# Aviation Nutrition Guide

**10 September 2003**

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## Introduction

The guidelines presented in this publication are intended to enhance physical and cognitive performance, improve flight safety, and promote long-term health. Information from a variety of fields including nutrition, physiology, sports medicine, psychology, neuroscience, and food science served as a basis for most of the information and recommendations. The result is a basic set of guidelines that will serve as a starting point to help you counter the effects of fatigue and maintain your health.

Why was there a need to consolidate this nutrition information? Military aviators are routinely subjected to environmental stresses as a consequence of mission requirements, airframe and duty locations. Long duration missions crossing multiple time zones, unusual duty hours, barometric pressure changes, temperature extremes, vibration, noise and G-forces contribute to increased levels of physical and mental fatigue. These environmental stresses can result in decreased mental alertness and performance. Countermeasures to the detrimental effects of fatigue and stress on aviator performance include modified sleep schedules and a healthy diet. Therefore, it is reasonable to suggest that healthy eating habits can help maximize an aviator's physical and cognitive performance during a single mission or during multiple missions separated by minimal crew rest over a period of several weeks.

Dietary habits and hydration status before and during flights will influence your cognitive and physical performance. Cognitive performance refers to mood, alertness, and the ability to process information; however, it is a general term and may encompass any mental function related to the highly technical aspects of aviation. Aircrew members, regardless of crew position, are subject to the potential complications brought on by dietary factors. Investigations of physiological mishaps have suggested that poor dietary habits and dehydration can lead to serious consequences such as reduced tolerance to G-forces, gastrointestinal distress, increased fatigue, and decreased cognitive performance.

Several factors must be considered before addressing the problem of optimizing the diets of aviators. First, the term "optimal" should be defined. Second, obstacles interfering with the optimal diet before, during and after a flight must be identified and overcome. To identify obstacles, or barriers, to optimal nutrition, aircraft type, mission duration and profile, presence of food service facilities at deployment locations, access to food or cooking facilities, aircrew members' knowledge of food and nutrition, as well as duty schedule and manning should be assessed. Further complicating the development of aviation nutrition guidelines is the remarkable diversity in the physiological demands placed on aviators in different aircraft types. Aircrew responsible for long haul and overnight airlift operations will have different requirements and resources than aircrew responsible for fighter, attack, and reconnaissance operations. Climate may also influence dietary recommendations and recommendations for fluid intake. Secondary factors that should be assessed include safe food handling during preparation and adequate nutrient content of the total diet.

A team of Air Force professionals including Aerospace Physiologists, Flight Surgeons, Registered Dietitians, Air Force Services Representatives, and researchers from the United States Army Research Institute for Environmental Medicine (USARIEM) have worked together to develop the guidance presented here. If you would like to discuss the information in this publication in greater detail, contact one of these professionals at your base.

## Nutrition 101: Building the Foundation

**Introduction.** There are six major classes of nutrients that are regarded as essential. These include carbohydrate, protein, fat, water, vitamins, and minerals. Eating the right balance of food should allow you to get enough of all the nutrients you need for optimal performance and long-term health.

**Proteins** are made up of chains of amino acids, the building blocks of all proteins, and account for about 17% of your body's mass. It is recommended that 12% to 15% of your calories come from protein. Protein serves as the major structural component of all cells in the body. During digestion and absorption dietary proteins are broken down to amino acids which become the building blocks of structural and functional compounds that function as enzymes, in membranes, as transport carriers, and as some hormones. Nine of the amino acids must be provided in the diet; these are called indispensable amino acids. The body can make the other amino acids needed to synthesize specific structures from other amino acids.

**Excess dietary protein**. Excess dietary protein is not stored. Instead, it is broken down and part is excreted in urine while the remainder is either utilized directly as energy or converted to carbohydrate or fat.

Table 1 can help you estimate your daily protein requirement.

**Table 1**

**Estimated Protein Requirements Based on Activity Level (male and female)**

| Exercise | grams/kilogram/day | Example based on 176 lb person (176 lb ÷ 2.2 = 80 kg) |
|---|---|---|
| RDA | 0.8 | 80 × 0.8 = 64 g/day |
| Endurance Exercise | 1.2 to 1.4 | 80 × 1.2 to 1.4 = 96 to 112 g/day |
| Cross Training | 1.5 | 80 × 1.5 = 120 g/day |
| Resistance Exercise | 1.6 to 1.8 | 80 × 1.6 to 1.8 = 128 to 144 g/day |
| Maximum usable amount | 2.0 | 80 × 2.0 = 160 g/day |

Table 2 lists some common dietary sources of protein. To put things in perspective, remember that a 3 ounce serving of meat, chicken, or fish would be about the same size as a deck of cards. Considering today's portion sizes, you can probably see why it's not difficult for most Americans to meet their estimated protein requirements each day.

**Table 2.**

**Protein Content of Common Foods**

| Food | Measure | Protein (grams) |
|---|---|---|
| Chicken breast (meat only, no skin) | 3 oz | 27 g |
| Fish (salmon) | 3 oz | 23 g |
| Ground beef (85% lean meat) | 3 oz | 22 g |
| Egg (boiled) | 1 | 6 g |
| Milk | 8 oz | 8 g |
| Yogurt | 8 oz | 9 g |
| Cheese (cheddar, swiss) | 1 oz | 7 g |
| Beans, cooked (kidney, navy, pinto, etc) | ½ cup | 8 g |
| Almonds (1 ounce = 24 nuts) | 1 oz | 6 g |
| Peanut Butter | 1 Tbsp | 4 g |
| Bread (whole wheat) | 1 slice | 3 g |
| Vegetables (cooked) | ½ cup | 3 g |
| Fruits | ½ cup | 1 g |

Source: USDA National Nutrient Database for Standard Reference

**Carbohydrate** is the most important energy nutrient for heavy physical activity. Carbohydrate is your best performance fuel for a quick start, short bursts of energy and endurance over the long haul. It is recommended that approximately 55 percent of your total daily caloric intake should come from carbohydrates. Starch, fiber and sugar are the major types of carbohydrates. Grains and vegetables (corn, pasta, rice, potatoes, and breads) are sources of starch. Natural sugars are found in fruits and juices. Sources of added sugars are soft drinks, candy, fruit drinks, and desserts.

Fiber reduces the risk of coronary heart disease, and helps maintain normal blood glucose levels. Sources include grains such as oats, wheat, or unmilled rice, vegetables, and fruits.

**Fat** provides an important fuel source for prolonged activities, and only fat can transport fat-soluble vitamins. Your body can store more fat than you will ever need. Thus too much of it in your diet can lead to excess weight or obesity and lower your potential to reach optimum levels of performance. It is recommended that you limit your fat intake to 20 to 30 percent of your calories.

**Vitamins** are small molecules that play a role in many bodily functions, including the regulation of growth and metabolism. They are classified according to whether they are soluble in water or fat. Water-soluble vitamins consist of several B complex vitamins and Vitamin C. The kidneys can eliminate any excess of these vitamins. Fat-soluble vitamins consist of Vitamins A, D, E, and K. Because they are stored in body fat, it is possible for these vitamins to accumulate in the

body at toxic levels. Most vitamins cannot be manufactured in the body and must therefore be consumed in the diet. The exception is Vitamins A, D, and K, which can be produced by the body in small quantities. Vitamins exist in almost all foods, and a balanced diet supplies all of the vitamins essential to body functions.

**Minerals** are chemical elements such as sodium and calcium required by the body for normal function. Like vitamins, minerals are contained in many foods and play important roles in regulating key body functions; such as conducting nerve impulses, muscular contraction, enzyme function, maintenance of water balance, providing structure to bones and teeth, and carry oxygen.

**Water** is perhaps your most critical performance nutrient. In fact, you can only live 3 to 4 days without water. Your body is about 70% water. Water carries nutrients through your bloodstream. It helps digestion, relieves fatigue, keeps you mentally alert, and carries waste products out of the body. Water maintains blood volume and pressure, which carries oxygen to tissues. It is recommended that during normal activities, you drink at least 8 to 10 cups of water per day.

## Calories

A Calorie is a unit of energy or, more specifically, heat. The energy our bodies derive from food is expressed in Calories. Carbohydrates and protein each provide 4 Calories per gram, fat provides 9, and alcohol provides 7. At over two times the amount of Calories per gram, it's easy to see why reducing the amount of fat in your diet is a good place to start if you are trying to lose weight.

How many calories do you need to maintain your body each day without storing unwanted fat? Using the calculation shown below, you can estimate how much energy you burn in a day.

**Multiply your weight (in kilograms) by your activity level.**

**Weight in Kg** (pounds ÷ 2.2) _____ × **25-30** (sedentary-light activity)
**30-35** (moderate activity)
**35-40** (heavy activity)
**40-45** (exceptionally heavy activity)

**Weight in Kg × Activity Level = _____ Calories/day**

Remember, these are just estimates. Also, other factors, such as extreme heat and cold, can increase the number of calories you need. If you are trying to lose body fat, you may require fewer calories.

If you need to lose weight, reduce the calories and the amount of fat you eat gradually. Your performance can suffer if you cut too many calories or don't eat the nutrients you need for your physically demanding routine. For performance and health, you should not lose more than two pounds per week.

In the late 1960's, research was conducted to determine how many Calories pilots needed to fly different types of aircraft. Table 3 summarizes the results:

**Table 3.**

**Energy Expenditures in a 70 Kilogram Man**

| Activity | Max Calories/hour |
|---|---|
| Sitting quietly flying | 75 |
| T-33 | 165 |
| UH-1 | 130 |
| C-131 | 150 |
| Walking 4.0 MPH | 380 |
| Jogging 5.5 MPH | 665 |

Source: Fundamentals of Aerospace Medicine, 3rd Edition

**Dietary Guidelines for Americans**

The Dietary Guidelines for Americans, published by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services, provides guidance on what to do for good health. The complete guidelines are available at http://www.usda.gov/cnpp/DietGd.pdf. The most recent version emphasizes physical activity and healthy weight maintenance while providing more specific advice on food choices than previous editions.

It is important that you read and understand these guidelines because following them while you are at home may help you stay healthier while you are deployed.

✈ **Aim For Fitness**…

**Aim for a healthy weight.** For individuals at a healthy weight, the aim is to avoid weight gain. For persons above their healthy body weight, moderately decreasing calorie intake and increasing exercise will help. A steady weight loss of ½ to 2 pounds per week is usually safe. The diet should consist of a healthful assortment of foods that includes vegetables, fruits, grains, (especially whole grains), skim milk, and fish, lean meat, poultry, or beans. Foods that are low in fat and added sugars should be chosen most of the time. Whatever the food, the portion size should be sensible.

**Be physically active each day.** The aim is to accumulate at least 30 minutes of moderate physical activity daily. Individuals who already get 30 minutes of physical activity daily gain even more health benefits by increasing the amount of time they are physically active or taking part in more vigorous activity. In other words, the goal is a lifestyle that combines sensible eating with regular physical activity.

