure 5. Dr. Weil's Anti-Inflammatory Food Pyramid.[63] *Reprinted Courtesy of DrWeil.com* *http://www.drweil.com/drw/u/ART02995/Dr-Weil-Anti-Inflammatory-Food-Pyramid.html*.

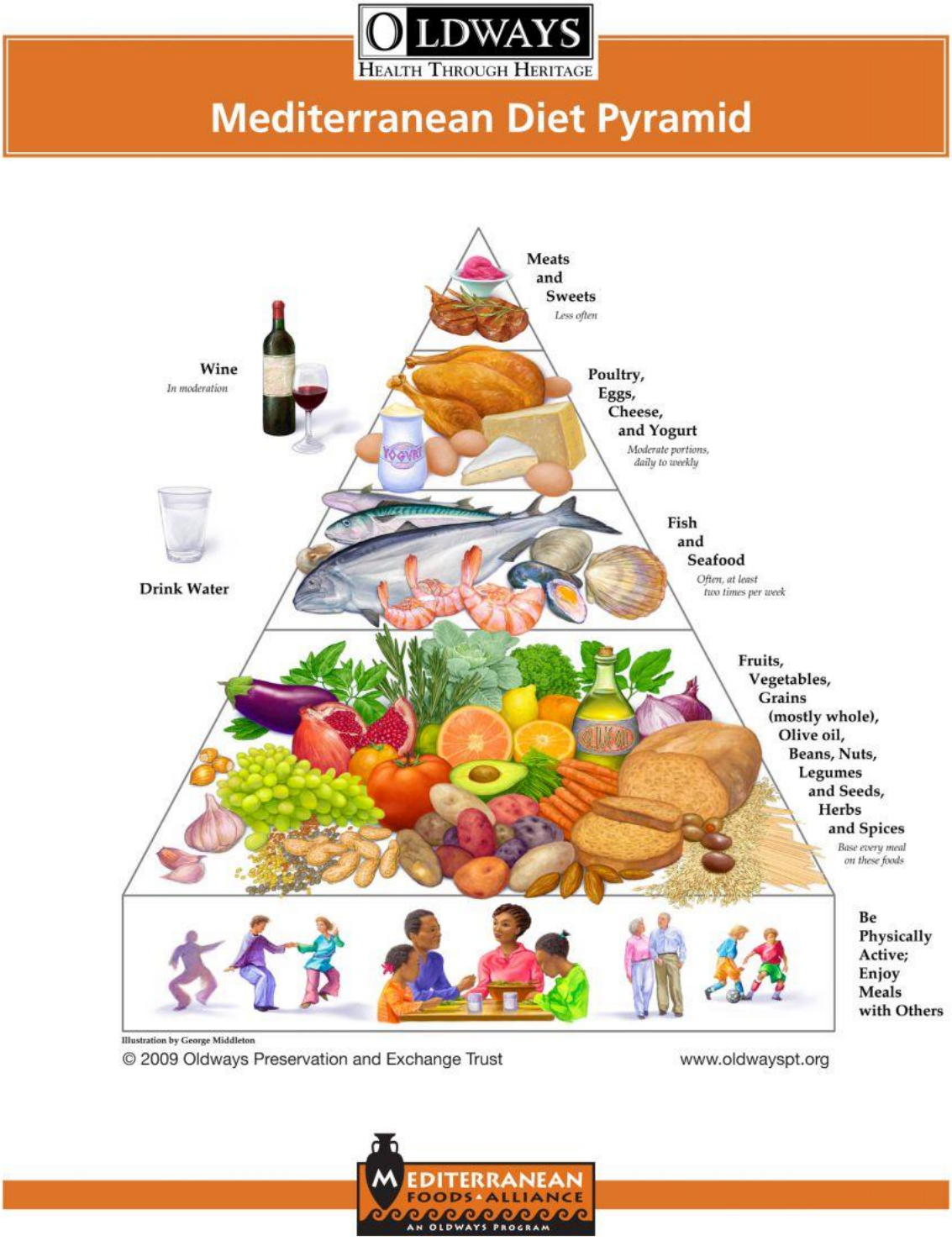

Figure 6. Oldways Health Through Heritage Mediterranean Diet. Reprinted with Permission from Oldways, www.oldwayspt.org.[64]

Different Food Plans

What follows are a few final tips about choosing the right overall diet.

Tailor your food plan to reduce inflammation

We know that chronic inflammation is linked to a number of diseases, including cancer, asthma, chronic pain, cardiovascular disease, and diabetes. One helpful way to think of inflammation is that it is like a fire. In controlled circumstances, fire increases our chances of survival; it allows for warmth, light, and heating food. However, if a fire burns out of control, it can be very destructive, or even fatal.