✈ **Build a Healthy Base…**

**Let the Food Guide Pyramid guide your food choices**. Different foods contain different nutrients and other healthful substances. No single food contains all nutrients in the amounts needed for health. One way to build a healthy diet is to choose foods each day from the major food groups depicted in the Food Guide Pyramid (see page 6). Individuals who avoid

all foods from any of the five food groups should seek guidance from a dietitian to ensure they get all nutrients needed.

**Choose a variety of grains daily, especially whole grains.** Foods made from grains (like rice, pasta, tortillas, cereals, or breads) are the foundation of a nutritious diet. They provide complex carbohydrates, dietary fiber, vitamins, minerals, and other food components linked to good health. Whole grains have more fiber, nutrients, and other protective substances than do refined grain products. Grain products are low in fat—unless fat is added in processing, in cooking, or at the table.

**Choose a variety of fruits and vegetables daily.** Fruits and vegetables are key foods in the daily diet, providing essential vitamins, minerals, fiber, and other substances important for good health. Eating plenty of fruits and vegetables makes it easier to avoid getting too many calories. Dark-green leafy vegetables, bright orange fruits and vegetables, and cooked dried peas and beans should be chosen often.

**Keep food safe to eat.** Eating even a small portion of an unsafe food can make someone sick. Perishable foods that require special care include foods containing eggs, meats, poultry, fish, shellfish, or milk products.

**To keep foods safe:**

**Clean:** Wash hands and surfaces often. Wash hands before and after preparing food, especially after handling raw meat, poultry, fish, shellfish, or eggs. Wash raw fruits and vegetables with warm water before eating.

**Separate:** Separate raw, cooked, and ready-to-eat foods while shopping, preparing, or storing. Store raw foods in a container in the refrigerator to prevent the juices from dripping onto other foods.

**Cook:** Cook food to a safe temperature. Proper cooking makes most uncooked foods safe. The best way to tell is to use a thermometer. Reheat sauces, soups, marinades, and gravies to a rolling boil. Reheat leftovers thoroughly to at least 165° F, and reheat them only once. Don't eat raw or partially cooked eggs or foods made with them.

**Chill.** Refrigerate perishable foods promptly. Refrigerate foods within 2 hours of purchasing or cooking—within 1 hour if the air temperature is above 90° F. Use refrigerated leftovers within 3 to 4 days. Freeze fresh meat, poultry, fish, and shellfish that cannot be used in a few days—never thaw at room temperature.

**Follow the label.** Follow the safe handling instructions on the package, such as "Keep refrigerated."

**Serve safely.** Keep hot foods hot (above 140°F) and cold foods cold (below 40°F). Chill leftovers as soon as people are finished eating. Whether raw or cooked, never leave meat, poultry, eggs, fish, or shellfish out at room temperature for more than 2 hours (1 hour in hot weather).

**If in doubt, throw it out.** Even if a food looks and smells fine, it may not be safe to eat.

✈ **Choose Sensibly…**

**Choose a diet that is low in saturated fat and cholesterol and moderate in total fat. In general:**
Eat plenty of vegetables, fruits, and grain products
Choose lean meats, fish, or poultry (without skin)
Choose dried beans, peas, or lentils often
Choose low-fat dairy products
Choose vegetable oils rather than solid fats (meat and dairy fats and shortening)
Use fats and oils sparingly.

**Choose beverages and foods that limit your intake of sugars.** Foods that are high in added sugars are often high in calories but low in essential nutrients. Take care not to let soft drinks or other sweets crowd out other foods needed to maintain health (such as milk or other good sources of calcium) or contribute unneeded calories. Eating or drinking sweet (or starchy) foods between meals is more likely to harm teeth than eating the same foods at meals and then brushing. Rinsing the mouth with water after between meal snacks can reduce the risk of tooth decay.

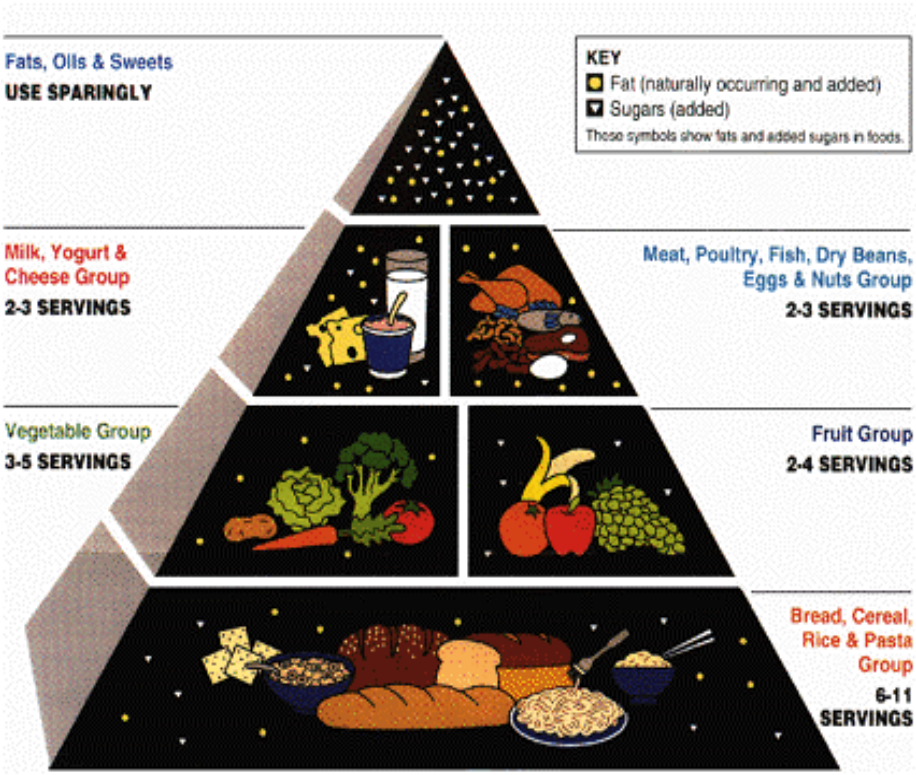
**Choose and Prepare Foods with Less Salt.** Table salt is made of sodium and chloride. Salt is found mainly in processed and prepared foods. Sodium helps our body maintain proper fluid balance, but too much sodium increase blood pressure. Reducing salt and sodium intake may help lower blood pressure in people who have high blood pressure and may help prevent others from developing high blood pressure. Limit salt added to foods and the consumption of processed, high-sodium foods (read food labels). Use herbs, spices, and fruits to flavor food.

**If You Drink Alcoholic Beverages, Do So in Moderation**. Alcoholic beverages supply calories but few nutrients. Moderate drinking may be beneficial for cardiovascular health (mostly in older men and women), but drinking is also linked with many health problems. It also is the cause of many accidents and can lead to addiction. Heavy drinkers are often malnourished because of low food intake and poor absorption of nutrients by the body. Alcohol should be limited to one drink/day for women or two drinks/day for men and should be taken with meals to slow the absorption of the alcohol. One drink is 12 ounces of regular beer, 5 ounces of wine, or 1.5 ounces of 80-proof distilled liquor.

## The Food Guide Pyramid

The Food Guide Pyramid (Figure 1) is a graphic display of a "healthy diet. The Pyramid illustrates the food groups and how much to eat from each food group to meet your requirement for different nutrients and stay within the Dietary Guidelines for Americans.

**Figure 1.**




USDA and the US Department of Health and Human Services

Use the Food Guide Pyramid to help you eat better every day. Start with plenty of breads, cereals, rice, pasta, vegetables, and fruits. Add two to three servings from the milk group and two to three servings from the meat group. Each of these food groups provides some, but not all, of the nutrients you need. No one food group is more important than another—for good health you need them all. Go easy on fats, oils, and sweets—the foods in the tip of the pyramid.

At the base of the Pyramid is the **bread, cereal, rice and pasta group**: this is the largest part of the Pyramid. It is recommended that you consume a minimum of 6-11 servings per day from this group. When you are actively training, you may need many more servings than this. Your calorie needs for activity will serve as your guide.

As you move up the Pyramid, the next section is the **vegetable group**. It is recommended that you consume a minimum of 3-5 servings per day. It is important to make wise choices from this group and include deep yellow and dark green vegetables that are high in vitamin A and beta-carotene.

On the same level as the vegetable group is the **fruit group**. One should aim to consume 2-4 servings minimally each day. A fruit or juice that is high in vitamin C, like oranges or orange juice should be included daily. As with all the food groups in the Pyramid, your calorie needs will guide the number of servings you eat.

Moving up the Pyramid, the next group you see is the **dairy group**. It is recommended that women, throughout their life span, consume a minimum of 2-3 servings per day from this group to obtain adequate calcium to prevent osteoporosis. A minimum of 2-3 servings is also recommended for men. Foods in the dairy group are the major sources of calcium in the American diet, so it is important to consume adequate amounts from this group. If a person is intolerant of milk, cheese and yogurt can often be substituted. Another option is to drink milk that has been modified to reduce lactose. Whatever dairy product is chosen, it is important to make sure that it is low-fat or fat-free to lower the saturated fat content of the diet.

Next to dairy products is the **meat group**, which contains meat, poultry, fish, dry beans, eggs, and nuts. As for dairy products, it is recommended that you consume 2-3 small servings per day from the meat group. Americans tend to eat larger portions of meat than is needed for adequate protein intake. Because animal products can provide significant amounts of fats—particularly saturated fats—the focus should be on consuming foods of a lower fat nature: poultry without the skin, lean cuts of beef and pork, and fish. Items should be broiled, baked, or roasted rather than fried.

Finally, at the tip of the Pyramid are the **fats, oils, and sweets**. These are foods such as salad dressings, cream, butter, margarine, soft drinks, candies, and sweet desserts. Alcoholic beverages also belong in this group. These foods can be very high in calories and often have little or no nutritional value.

You should consume a variety of foods from each of the five major food groups. Let your activity level guide the number of servings you choose from each group.

**Additional guidelines for selecting healthy foods are provided in Appendix B.**

## Aviation Nutrition: Special Topics

### Meal Composition and Performance

Diet composition and timing can influence subjective feelings of sleepiness or alertness. An optimal diet, in addition to regular exercise and adequate sleep, has been shown to be an effective counter measure to environmental stressors and the resulting decline in cognitive and physical performance. Protein, carbohydrate, and fat intake along with timing of meals, circadian rhythms, alcohol consumption, hydration status, and stimulant (e.g., caffeine) intake has been shown to influence alertness, cognitive function, and physical ability to perform under stress.

Extreme compositions of carbohydrate, protein, and fat in the diet have all been shown to exert some effect, typically negative, on cognitive performance and mood. No conclusions can be drawn at this time regarding the optimal amounts of carbohydrate, protein and fat in the diet, however, some studies suggest that the more consistent an individual's diet is throughout the day, the less of a negative impact it will have on their mood and cognitive performance. Table 4 summarizes the basic guidelines to follow regarding meal composition.

**Table 4.**

**Meal Composition Guidelines to Help You Optimize Performance**

| |
|---|
| Avoid large meals. Consume small, frequent meals or snacks, consistently throughout the day (preferably every 2-3 hours). |
| Include a protein food in each meal or snack. Examples include meat, fish, poultry, eggs, nuts, and dairy products. |
| Limit high glycemic load foods (i.e. candy bars, regular sodas, fruit punches and juices, refined flour bread and cracker products, potatoes, potato chips, french fries, and white rice) particularly before and during a flight. |
| If you are actively trying to lose weight, avoid the very low carbohydrate diets. These have been shown to negatively influence cognitive performance. |
| Never intentionally skip a meal |

**Meal Timing and Performance**

Duty schedules and meal times often conflict in the daily routine of the aviator. You have probably had to choose more than once whether to get one more hour of sleep, or to have a "normal" breakfast before show time. Perhaps what started out as a relatively easy day turned into a day of missed meals due to maintenance delays or changes to your flight plan? Regardless of the cause, missed meals should be a significant concern for aviators because long periods of time without eating can have a negative impact on your cognitive and physical performance.

Here are just a few of the reasons often cited for missing a meal:

No time
Nothing to eat
Tied up
Worked out
No money
On a diet

These are the some of the results:

Decreased ability to concentrate
Increased feeling of fatigue
Low energy
Missed nutrition
Overeating at next meal or snack time
Repeated meal skipping can slow metabolism and lead to weight gain in the long run.
Erratic aircraft control
Missed radio calls
Misprioritization of tasks
Loss of patience

To mitigate this threat, have a plan for your meals, whether it's a fly or no-fly day. You should know generally when, where, and what you'll eat that day. Are you bringing something from home, or buying something? Whichever you chose, try to make balanced, healthy meal choices. Plan ahead for days when you are most likely to miss a meal. Bring non-perishable items from home and keep them with you. Bottled water, beef jerky, string cheese, fresh fruit, dried fruit, vacuum-packed tuna (now available in pre-seasoned varieties!), sports drinks and bars, dry cereal, and nuts are just a few of the examples of highly-portable and shelf-stable foods you can keep with you. If you don't use them, keep them for next time. This will help you save time and money.

**Countermeasures for Symptoms of Jet lag**

What are circadian rhythms? Each of us operate on a 25-hour cycle referred to as a circadian (circa = about; dies = a day) rhythm (2, 3). We actually have several circadian rhythms, or cycles, working in harmony to regulate our physiological, biochemical and behavioral processes. Of these, we are only consciously aware of the sleep/wake cycle. The sleep/wake cycle organizes and coordinates the processes that allow us to stay awake during the day, and sleep at night. Your circadian cycles are driven by an internal mechanism (a biological clock) that

measures the passage of time and doesn't rely solely on environmental factors such as light and temperature to set itself.

What happens when something interferes with our circadian rhythms? Circadian rhythm descynchronosis (jet lag) occurs when your body clock and local environmental stimuli (light and temperature for example) are out of phase with each other. Crossing as few as three time zones to a new location can cause jet lag. Symptoms include lethargy, fatigue, insomnia, sleepiness, decreased performance, and impaired mood (1). It can take several days for all of the body's circadian rhythms to completely resynchronize to a new time zone. As a general guideline, you should expect your wake/sleep cycle to resynchronize itself at the rate of 1 to 2 hours per day (3). Because your circadian rhythm is about 25 hours, it is easier to adapt after traveling westward to a new time zone. This occurs because the day is "lengthened" during westward travel and "shortened" during eastward travel.

In general, if you are away from home for 3 days or less, you should try to do things as much as possible on your home time. If you are going to be gone for more than 3 days, then you should plan to adapt to the new time zone.

Can my diet help me prevent or reduce the symptoms of jet lag? There hasn't been a great deal of research conducted to answer this question, but as is often the case, there are still several diet recommendations for reducing the symptoms of jet lag. The most popular is the Argonne diet. Named after the Argonne National Laboratory (a research facility of the U.S. Department of Energy operated by the University of Chicago in Argonne, Illinois), the Argonne diet alternates days of high-protein breakfasts and lunches and high-carbohydrate dinners with days of eating small low-calorie meals (1). The diet begins 4 days prior to departure and is based on research indicating that proteins (chicken, fish, poultry, meat, eggs, etc.) and carbohydrates (bread, rice, potatoes, pasta, fruit, vegetables, etc.) can alter brain biochemistry and ultimately the sleep/wake cycle (2). In a well-controlled, laboratory study, the Argonne diet did not increase adaptation to a new time zone or improve sleep, mood or performance (2). In another study, it was reported that the Argonne diet was effective in preventing jet lag of military personnel deployed across several time zones (1). It should be noted that the latter study had several weaknesses that bring the validity of the results into question.

If the most popular anti-jet lag diet has produced inconclusive results, what reliable recommendations are available? Sleep/wake schedules recommended by the Sustained Operations Branch of the Air Force's Armstrong Laboratory may help. In addition, some basic diet modifications may also help reduce your symptoms of jet lag. For your convenience the sleep/wake schedules and diet recommendations have been combined into a decision tree on page 19. Following these basic recommendations may help you more rapidly adjust to your new time zone.

**Table 5.**

**Key Points to Remember Regarding Jet Lag**

Use the decision tree on the following page to help you choose the best countermeasures for your symptoms of jet lag

You may hear the terms "jet lag" and "circadian rhythm descynchronosis" used interchangeably.

Jet lag occurs when your body's internal clock is out of phase with your local environment.

Symptoms of jet lag include:

a. Lethargy (drowsy or sluggish indifference)
b. Fatigue
c. Insomnia (during your new nighttime)
d. Sleepiness (during your new daytime)
e. Decreased performance (mental and physical)
f. Impaired mood

Your body's internal clock can reset itself about 1 to 2 hours per day

Westward travel is usually easier than eastward travel.

One study (1) suggested an anti-jet lag diet was effective, while another (2) showed the same diet was not effective and may even worsen symptoms of jet lag.

References


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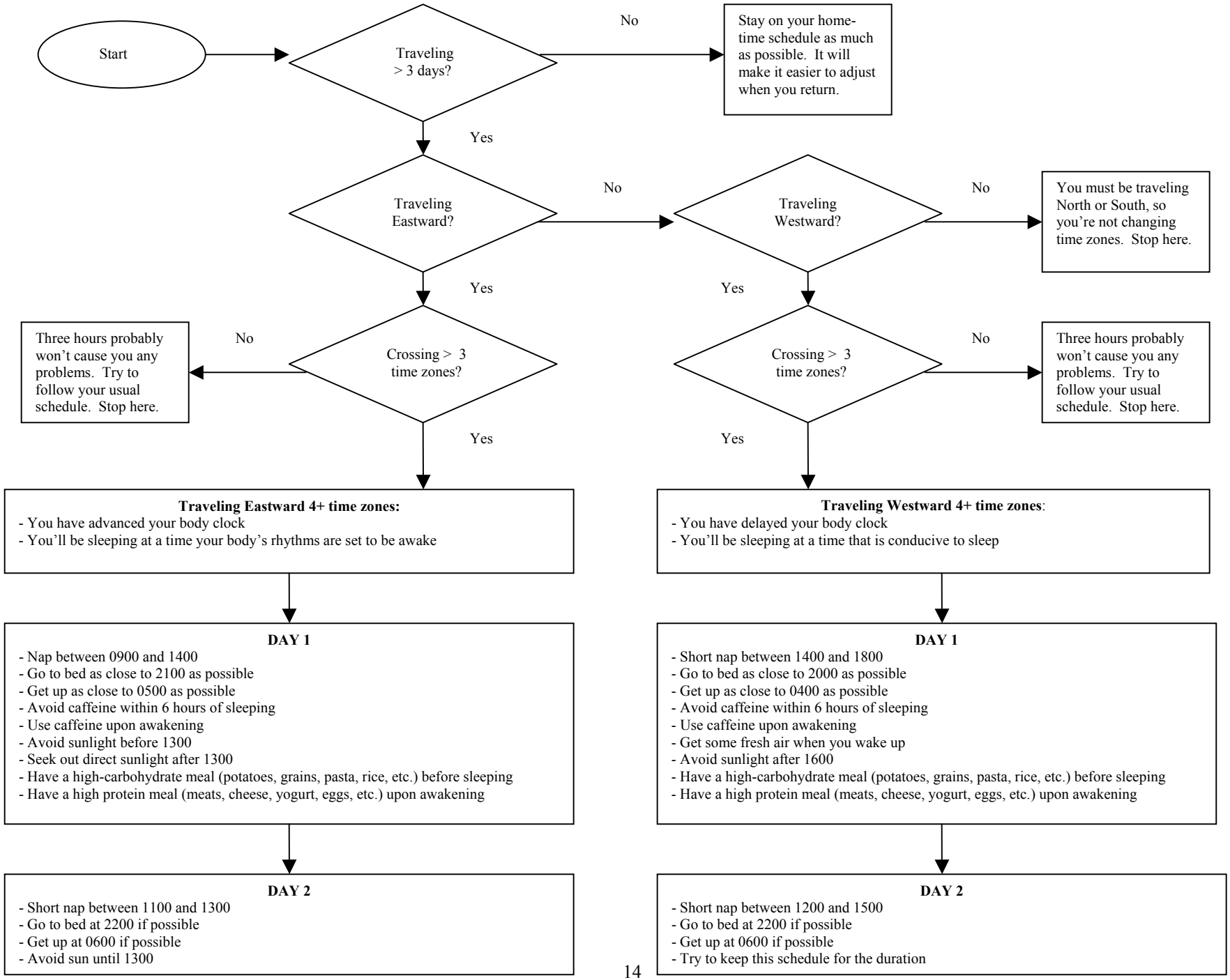
**Figure 2. Sleep/Wake/Diet Guidelines for Managing Symptoms of Jet Lag**



## Weight Loss and Weight Maintenance

### The Obesity Epidemic

According to the 1999/2000 National Health and Examination Study (NHANES), 64.5% of Americans are overweight or obese. By comparison, an estimated 54% of AF personnel are overweight or obese (Robbins, Chao, Fonseca, Snedecor, & Knapik, 2001).

Why are so many Americans overweight? The answer is complicated, but for the purposes of this discussion, we can limit our answer to three contributing factors. Genetic, environmental, and psychological factors each contribute to excess weight gain.

Genetic factors account for 60% to 80% of an individual's predisposition to obesity. Although a genetic predisposition can be a strong predictor, the genetic expression of overweight and obesity cannot occur unless the environment supports the storage of excess body fat.

There are several environmental factors that contribute to the storage of excess body fat. Aircrew and other AF personnel may find their lifestyles becoming more stressful. Increased workload, longer hours at work and more frequent deployments mean less time at home and less time for meal planning and preparation. The resulting chaos leads to erratic eating patterns, increased reliance on fast food and vending machines and less time for exercise and physical activity.