An anti-inflammatory diet emphasizes nutrient dense, whole foods that contain antioxidants and other compounds that diminish, or at a minimum, do not contribute to, inflammation in the body. This approach to eating also emphasizes fruits and vegetables and healthy amounts of fiber. It encourages avoiding unhealthy fats, particularly the omega-6 fats found in animal fats and foods with partially hydrogenated oils. Antioxidants can be taken in supplement form (e.g., as vitamin C, vitamin E, and pycnogenol), but it is preferable to obtain them by eating an array of fruits and vegetables. In foods, antioxidants are consumed with multiple other chemical compounds that can work with them synergistically and maximize their benefits. An appropriate recommendation to patients would be to eat a rainbow of fruits and vegetables daily. For a more in-depth review, please see the clinical tool, The Anti-Inflammatory Diet.

Consider eating organic, but focus on foods that matter most

Organic foods are those that are farmed without synthetic pesticides or fertilizers. They are processed without industrial solvents, irradiation, or food additives. Multiple systematic reviews have been unable to show a difference between the nutritional value of organic versus conventionally produced foods,[65] though eating organic foods may reduce exposure to pesticide residues and antibiotic-resistant bacteria.[66] The Environmental Working Group has created two lists, referred to as the "Dirty Dozen" and the "Clean Fifteen."[67] These lists highlight which 12 fruits and vegetables are the most pesticide-laden *after cleaning*, and which 15 vegetables and fruits are the safest to buy.

The Dirty Dozen: Foods with the Most Pesticide Residues[67]	The Clean Fifteen: Foods with the Least Pesticide Residues[67]
1. Apples 2. Strawberries 3. Grapes 4. Celery 5. Peaches 6. Spinach 7. Sweet Bell Peppers 8. Nectarines (imported) 9. Cucumbers 10. Cherry Tomatoes 11. Snap peas (imported) 12. Potatoes	1. Avocados 2. Sweet corn 3. Pineapples 4. Cabbage 5. Frozen sweet peas 6. Onions 7. Asparagus 8. Mangoes 9. Papayas 10. Kiwis 11. Eggplant 12. Grapefruit 13. Cantaloupe 14. Cauliflower 15. Sweet potatoes.

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For more information, see the Food Safety clinical tool.

Know about different food plans

Each year, new popular diets emerge, and patients often have questions about them. Below is some general information about several of the most popular diets. For more detailed information, see the clinical tool, Choosing a Diet.

- **Anti-Inflammatory diet**
  This is described in a previous section. Like other healthy diets, the anti-inflammatory diet encourages eating minimally processed whole foods, healthy fats (particularly omega-3 fats), and whole grains with a minimum of pro-inflammatory foods such as red meats, processed foods (those with a long shelf life) or dairy and dairy fats.

- **Elimination diet**
  The elimination diet involves systematically removing foods from the diet that may have an adverse health effect, such as increasing pain or negatively influencing mood. It allows a person to pinpoint whether or not they have a food intolerance. It involves keeping a diet journal to look for any links between foods and symptoms, removing them from the diet to see if symptoms improve (usually for two weeks or more), and then re-introducing the foods after a period of abstinence to see if eating causes symptoms to recur. This information is then used to create a new diet plan. For more information, see the clinical tool, Elimination Diets, in the educational overview, Digestive Health. See also the VA Nutrition and Food Services patient handout "Food Allergies and Intolerances," available at

http://www.nutrition.va.gov/Nutrition_Handouts.asp.

- **Mediterranean diet**
  As illustrated in the Mediterranean Diet Food Pyramid above, the Mediterranean diet is a way of eating that is traditional in many of the countries surrounding the Mediterranean Sea. It emphasizes a diet high in fruits, vegetables, legumes and whole grains, cooking with olive oil, small amounts of dairy and a minimum of meats, with most animal protein coming from fish.

- **Paleo diet**
  The Paleo diet is structured to be similar to the diet of our hunter-gatherer ancestors with the logic that our genes are genetically adapted to this diet, which is higher in animal protein than the Mediterranean diet, but still emphasizes fruits and non-starchy vegetables, fish, nuts and seeds.

- **Vegetarian/vegan diets**
  Vegetarians do not eat meat, fish or poultry. Vegans avoid those foods as well as any products from animals such as cheese, dairy, honey, eggs, wool, silk, or leather.