Another set of environmental factors can be found conveniently co-located in any fast food restaurant. The overwhelming number of fast food restaurants increases our access to food. Easy access to food would ordinarily be a good thing, but the calories found in a fast food meal typically exceed the calories needed for weight maintenance. The caloric density of fast food is due to the high fat content (9 Calories per gram) and the large portion sizes. Ordering lower fat options and smaller portions can be a good way to counter the environmental threats found in a fast food restaurant.

Psychological factors have also been shown to contribute to the occurrence of overweight and obesity. The National Health Epidemiological follow-up study to the first NHANES revealed that depression played a substantial role in the patterns of weight change in US adults. Although data for AF personnel has not been collected, it is still worth mentioning. Table 6 summarizes some of the environmental factors that may contribute to weight gain.

**Table 6.**

**Environmental Factors Contributing To Overweight And Obesity**

| |
|---|
| Increasingly stressful lifestyles |
| Decreased physical activity |
| Increased availability of food |
| Increased caloric density of food |
| Increased portion sizes |

## Fad Diets and Other Weight Loss Strategies

Unlike most US adults, AF personnel have been obligated to maintain predetermined weight standards and, in the future, will be obligated to maintain standards for waist circumference. The high incidence of overweight and obesity combined with the weight and fitness standards may make fad diets seem irresistible to some AF personnel. Table 7 lists some common weight loss strategies, many of which are fad diets. See Table 8 for tips on how to recognize a fad diet.

**Table 7.**

**Weight Loss Strategies: Advantages and Disadvantages**

| Approach | Advantages | Disadvantages |
|---|---|---|
| Moderate Calorie restriction (1200 – 1800 Calories/day)<br>• The Zone Diet<br>• Weight Watchers<br>• American Heart Association Diet<br>• The Setpoint Diet | Safe | Slow weight loss may be discouraging<br><br>May be complicated or regimented |
| High-protein, low-carbohydrate diets (<100 grams/day)<br>• Atkins' Diet Revolution<br>• Protein Power<br>• The Carbohydrates Addicts Diet<br>• The Complete Scarsdale Medical Diet<br>• Calories Don't Count Diet<br>• The Doctor's Quick Weight Loss Diet | Rapid initial weight loss | Cause weakness, ketosis, and poor stamina, very high fat, much of initial weight loss is water |
| Extremely low fat diets (<20% Calories from fat)<br>• The Pasta Diet<br>• T-Factor Diet<br>• The Maximum Metabolism Diet<br>• The Pritikin Diet<br>• Fit or Fat | Normal portions, variety, decreased risk of heart disease and cancer | Little satiety, increased gas, low palatability |
| Novelty diets (promote certain nutrients, foods, etc.)<br>• Fit for Life Diet<br>• The New Beverly Hills Diet<br>• The Rotation Diet<br>• Cabbage Soup Diet<br>• Sugar Busters Diet<br>• Eat Right For Your Blood Type | May produce rapid weight loss | May be nutritionally inadequate, do not promote permanent change in food habits or body weight |
| Very-low Calorie diets (< 800 Calories/day)<br>• Optifast<br>• The Rotation Diet<br>• Medifast<br>• Cambridge Diet<br>• Herbalife | Quick weight loss | Can be dangerous if not supervised by a physician |
| Pre-measured diets<br>• Jenny Craig<br>• Nutri-System | Safe, effective, eliminates decision making from eating | Expensive, may not promote permanent change in food habits |
| Behavior Modification | Safe, long-term | Slow weight loss |
| Exercise | Safe, long-term | Slow weight loss |

## Moderate Calorie Restriction Diets

**The Zone Diet:** A best seller a few years ago; popularity of the Zone Diet has waned in the past year or so. Dr. Sears, a biochemist, has now published 4-5 books on the subject. He claims that his diet can produce weight loss, improve athletic performance PLUS prevent cardiovascular disease, cancer, diabetes, fatigue, depression, arthritis, and alcoholism. The Zone Diet is based on a specific ratio of carbohydrate to protein at each meal (including snacks). Very regimented, the hardest part for people is keeping all meals in the proper ratio. On the other hand, you can purchase Sears' line of meals and snack bars.

The Zone is essentially a low-calorie diet, from 1000-1400 calories, and shares many of the same characteristics of more traditional weight loss diets. The core diet revolves around lean proteins, fruits, vegetables and high-fiber starches and a small amount of unsaturated fats. The trick is to combine them in exactly the right amount. While difficult for most, the Zone diet may prove very successful for those who like the complexity and enjoy becoming involved in the calculations and meal planning. No evidence exists for his claims that the Zone Diet cures the many illnesses.

Other moderate calorie restriction diets include Weight Watchers, The American Heart Association Diet, and The Setpoint Diet.

## High-Protein, Low Carbohydrate Diets

**The Atkins Diet:** The most popular diet book in the past 3 years, the Atkins Diet has been around since first being published as the *Dr Atkins' Diet Revolution* in 1972. Despite strong criticism from the medical community and a highly critical article in the Journal of American Medical Association, Atkins nonetheless released numerous other books such as the *Dr Atkins' Superenergy Diet* (1977), *Dr Atkins' Nutrition Breakthrough* (1981), *Dr Atkins' Health Revolution* (1988) and then the *New Diet Revolution* (1992).

The Atkins Diet starts with a 2-week induction diet that limits carbohydrate intake to 20 grams per day. This is followed by less restrictive phases with each phase allowing progressively more carbohydrate. The induction diet is for the initial 2 weeks and is limited to 20 grams per day. The maintenance phase is the least restrictive allowing 60-70 gram carbohydrate per day. Atkins says you can eat all the meats and fat you want and he does not limit saturated fat. Exercise is mentioned but not emphasized.

**Protein Power:** Another top seller in the past 5 years and frequently seen on TV infomercials, Protein Power is similar to the Atkins Diet in that carbohydrates are strictly limited (no more than 30 grams) in the early stages. The primary difference is that Protein Power does not indiscriminately recommend increased intake of protein and fat. Instead, they advocate controlled portions of meats and recommend the use of less saturated fats such as olive oil, peanut or sunflower oil, and avocado. Ketosis and dehydration are still of concern.

**The Carbohydrate Addicts Diet**: A more-liberal version of the Atkins Diet, this diet recommends eating very-low carbohydrate meals for breakfast and lunch but include a reward

meal every day. During this meal dieters can have whatever they want, at all other meals, carbohydrates are strictly limited. Because of the increased carbohydrate consumed in the reward meal, The Carbohydrate Addicts Diet is unlikely to cause ketosis or lead to significant harm.

Other high-protein, low-carbohydrate diets include the Complete Scarsdale Medical Diet, Calories Don't Count, and the Doctor's Quick Weight Loss Diet. Each of these variations limits carbohydrates in different amounts; however, they all restrict it to less than 100 grams per day. This is far below what is required each day to meet your basic energy requirements.

**Extremely Low Fat Diets (<20% Calories from fat)**

Extremely low fat diets typically are not "filling" and often lack flavor. Some of the more popular versions include the Pasta Diet, T-Factor, Maximum Metabolism, Pritikin, and Fit or Fat:

**Novelty Diets:**

**The New Beverly Hills Diet:** This is a rehash of the similarly titled book published in 1981. The diet is based on strict food combining principles. You're told to not mix carbohydrates with proteins and to eat carbohydrates after proteins because of digestive problems. You can eat as much fruit as you want but only one fruit at a time. Once you eat one food from another group, you can't eat another fruit the rest of the day. These restrictions result in a low-calorie diet. Depending on actual food choices, the diet is also low in protein, zinc, calcium, and vitamin D.
The diet is similar to the best-selling diet book of the 80's, Fit For Life.

**Cabbage Soup Diet:** Each day, you can consume as much cabbage soup as you want (the soup recipe calls for cabbage, onions, pepper, tomatoes, celery, onion soup mix) plus a specified food each day. The main concern: gas! The diet has multiple nutritional deficiencies but is unlikely to be followed for long.

**Sugar Busters:** This easy-to-read book recommends cutting out refined sugar with the promise of reduced body weight, lower cholesterol levels, and lower blood sugars (referring to persons with diabetes). The authors suggest that refined sugar is the cause of obesity, elevated cholesterol levels, etc. They state "sugar is toxic…refined sugar in any significant quantity is toxic to many human bodies, and it certainly helps to make bodies fat." The authors categorize carbohydrates by glycemic response (the relative effect of individual foods on blood sugar when compared to a standard response of an equivalent amount of glucose or bread). Exercise is not emphasized, but certainly encouraged as a "definite plus in overall fitness and health."
While one might dispute some of their claims and especially the oversimplification of weight control, it's difficult to argue with their overall advice to consume "a diet based on low-glycemic index carbohydrates, lean meats, and fat in moderation." The diet plans included in the book included a wide range of high-fiber fruits, grains and vegetables plus moderate amounts of lean protein and more healthful fats. The diet is unlikely to cause harm.

**Eat Right For Your Blood Type:** The "Eat Right For Your Blood Type" diet is the 1990's astrological diet plan: Diet recommendations depend on your blood type (A, B, or O) and are based on the claim that red blood cell surface antigens are sensitive to specific components in the diet; primarily lectin proteins. Lectins are plant proteins or phytohemagglutinins. Specifically, the author claims that lectins "target an organ and begin to agglutinate blood cells in that area." Once the lectin protein settles someplace, it has a magnetic affect that clumps cells together. These clumps of cells are then "targeted for destruction." While the theory is interesting, most researchers find it far-fetched. If lectins were as bad as the author claims, one would expect to see far more serious problems. Agglutination is a clumping of the blood cells and is what happens if you mix together blood of different types. Not something you'd like to have happening in your blood stream. Since lectins are present in virtually all plants, and since most people consume almost half of their calories from plants, that scenario is extremely unlikely. Further, there is little evidence of lectin absorption from the gut in physiologically significant amounts. So, while lectins may agglutinate red blood cells in the lab, it is doubtful that it is occurring in you right now.

**Table 8.**

**Fad Diet Characteristics: How to recognize a fad diet**

| |
|---|
| Promote quick & easy weight loss |
| Limit types of food selections |
| Rely on testimonials |
| Promoted as a cure-all |
| Often need supplements/special foods |
| No attempts to change long-term eating habits and lifestyles |
| Often have contempt for the scientific & medical community |

## Dietary Supplements

Dietary supplements, ranging from essential nutrients to herbal remedies and sports products, have become a multi-billion dollar business during the past decade. Besides the traditional multi-vitamin and mineral supplements designed to correct or prevent nutrient deficiencies or reduce the risk of chronic diseases, there is a growing list of ergogenic products (substances that promise to boost physical performance) to tempt both weekend and professional warriors. Some Air Force personnel may take supplements because they believe they cannot or do not consume enough food to meet their nutritional needs. Or they may believe supplements provide extra nutrients or give a performance advantage that food alone cannot provide. Although some persons may need or benefit from dietary supplements in some situations or at certain times, the routine use of supplements is not worthwhile for most personnel. Simply following a sensible diet (see the previous section on the Dietary Guidelines for Americans) will provide adequate nutrition to meet the needs of almost all military personnel.

Although a few dietary supplements may possess qualities that might enhance health status or sport performance, many, if not most, do not live up to their marketing hype. Supplements are not regulated and do not fall under the same strict formulation and production guidelines as drugs. Manufacturers of dietary supplements do not have to prove they are safe and effective before putting them on the market. Also, those who benefit from their sales often distort or exaggerate the research findings or overlook negative effects. There is very little research on the safety of taking even beneficial supplements for a long time. In addition, the effect of simultaneously taking multiple supplements is unknown, as is the effect of taking supplements in very hot or very cold climates. Also unknown is the highest safe level of intake for many supplements. Vitamins A and D, iron, zinc, and selenium are especially toxic in high doses, while large amounts of vitamin B6, niacin, and many other nutrients have harmful side effects.

**Table 9.**

**RDAs and Tolerable Upper Intake Levels for selected vitamins and minerals**

| Vitamin/Mineral | Recommended Dietary Allowance (RDA) Or Adequate Intake | Tolerable Upper Intake Level |
|---|---|---|
| A | 700 μg (female) [a] | 3000 μg [b] |
| | 900 μg (male) [a] | 3000 μg [b] |
| D | 200 IU (5μg) [a] | 2000 IU (50μg) [b] |
| Iron | 18 mg (female) [a] | 45 mg [b] |
| | 8 mg (male) [a] | 45 mg [b] |
| Zinc | 8 mg (female) [a] | 40 mg [b] |
| | 11 mg (male) [a] | 40 mg [b] |
| Selenium | 55 μg [a] | 400 μg [b] |
| B6 | 1.5 mg [a] | 100 mg [b] |
| Niacin | 14 mg (female) [a] | 35 mg [b] |
| | 16 mg (male) [a] | 35 mg [b] |

[a] RDA for males and females ages 19 – 50.
[b] For males and females ages 19 –70.

Herbal products are particularly risky. The active substances in herbs are fundamentally drugs, but, unlike drugs, they are not purified nor are the levels of the active compounds standardized. Many herbal products have caused allergic reactions in certain individuals; others have caused liver damage, high blood pressure, irregular heart beats, or death. For these reasons, aircrew must consult with their flight surgeon regarding any supplement they may be thinking about taking and determine if there are any potential problems with their intake. There are several factors that individuals need to consider when evaluating the claims for a supplement.

1. Does the supplement's claim make sense? Are potential side effects as well as benefits listed? Is there good evidence from an unbiased source it really works? (Salespeople and advertising are not reliable sources of information.)

2. Is the claim made by a source known to be truthful?

3. Has the supplement been evaluated in well-controlled research studies and have the findings been corroborated?

4. Has information on the supplement's effects been published in scientific journals and are references provided? Is the claim based on more than bold headlines based on a single study?

5. Is there information on the effects of taking more than one supplement at a time? Is there information on the effects of taking the supplement when taking any medications?

6. Have the Food and Drug Administration or the state department of health issued any advisories on this supplement? Determining whether a supplement is appropriate or potentially beneficial under field conditions is even more complicated. While supplements may have undergone studies in the laboratory, little if any information may be available about the effects of a supplement when taken in severe environments or under conditions of fatigue or dehydration—conditions that are often encountered in training or on the battlefield.

| Supplement | Available Form | Manufacturers' Claims* | Side Effects |
|---|---|---|---|
| Amino Acids | Powders, tablets, liquid; Adequate amounts of individual amino acids may be obtained in a diet consistent with the Food Guide Pyramid. | Enhances muscle formation by increasing the release of growth hormone; changes hormonal responses to enhance recovery after high-intensity exercise; delays fatigue (*questionable benefit)* | Nutritional imbalances; diarrhea; Prolonged use over a decade or more may lead to calcium deficiencies/osteoporosis; High amounts may increase health risk for those with liver or kidney ailments |
| Amphetamines | Tablets or powders | Stimulates central nervous system; increases blood flow to and contractility of muscle, increases time to exhaustion (*illegal unless prescribed by a physician)* | Large doses can produce mental confusion, hallucinations, dependency, and brain damage; lower doses can produce headache, anxiety, and sleeplessness; cardiorespiratory effects include high blood pressure, irregular heartbeat, convulsions, and death; There are reported cases of lethal heat stroke during prolonged heavy exertion. |
| Androstenedione | Pill | Used by the body to manufacture estrogen and testosterone, which regulates the growth and repair of muscles resulting in gains in muscle mass and strength *(conflicting data)* | Increased risk of heart attack; may stunt growth in young people; may alter secondary sexual characteristics; limited information regarding the extent to which it increases muscle mass |
| Antioxidants | Tablets, sports bars, sports drinks, vitamin C, vitamin E, beta-carotene; found in fruits and vegetables | Reduces oxidative damage to reduce muscle soreness caused by unaccustomed strenuous aerobic exercise, thereby helping recovery; prevents muscle breakdown associated with eccentric exercise; Improves physical power *(More research needed)* | High doses can cause nausea, abdominal pain, diarrhea, peripheral nerve impairment, fatigue (selenium); headache, fatigue, diarrhea (vitamin E); diarrhea, kidney stones, and other side effects (vitamin C); yellow skin (beta-carotene) |
| Caffeine | Pills such as NoDoz, Vivarin, and Ripped Fuel; found in coffee, tea, and chocolate and guarana and kola nuts | Increases alertness by stimulating the central nervous system; excites muscle contractions; lowers perceived exertion; increases free fatty acid mobilization; spares muscle glycogen | *In high doses*, increased nervousness, insomnia, stomach and intestinal distress, increased urine formation, tremors, anxiety; heart palpitations, convulsions; may impair the potential ergogenic effect of creatine. |
| Carbohydrates | Liquids (sports drinks), gels, sports bars, glucose tablets | Provides energy for activity, especially aerobic endurance activity; enhances intermittent, high-intensity, anaerobic exercise; accelerates recovery after exercise *(benefits proven)* | Large doses of concentrated simple carbohydrates *(i.e. sugars, especially fructose)* can cause diarrhea |
| Carnitine | Powders, pills; found in meat & milk products | Corrects carnitine deficiency in the body thereby improving physical performance by increasing power and endurance *(no benefit)* | Little data on long term safety; diarrhea occurs in doses larger than 2 to 6 grams/day |

***With the exceptions of carbohydrate and caffeine, and possibly creatine, the effectiveness of other substances as ergogenic aids has not been irrefutably proven. The possible harmful side effects outweigh any small potential benefit as performance enhancers.**

| Supplement | Available Form | Manufacturers' Claims* | Side Effects |
|---|---|---|---|
| Choline | Powder, pills; found in nuts, wheat germ, cauliflower, spinach, soybeans and the lecithin in egg yolks and organ meats | Increases physical power by maintaining optimum acetylcholine levels for its function as a neurotransmitter *(no proven benefits)* | Nausea, bloating, diarrhea |
| Chromium picolinate | Tablets; found in brewer's yeast, asparagus, mushrooms, cheese, nuts and whole-grain products | Enhances muscle mass and decreases body fat through improved insulin sensitivity which may improve storage of muscle and liver glycogen, thereby improving use of glucose during aerobic endurance events *(no proof to support benefits)* | Excessive intake may be be toxic to the kidney or cause cancer |
| Creatine | Powders, pills; found in red meats & produced by the body | May stimulate energy production, increase strength, power and muscle size when combined with resistance exercises. Creatine may help the body produce energy for quick bursts of power *(claimed benefits likely valid)* | Cramping, muscle tears, stomach and intestinal distress; may cause water retention, lead to kidney problems, seizures; impact of long term use is unknown |
| Ephedrine | Pill, tablet, or by inhaler; Ma Huang | Stimulant to promote weight loss; Enhances performance factors that may benefit from stimulation of the ATP-CP, lactic acid and oxygen energy systems *(very risky)* | Over-stimulation of the central nervous system, vomiting, shortness of breath, irregular heartbeat, seizures, death |
| Ginseng | Capsules and liquids | Increases oxygen consumption leading to increased energy production and decreased time to fatigue; Resistance to stress *(no proven benefits; preliminary evidence may prevent acute mountain sickness )* | May cause diarrhea, skin rash, insomnia, nervousness high blood pressure, abnormal accumulations of body fluid, euphoria |
| Growth Hormone | By injection | Stimulates growth of muscles; enhances fat oxidation and metabolism of carbohydrate | May cause pathologic enlargement of the face, hands, and feet, as well as body organs (such as the liver and heart) weakening them and predisposing them to chronic diseases |
| Protein | Powders, drinks (such as GatorPro, NitroFuel); found in meat, milk, and many other foods. Adequate amounts of protein may easily be obtained from a normal diet. | May decrease muscle breakdown, enhance tissue formation, and accelerate recovery from training | Prolonged use over a decade or more may lead to calcium deficiencies/osteoporosis; quantities in excess of RDA may increase health risk for those with liver or kidney ailments |
| Yohimbe | Tablet, capsule, or liquid extract | Increases muscle mass and decrease body fat *(no benefits)* | Side effects include dizziness, nervousness, headache mild tremors, nausea; no long term studies to document effectiveness |

***With the exceptions of carbohydrate and caffeine, and possibly creatine, the effectiveness of other substances as ergogenic aids has not been irrefutably proven. The possible harmful side effects outweigh any small potential benefit as performance enhancers.**

## Alcohol

Aircrew are prohibited, by Air Force policy, from dinking alcohol (ethanol) a minimum of 12 hours prior to flight. However, waiting 12 hours doesn't guarantee you will be in the best physical condition to fly. In fact, even after complete elimination of all the alcohol in your body, there are undesirable effects (collectively referred to as a hangover) that can last 48 hours following excessive drinking. The effects of a hangover may be just as dangerous as the intoxication itself. Symptoms of a hangover include: headache, dizziness, dry mouth, stuffy nose, fatigue, upset stomach, irritability, impaired judgment, and increased sensitivity to bright light. Any of these symptoms will probably decrease your ability to perform during a mission. Alcohol is also a diuretic and will increase your fluid requirements. If other variables are added such as sleep deprivation, fatigue, medication use, hypoxia, or flying at night or in bad weather, the negative effects of alcohol are significantly magnified. As an aviator, you should adopt the philosophy that, during a mission, any lingering effects of excessive alcohol consumption are unacceptable and can result in a mishap.

Alcohol and its hangover effect have a significant negative impact on G-tolerance. Alcohol degrades sleep quality, causes dehydration and can decrease your blood sugar. It also dilates (expands) blood vessels. All of these factors have a negative effect on your ability to tolerate G-stress.

The majority of adverse effects produced by alcohol relate to the brain, the eyes, and the inner ear. Table 10 summarizes the effects of alcohol. Table 11 provides some common sense rules.