- **Blood type diet**
  This diet, outlined in the book Eat Right 4 Your Type by Peter D'Adamo suggests that our blood type is the main determinant for a healthy diet, with different recommendations for each blood type. Research ***does not*** support this diet.[68]

- **DASH diet**
  This stands for Dietary Approaches to Stop Hypertension; it was initially recommended for those at risk for hypertension as well as for anyone with hypertension, but subsequent studies have found that this diet is also helpful for improving cholesterol levels and insulin sensitivity.

- **The Ornish diet**
  This diet is based on Dean Ornish's research regarding optimizing diet to control heart disease.

Remember, it is not so much which diet is chosen, so much as one's willingness to adhere to it, that seems to have the greatest impact on body weight.

Back to Erin

After speaking with Erin and reviewing her story, the following recommendations could be made:

- Since she has insulin resistance, a diet that is relatively low in carbohydrates is preferable and will likely help her with weight loss.
- To feel more full, she can eat more whole grains. When eating carbohydrates she will choose higher fiber breakfast choices like oatmeal, high fiber bread or toast or make her own healthy granola mix. If, for convenience, she selects a granola bar, a bagel or chips, it would be best to eat the food with something like nuts or a hard-boiled egg, which can prevent sudden spikes and crashes in her blood sugar through the day.
- Fiber will help to make her feel full, and it delays absorption of glucose and cholesterol and improves satiety. It also helps with constipation.
- If possible, she should consider eating fatty cold-water fish that are good sources of DHA and EPA twice weekly and eat eggs that have DHA or take an omega-3 supplement.
- It is best to cook with extra virgin olive oil and canola oil instead of corn oil or other vegetable oils. We recommend that she cut out trans-fats all together.
- Protein does not need to be consumed in high quantities. She can eat plant-based proteins such as legumes, beans, whole grains and soy regularly for health benefits, and consume animal protein just a few times weekly.
- Vitamins and minerals are best obtained through eating fruits and vegetables and other nutrient-dense foods. Erin should aim to eat a variety of fruits and vegetables (at least 2 of each daily). Juice is very high in sugar and low in fiber and therefore is not recommended as a serving of fruit. She can eat as many vegetables as she wants.
- Eating well does not have to cost a lot of money. Buying food seasonally, buying less expensive fruits and vegetables, and eating at home regularly can make healthy eating affordable.
- To make water taste more interesting, Erin can add some fruit, herbs or vegetables. Lemon water is delicious and mint-cucumber water is very refreshing in the summer. Tea can also be a healthy choice, if taken without cream or sugar. See the clinical tool, What We Drink.
- Eating when feeling bored or sad, but not necessarily hungry, happens to a lot of people. Seeing food from a new point of view and learning new techniques to feel more satisfied with the foods one eats are important skills Erin can develop. To find out more about this, please see the clinical tool, Mindful Eating.
- Most people do not need a multivitamin or mineral supplements if they eat a well-balanced diet.
- Anti-inflammatory and elimination diets can help clarify which foods, if any, are causing symptoms like headaches, rashes, fatigue, constipation or joint pain. See the clinical tool, Elimination Diets, in the module, Digestive Health.

After reviewing her options for improved health, Erin found herself drawn to the MOVE! program and its resources. Erin ultimately (beginning with a few manageable changes at a time) chose to begin by increasing her vegetable intake to one serving daily) and eliminating fruit juice and juice drinks from her children's diets. Her future plans include a trial of eliminating dairy from her diet to see if her headaches and gastritis improve. She also will start a fiber supplement to help with her post-prandial sugars, lipids and constipation until she ramps up the fiber she obtains through the foods she eats. She is scheduled to see a nutritionist in the near future, as well.

Food and Drink Clinical Tools
• What We Drink • Choosing a Diet • The Anti-Inflammatory Diet • Food Safety • Mindful Eating

Additional Resources		
Resource	**Description**	**Link**
MyhealtheVet	Offers a food journal and other tools	https://www.myhealth.va.gov/index.html
Eat Wisely	VA National Center for Health Promotion and Disease Prevention (NCP) website with tip, information and policies	http://www.prevention.va.gov/Healthy_Living/Eat_Wisely.asp
Eat Wisely	Patient handout	http://www.prevention.va.gov/docs/VANCP_HL_Eat_Wisely_508.pdf
MOVE! Program (NCP)	Internet resources for both Veterans, their families and clinicians	http://www.move.va.gov/
MOVE! Program (NCP)	Intranet resources for VA clinicians*	https://vaww.move.med.va.gov/.
*Move! Web-Based Training is TMS # 16773		

Whole Health: Change the Conversation Website
Interested in learning more about Whole Health? Browse our website for information on personal and professional care. http://projects.hsl.wisc.edu/SERVICE/index.php

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