**Table 10.**

**Adverse effects produced by alcohol**

| Organ | Alcohol |
|---|---|
| Brain | Impairs reaction Time |
| | Impairs reasoning |
| | Impairs judgement |
| | Impairs memory |
| | Decreases brain's ability to utilize oxygen |
| Eye Muscles | Causes double vision |
| | Causes difficulty focusing |
| Inner Ear | Causes dizziness |
| | Decreases hearing capability |

**Table 11.**

**If You Drink Alcoholic Beverages Follow These Common Sense Rules**

| |
|---|
| Drink moderately and never with the idea of deliberately getting drunk. |
| Never drink on an empty stomach |
| At the club or bar, drink nonalcoholic beverages |

## Caffeine

Caffeine is a mild stimulant that is often referred to as the most widely used psychoactive drug in the world. It is found in more than 60 different plant species and, therefore, occurs naturally in many foods including coffee, tea, cocoa, chocolate and soft drinks. In addition to being present in several prescription and over-the-counter drugs, caffeine is also a food additive. Table 12 lists the caffeine content of selected foods and beverages.

**Table 12.**

**Caffeine Content of Selected Foods and Beverages**

| Food/Beverage | Caffeine (mg) |
|---|---|
| **Coffee** | |
| Brewed (6 oz) | 103 |
| Instant (1 rounded teaspoon) | 57 |
| Expresso (6 oz) | 210 |
| Cappuccino (6 oz) | 30 |
| **Tea, 5 oz** | |
| Brewed, black, 3 minutes | 36 |
| Instant (1 teaspoon) | 31 |
| **Chocolate beverages** | |
| Chocolate milk (8 oz) | 8 |
| Cocoa beverage (6 oz) | 5 |
| **Carbonated beverages (regular and diet)** | |
| Cola-type (12 oz) | 46 |
| Pepper-type (12 oz) | 41 |
| Mountain Dew (12 oz) | 54 |
| Mello Yello (12 oz) | 52 |
| Jolt (12 oz) | 70 |
| **Chocolate** | |
| Milk Chocolate (1 oz) | 7 |
| Dark Chocolate (1 oz) | 21 |
| Baker's Chocolate (1 oz) | 25 |
| **Over the counter drugs (1 tablet)** | |
| No-Doz | 100 |
| No-Doz, maximum strength | 200 |
| Vivarin | 200 |
| Anacin | 32 |
| Excedrin | 64 |

Note. Caffeine data are from Bowes & Church's Food Values of Portions Commonly Used. (p. 381-383), A. D. Bowes and J. A. Pennington, 1998, Philadelphia: Lippincott.

Caffeine, in moderate amounts, has positive effects on alertness and physical performance. It can also be used as a countermeasure for the effects of sleep deprivation. However, very high doses of caffeine can have negative effects on mental function. In addition, tolerance can develop if you are a regular caffeine user. Withdrawal symptoms can occur when caffeine is eliminated from a habitual user's diet. These include headaches, drowsiness, irritability, fatigue, and flu-like symptoms. The symptoms don't last long and are generally mild. However, the withdrawal phenomenon could possibly lead to decrements in performance during military operations.

The Committee on Military Nutrition Research reviewed the use of caffeine in military operations. They found that caffeine doses of 100 to 600 mg could maintain cognitive performance, especially in situations of sleep deprivation. This consensus was the result of research conducted at a number of institutions, including several military laboratories, that demonstrated improved vigilance in rested subjects and more generalized effects on cognitive function in sleep-deprived individuals following caffeine consumption.

How fast is caffeine absorbed? Almost all (about 99%) of the caffeine in foods and beverages is absorbed within 45 minutes. Peak plasma concentrations (the amount of caffeine in your blood) are typically reached between 15 minutes and 2 hours. This time varies because, in addition to individual differences, the presence of other foods can slow the digestion and absorption process.

Caffeine can start to have an effect within 15 minutes of consuming it, but how long will the effects last? Caffeine typically has an effect for 2.5 to 4.5 hours. The amount of time a substance remains active is sometimes referred to as the "half-life." There are, however, factors that influence caffeine metabolism. For example, it has been shown that caffeine's half-life in adult males is reduced by up to 50% in smokers compared with non-smokers. In contrast, caffeine's half-life is increased by 50% in women taking oral contraceptives.

## Side Effects and Hazards of Caffeine

Caffeine is generally regarded as safe; however, there are a few side effects and hazards you should know about. Caffeine taken in moderate or high doses can disrupt sleep. High doses can increase blood pressure, may have other temporary cardiovascular side effects, can increase anxiety and perhaps impair fine motor function. Although caffeine has some diuretic effects, these to not appear to be significant when it is used in moderate doses. As mentioned earlier, individuals who normally consume significant amounts of caffeine on a daily basis may experience sudden withdrawal resulting in significant adverse effects such as headaches, malaise, and impaired performance and mood. Care should be taken not to produce withdrawal during deployments or field exercises. If withdrawal is desired, it should be undertaken gradually — over a period of at least several days or a week.

**Table 13.**

**Key Points to Remember Regarding Caffeine**

| |
|---|
| Avoid caffeine if you are already alert (e.g., the start of a mission) |
| Consume caffeine 15 to 30 minutes prior to critical phases of flight (e.g., landing, air refueling, etc.) or circadian low-points (0300 – 0500 and 1500 – 1700) |
| The effective dose is ~ 200 mg (1 or 2 cups of coffee) |
| Excess caffeine may lead to adverse behavioral or cardiovascular symptoms |
| In rested subjects, caffeine improves vigilance and mood states related to alertness |
| In sleep deprived subjects, caffeine improves vigilance, mood, and higher cognitive functions |
| Even in the most stressful operational scenarios, caffeine improves performance |
| Caffeine may disrupt sleep |

## Aspartame

Aspartame is an artificial sweetener made from the amino acids phenylalanine and aspartic acid. It is 180 times sweeter than sucrose (table sugar) and it is marketed as *Equal*™ and *NutraSweet*™. Aspartame has been available to the public as a sweetener and flavor enhancer for over 20 years. Although aspartame is approved for human use in over 100 countries, there are still occasional, informal reports of adverse reactions following its use. These unofficial reports have suggested that aspartame may contribute to headaches, panic attacks, or even seizures. In response to these concerns, aspartame has been evaluated for links to headaches, seizures, behavior, cognition, mood, and allergic reactions; however, insufficient evidence has been found to show adverse effects following aspartame use by children or adults.

The safety testing of aspartame has been extensive—well beyond that of most food additives. The results of this testing suggest that aspartame is safe for use by children and adults.

## FOD

Practice good FOD awareness when deciding what foods to take with you on a flight. Common sense is the rule here. Nuts, seeds, raisins, grapes, and other finger foods can be a great addition to your flight meal, but it is important that the packaging is stowed properly and any dropped food items are accounted for as soon as possible. Consider transferring foods from the flight meal box to a large, Ziplock™-style bag. Bags are easier to carry, may make finger-foods easier to handle and eat during flights, and provide a convenient way to dispose of leftover food items and garbage.

## Dehydration

Water is the most important nutrient for performance. Approximately 60 to 70 percent of your body is water. Because water is involved in all of the body's vital processes, it is considered to be the nutrient of greatest concern in physically active aircrew and other military personnel. Table 14 lists the primary functions of water in the body.

**Table 14.**

**Primary Functions of Water in the Body**

| |
|---|
| Maintains the right body temperature – it keeps you cool when you heat up |
| Maintains blood pressure |
| Carries nutrients such as carbohydrates and protein to working muscles |
| Carries away waste products from the muscles that prevent them from contracting |
| Rids the body of waste products through the urine |
| Lubricates joints and internal organs |

Personnel performing heavy exercise in a hot, humid environment can lose 1 to 3 liters of water per hour through sweating. When your body gets low on fluid, your physical performance and your mental functions are impaired. Your body sends a lot of warning signs of dehydration; such

as, dizziness, fatigue, flushed skin, headache, impatience, loss of appetite, thirst, and weakness. It is easy to become dehydrated in military training. Even mild dehydration can slow your performance. Severe dehydration can lead to heat exhaustion and death.

According to AFP 11-419, G-Awareness for Aircrew, "Heat stress degrades the body's ability to do work and reduces G-tolerance. The combination of dehydration and blood moving to the skin for cooling significantly reduces G-tolerance and work capacity. As previously mentioned, Studies have shown that with only 3 percent dehydration, G-tolerance time may be reduced up to 50 percent. Always stay well hydrated, especially in hot conditions; increase fluid intake before and during the mission. When heat stress is present, realize your g-tolerance may be reduced and adjust your g onset rates and g-levels accordingly! Table 15 lists the effects of dehydration on performance.

**Table 15.**

**Effects of Dehydration on Performance**

| | |
|---|---|
| **Mild dehydration**<br>**1-5% Body Weight Loss** | Reduced Concentration<br>Fatigue<br>No Appetite<br>Thirst<br>G-tolerance may be reduced up to 50% |
| **Moderate dehydration**<br>**6-10% Body Weight Loss** | Mental Confusion<br>Inability to walk and talk<br>Breathing Difficulty<br>Headaches<br>Dizziness |
| **Severe dehydration**<br>**11-20% Body Weight Loss** | Kidney Failure<br>Dim Vision<br>Deafness<br>Delirium<br>Heat Stroke<br>Death |

To determine the percentage of body weight loss due to dehydration, weigh yourself (without clothes and shoes) before you engage in heavy physical activity. Weigh yourself again (without clothes and shoes) after the heavy physical activity. Take the weight loss and divide it by your weight before the activity. This will be the percent of your body weight loss. Example: a 150-pound person looses 6 pounds, this equates to a 4% body weight loss. This is about 12 cups of sweat. (3 cups of sweat = 1% weight loss.)

**Preventing Dehydration**

Does the dry air at altitude increase your fluid needs? More than likely, but so far there haven't been any published scientific studies to evaluate how fluid requirements change during flight. However, recent studies have shown that most adults need a little more fluid than the standard eight, 8-ounce (64 ounces total/day) glasses recommended in the past. Because even mild dehydration can have adverse effects on your performance (see Table 15), it is recommended that you consume at least nine, 8-ounce (72 ounces total) beverages per day. Keep in mind that regular sodas are only about 90% water, the rest is high-fructose corn syrup and other ingredients, so you should adjust for that and increase the total volume of your fluid intake accordingly. In addition, research has shown that caffeine-containing beverages do not contribute significantly to dehydration if consumed in moderation and therefore can certainly count toward your total fluid intake for the day.

**Water should be your first choice of fluids.** Cool, plain water is the best performance fluid replacement for any physical activity that lasts less than 90 minutes. Water is typically better than soda, coffee, beer or full-strength fruit juice, and equal to sports drinks for replacing the fluid you lose.

**Don't wait until you're thirsty to drink.** By the time you feel thirsty you have probably already lost 2 quarts of water. You are already dehydrated.

**Drink beyond your feelings of thirst.** If you stop drinking when your thirst is satisfied, you have replaced only about 2/3 of the water you have lost. Drink an additional 1 to 2 glasses after your thirst is satisfied.

**Drink water regularly and frequently.** Drink at least nine cups of water a day, at regular intervals. In extreme climates you will need even more water to prevent dehydration.

**Drink water before, during, and after activity.** Get into the habit of drinking water regularly and frequently all day. Use these guidelines for drinking before, during, and after physical activity.

**Before**: Drink 2 to 2 ½ cups of water during the 2 hours before physical activity. Then drink up to 2 more cups of cool water 15 minutes before activity.

**During:** ½ to 1 cup of water every 15-20 minutes. About 1 ¼ quart canteens per hour are the most fluids your stomach can empty in one hour. This may not be enough to prevent dehydration in some hot-weather situations. Watch for signs of dehydration even if you are drinking the maximum amount. For exercise lasting 90 minutes or longer, sports drinks may help you to sustain your pace.

**After:** Drink 2 cups fluid for every pound lost during activity. Drink until urine is clear or light yellow. Avoid alcohol as a fluid replacement. If you do drink beer after activity, drink 1 - 2 cups water or juice at the same time to counter the dehydrating effects of alcohol. Optimize glycogen refueling by consuming 50 – 100 grams of carbohydrate in beverage or food within 30 minutes of activity and every 2 – 4 hours thereafter. A complete balanced meal within 3 –4 hours of activity will replace electrolytes.

**Table 16.**

**Key Hydration Points to Remember**

| |
|---|
| Caffeine does not significantly contribute toward dehydration |
| Drink at least 9 cups (72 ounces) of fluid per day |
| Drink water, or other beverages, before, during, and after flights |
| Drink at least 2 cups (16 ounces) of fluid for every pound lost during physical activity/exercise |

## Sustained Operations: Eating to Promote Sleep

Operational fatigue is often seen in continuous and sustained air operations involving changes in your sleep-wake cycle, or moving you across several time zones (resulting in symptoms of jet lag). The significance of fatigue is that it degrades performance. Specifically, fatigue can lead to lapses in attention, loss of fine motor control, slowed reaction time, impaired short-term memory, irritability and depression. Fatigue can be defined as the physiological need for sleep and/or rest caused by inadequate or poor quality sleep. In short, sleep is the best weapon we have for combating the symptoms of fatigue.

Your dietary habits may influence the quality of your sleep.

Table 17 lists some general recommendations for promoting good quality sleep.

**Table 17.**

**Diet-Related Recommendations for Promoting Good Quality Sleep**

| |
|---|
| Avoid caffeine at least 3 to 4 hours before going to bed |
| Minimize alcohol use—it can cause restless sleep with less time in deep recuperative sleep |
| To promote sleep, try meals that are high in complex carbohydrates (potatoes, pasta, etc.) |

## Nutrition in Deployed Locations

Most deployed locations have contract foodservice operations such as Marriott or Brown & Root. You may also have access to a small Base Exchange, and MREs. To maintain your nutritional health while you are deployed, the best advice is to follow the Dietary Guidelines for Americans summarized on pages 5 through 7.

Meals Ready to Eat (MRE) are typically available to supplement the contract foodservice operation or to use when there is no dining facility. MREs are specifically engineered to meet the military's nutrition needs. Each MRE delivers 1,000 to 1,300 Calories with no more than 35% of the calories from fat. Nutritional analysis information for each MRE is listed in Appendix A. Table 18 provides some tips for utilizing MREs.

**Table 18.**

**Tips for Utilizing MREs**

| |
|---|
| If you can't eat all of your MRE, eat a few high-carbohydrate foods first (beverage, cookies, crackers, granola bar, fruit dessert, etc.) |
| Eat some of each component to get a balance of nutrients |
| Save some unopened dry items for a snack |
| Opened dry items should be discarded within 2 days |
| Opened wet-pack rations (entrees, fruit) discard immediately |

# APPENDIX A

**Menu 1**

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| **Beef Steak w/mush | 185 | 18.14 | 2.49 | 9.98 | 49.90 | 0.12 | 5.59 | 20.13 | 2.84 |
| Western Beans | 141 | 7.77 | 24.56 | 1.81 | 0.00 | 4.42 | 84.46 | 29.29 | 10.71 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Beef Jerkey | 70 | 10.00 | 1.00 | 3.00 | | 0.00 | 1.74 | 2.61 | 2.16 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access B | | | | | | | | | |
| Grnd Red Pepper | 6 | 0.24 | 1.13 | 0.35 | 0 | 1.59 | 2.12 | 2.97 | 0.16 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Candy | 132 | 0.70 | 25.15 | 3.53 | 0.00 | 0.00 | 1.53 | 24.10 | 0.50 |
| Total | 1128 | 53.20 | 129.49 | 44.21 | 49.90 | 78.13 | 162.02 | 314.06 | 19.03 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 94% | 160% | 88% | 83% | | 391% | 122% | 118% | 317% |

**Menu 2**

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Jamaican Pork Chop | 312 | 27.07 | 26.06 | 10.67 | 84.32 | 7.57 | 30.32 | 45.88 | 2.59 |
| Spiced Apples | 159 | 0.23 | 37.19 | 0.98 | 0.00 | 79.85 | 0.08 | 7.26 | 0.36 |
| Cracker (Veg Flavor) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Jalapeno Cheese Spre | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Dairy Shake | 416 | 18.70 | 65.00 | 9.00 | | | 12.00 | 400.00 | 0.28 |
| Access A | | | | | | | | | |
| Tobasco Sauce | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 1263 | 55.32 | 161.46 | 43.70 | 126.92 | 117.42 | 93.28 | 841.74 | 5.28 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 105% | 166% | 110% | 82% | | 587% | 70% | 315% | 88% |

**Menu 3**

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Beef Ravioli | 279 | 15.85 | 36.67 | 7.47 | 24.25 | 8.16 | 11.67 | 68.23 | 2.34 |
| Potato Sticks | 149 | 1.95 | 13.70 | 10.60 | 0.00 | 13.60 | 14.00 | 4.00 | 0.46 |
| Fudge Brownie | 331 | 4.31 | 40.50 | 17.61 | 42.05 | 0.00 | 13.80 | 21.85 | 3.07 |
| Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Wheat Snackbread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 1299 | 31.71 | 160.42 | 59.64 | 108.93 | 88.55 | 54.83 | 471.55 | 8.00 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 108% | 95% | 109% | 112% | | 443% | 41% | 177% | 133% |

Menu 4

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Country Cpt Chicken | 266 | 29.40 | 19.66 | 7.39 | 70.84 | 21.01 | 9.67 | 50.60 | 1.69 |
| Buttered Noodles | 160 | 3.93 | 21.38 | 6.59 | 22.40 | 9.47 | 18.02 | 13.34 | 0.90 |
| Toaster Pastry | 204 | 2.30 | 34.20 | 6.65 | -- | -- | 40.00 | 12.00 | 1.75 |
| Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | 10.00 | | 36.00 | 0.36 |
| **Mocha Cappucino | 122 | 27.39 | 2.43 | 20.7 | 3.04 | 0 | | | |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1360 | 75.34 | 147.62 | 72.50 | 143.88 | 70.48 | | 500.54 | 6.75 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| % MRDA | 113% | 226% | 100% | 136% | | 352% | | 187% | 113% |

Menu 5

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Grilled Chicken Breast | 143 | 23.58 | 3.51 | 3.73 | 54.00 | 0.54 | 3.14 | 14.70 | 0.94 |
| Minestrone Soup | 118 | 5.13 | 22.13 | 1.19 | 0.39 | 4.62 | 56.28 | 46.90 | 1.69 |
| fudge Brownie | 331 | 4.31 | 40.50 | 17.61 | 42.05 | 0.00 | 13.80 | 21.85 | 3.07 |
| Jelly | 77 | 0.11 | 20.10 | 0.03 | 0.00 | 0.30 | 0.00 | 2.00 | 0.06 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | | | 36.00 | 0.36 |
| Cocoa | 179 | 2.97 | 31.10 | 6.13 | 2.00 | | 5.00 | 65.00 | 0.85 |
| Access D | | | | | | | | | |
| Seasoning Packet | | | | | | | | | |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| Apple Cider | 70 | 0.04 | 17.00 | -- | -- | 26.00 | -- | 23.00 | -- |
| | | | | | | | | | |
| Total | 1404 | 42.85 | 213.74 | 42.62 | 103.47 | 31.68 | 88.97 | 403.85 | 8.75 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 117% | 129% | 145% | 80% | | 158% | 67% | 151% | 146% |

Menu 6

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Oriental Chicken/Thai | 217 | 21.13 | 18.46 | 7.22 | 67.37 | 3.78 | 8.40 | 31.43 | 3.34 |
| White Rice | 268 | 3.21 | 37.58 | 11.14 | 0.00 | 0.00 | 101.69 | 17.46 | 1.94 |
| Raisin Nut Mix | 307 | 14.10 | 16.70 | 20.30 | -- | -- | 20.00 | 32.50 | 1.18 |
| Jalepeno Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker (Veg Flavor) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| **French Van Cappucir | 120 | 3.39 | 22 | 2.55 | 0 | 0 | | 127.2 | 0 |
| Access E | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Tea bag | 2 | 0.10 | 0.40 | 0.00 | | | 0.70 | 5.00 | 0.04 |
| Cream Sub | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Sugar | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| | | | | | | | | | |
| Total | 1267 | 51.25 | 122.35 | 64.26 | 109.97 | 33.78 | 181.67 | 602.19 | 8.55 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 106% | 154% | 83% | 121% | | 169% | 137% | 226% | 143% |

Menu 7

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Chicken with Salsa | 187 | 20.74 | 33.96 | 4.99 | 34.43 | 99.04 | 25.31 | 99.67 | 1.68 |
| Mexican Rice | 221 | 5.72 | 38.39 | 4.73 | 0.08 | 14.44 | 99.13 | 19.99 | 1.72 |
| Shortbread Cookie | 210 | 2.97 | 28.17 | 10.38 | 3.14 | 0.00 | 35.80 | 5.50 | 2.14 |
| Jalapeno Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker (veg flav) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | 10.00 | | 36.00 | 0.36 |
| Access C | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| | | | | | | | | | |
| Total | 1245 | 41.52 | 178.22 | 49.85 | 85.25 | 153.61 | 212.98 | 554.75 | 7.91 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 104% | 125% | 121% | 94% | | 768% | 160% | 208% | 132% |

Menu 8

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Hamburger | 202 | 23.30 | 1.70 | 8.81 | | | 10.60 | 11.40 | 2.79 |
| Nacho Combos | 236 | 5.02 | 33.91 | 8.62 | -- | 0.00 | 4.08 | 100.40 | 0.47 |
| Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| BBQ Sauce | 33 | 0.14 | 7.4 | 0.09 | | 0.06 | | 4.25 | 0.18 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access C | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| | | | | | | | | | |
| Total | 1215 | 41.37 | 146.37 | 45.85 | 42.66 | 67.08 | 40.79 | 684.92 | 7.25 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 101% | 124% | 100% | 86% | | 335% | 31% | 257% | 121% |

Menu 9

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Beef Stew | 266 | 29.45 | 13.09 | 9.96 | 71.42 | 3.32 | 16.79 | 21.25 | 3.48 |
| M&M Cookie | 272 | 3.48 | 43.98 | 9.24 | -- | -- | 42.00 | 11.40 | 1.84 |
| Jalapeno Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker (Veg Flav) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Dairy Shake | 416 | 18.70 | 65.00 | 9.00 | | | 12.00 | 630.00 | 0.28 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1330 | 60.95 | 155.28 | 51.25 | 114.02 | 33.32 | 121.67 | 1051.25 | 7.65 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 111% | 183% | 106% | 96% | | 167% | 91% | 394% | 127% |

Menu 10

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Chili Macaroni | 290 | 24.85 | 29.34 | 8.25 | 38.77 | 7.99 | 35.12 | 57.08 | 4.18 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Wheat Snackbread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Cocoa | 179 | 2.97 | 31.10 | 6.13 | 2.00 | 49.80 | 5.00 | 65.00 | 0.85 |
| Access B | | | | | | | | | |
| Ground Red Pepper | 6 | 0.24 | 1.13 | 0.35 | 0 | 1.59 | 2.12 | 2.97 | 0.16 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Candy | 132 | 0.70 | 25.15 | 3.53 | 0.00 | 0.00 | 1.53 | 24.10 | 0.50 |
| | | | | | | | | | |
| Total | 1303 | 41.67 | 158.26 | 55.33 | 136.38 | 89.47 | 77.29 | 536.79 | 9.20 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 109% | 125% | 108% | 104% | | 447% | 58% | 201% | 153% |

Menu 11

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Pasta w/ Veg tomato | 212 | 6.59 | 36.80 | 4.37 | 0.90 | 18.34 | 24.80 | 72.61 | 1.64 |
| Fruit | 71 | 0.00 | 18.52 | 0.00 | 0.00 | 63.29 | 0.00 | 0.06 | 0.41 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| MRE Charms (99) | 105 | 0.01 | 27.6 | 0.04 | -- | 0 | 0 | 5 | 0.03 |
| Access D | | | | | | | | | |
| Seasoning Packet | | | | | | | | | |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| Apple Cider | 70 | 0.04 | 17.00 | -- | -- | 26.00 | -- | 23.00 | -- |
| | | | | | | | | | |
| Total | 1225 | 26.09 | 184.88 | 41.68 | 53.87 | 143.07 | 111.53 | 351.39 | 6.14 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 102% | 78% | 126% | 78% | | 715% | 84% | 132% | 102% |

Menu 12

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Bean and Rice Burrito | 232 | 6.57 | 37.67 | 5.92 | 0.00 | 0.50 | | 50.39 | 2.49 |
| Fruit | 71 | 0.00 | 18.52 | 0.00 | 0.00 | 63.29 | 0.00 | 0.06 | 0.41 |
| Fruit Filled bar | 136 | 1.63 | 26.97 | 2.77 | -- | 0.00 | 39.96 | 160.00 | 1.80 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Picante Sauce | 7 | | 2.74 | | | 0 | | 0 | 0.99 |
| Access C | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| | | | | | | | | | |
| Total | 1213 | 27.68 | 170.92 | 45.98 | 52.98 | 99.23 | 126.81 | 461.77 | 9.81 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 101% | 83% | 116% | 86% | | 496% | 95% | 173% | 164% |

Menu 13

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Cheese Tortellini | 242 | 8.81 | 37.82 | 6.24 | 20.49 | 12.09 | 11.77 | 134.73 | 2.18 |
| Applesauce | 95 | 0.23 | 24.17 | 0.26 | 0.00 | 286.42 | 0.77 | 3.80 | 0.32 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| MRE Charms (99) | 105 | 0.01 | 27.6 | 0.04 | -- | 0 | 0 | 5 | 0.03 |
| Access D | | | | | | | | | |
| **Seasoning Packet | | | | | | | | | |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| Apple Cider | 70 | 0.04 | 17.00 | -- | -- | 26.00 | -- | 23.00 | -- |
| | | | | | | | | | |
| Total | 1280 | 28.55 | 191.55 | 43.80 | 73.47 | 359.94 | 99.27 | 417.25 | 6.59 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 107% | 86% | 130% | 82% | | 1800% | 75% | 156% | 110% |

Menu 14

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Pasta w/ veg Alfredo | 244 | 8.75 | 30.97 | 10.05 | 23.71 | 5.63 | 28.30 | 45.90 | 1.77 |
| Fruit | 71 | 0.00 | 18.52 | 0.00 | 0.00 | 63.29 | 0.00 | 0.06 | 0.41 |
| Dry Roasted Nuts | 176 | 7.44 | 6.11 | 13.00 | -- | -- | 21.60 | 14.70 | 0.59 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Access D | | | | | | | | | |
| **Seasoning packet | | | | | | | | | |
| Lemon Tea | 68 | 0.17 | 16.60 | 0.01 | -- | 0.14 | 1.87 | 7.99 | 0.06 |
| Apple Cider | 70 | 0.04 | 17.00 | -- | -- | 26.00 | -- | 23.00 | -- |
| | | | | | | | | | |
| Total | 1328 | 35.68 | 157.55 | 60.32 | 76.69 | 130.36 | 136.63 | 334.38 | 6.83 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 111% | 107% | 107% | 113% | | 652% | 103% | 125% | 114% |

Menu 15

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| **Beef Enchiladas | 229 | 12.50 | 26.40 | 12.50 | | 0.43 | 7.10 | 18.00 | 1.80 |
| Mexican Rice | 221 | 5.72 | 38.39 | 4.73 | 0.08 | 14.44 | 99.13 | 19.99 | 1.72 |
| Choc Chip Cookies | 272 | 3.48 | 43.98 | 9.24 | -- | -- | 42.00 | 11.40 | 1.84 |
| Jalapeno Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker (Veg) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1230 | 31.06 | 175.88 | 49.54 | 42.68 | 81.57 | 199.45 | 444.45 | 7.48 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 102% | 93% | 120% | 93% | | 408% | 150% | 166% | 125% |

Menu 16

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Chicken w/Noodles | 251 | 27.18 | 18.03 | 7.83 | 88.63 | 5.29 | 27.91 | 28.71 | 1.87 |
| Rasp Applesauce | 95 | 0.25 | 24.11 | 0.15 | 0.00 | 337.05 | 0.41 | 5.53 | 0.38 |
| Fig Bar | 190 | 2.26 | 38.10 | 4.19 | | 0.00 | 4.32 | 34.00 | 1.40 |
| Cheese spread | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Cracker (Veg) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | 10.00 | | 36.00 | 0.36 |
| Cocoa | 179 | 2.97 | 31.10 | 6.13 | 2.00 | 49.80 | 5.00 | 65.00 | 0.85 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1324 | 44.98 | 181.30 | 49.47 | 138.23 | 432.14 | 88.52 | 557.84 | 6.91 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 110% | 135% | 123% | 93% | | 2161% | 67% | 209% | 115% |

Menu 17

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Beef Teriyaki | 335 | 33.07 | 21.26 | 12.18 | 86.89 | 10.69 | 19.33 | 21.15 | 4.63 |
| Chow Mein Noodles | 134 | 3.75 | 17.10 | 5.89 | | 0.00 | 5.00 | 6.00 | 1.17 |
| Cheese and PB Cracke | 185 | 4.60 | 23.10 | 9.24 | | 0.00 | 10.00 | 35.20 | 1.11 |
| Jam | 77 | 0.11 | 20.10 | 0.03 | 0.00 | 0.30 | 0.00 | 2.00 | 0.06 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | 10.00 | | 36.00 | 0.36 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access B | | | | | | | | | |
| Grnd Red Pepper | 6 | 0.24 | 1.13 | 0.35 | 0 | 1.59 | 2.12 | 2.97 | 0.16 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Candy (tootsie or carar | 132 | 0.70 | 25.15 | 3.53 | 0.00 | 0.00 | 1.53 | 24.10 | 0.50 |
| | | | | | | | | | |
| Total | 1336 | 48.75 | 188.25 | 43.06 | 91.92 | 59.37 | 45.67 | 299.19 | 9.38 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 111% | 146% | 128% | 81% | | 297% | 34% | 112% | 156% |

Menu 18

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Turkey/Potatoes | 227 | 30.98 | 12.11 | 5.90 | 74.99 | 1.11 | 6.49 | 29.56 | 1.94 |
| Combos (cheddar) | 236 | 5.02 | 33.91 | 8.62 | -- | 0.00 | 4.08 | 100.40 | 0.47 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Choc Sports bar | 188 | 8.50 | 30.63 | 3.94 | 1.50 | 0.25 | 0.48 | 21.83 | 0.98 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1244 | 60.87 | 151.87 | 44.03 | 76.49 | 73.36 | 77.75 | 387.35 | 6.11 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 104% | 183% | 103% | 83% | | 367% | 58% | 145% | 102% |

Menu 19

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Beef w/Mushrooms | 323 | 32.76 | 12.16 | 15.20 | 105.40 | 3.35 | 22.17 | 45.11 | 3.73 |
| Yellow & Wild Rice | 171 | 4.82 | 28.95 | 3.90 | 0.00 | 1.25 | 38.59 | 20.53 | 1.05 |
| Oatmeal Cookie | 279 | 3.22 | 33.55 | 14.73 | 15.42 | 0.11 | 4.31 | 12.94 | 1.13 |
| Jam | 77 | 0.11 | 20.10 | 0.03 | 0.00 | 0.30 | 0.00 | 2.00 | 0.06 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Cocoa | 179 | 2.97 | 31.10 | 6.13 | 2.00 | 49.80 | 5.00 | 65.00 | 0.85 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1233 | 47.60 | 158.39 | 46.33 | 122.82 | 54.81 | 114.93 | 353.17 | 8.69 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 103% | 143% | 108% | 87% | | 274% | 86% | 132% | 145% |

Menu 20

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Spaghetti w/meat sce | 380 | 19.52 | 36.40 | 16.96 | 44.96 | 5.80 | 110.32 | 76.05 | 2.68 |
| ***Toasted PB Cracker | 200 | 4.29 | 21.40 | 11.40 | | | | 57.10 | 2.06 |
| Cheese Spread | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Dairy Shake | 416 | 18.70 | 65.00 | 9.00 | | | 12.00 | 400.00 | 0.28 |
| MRE Charms (99) | 105 | 0.01 | 27.6 | 0.04 | -- | 0 | 0 | 5 | 0.03 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1509 | 52.08 | 186.05 | 61.34 | 87.59 | 35.89 | 137.34 | 909.16 | 7.11 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 126% | 156% | 127% | 115% | | 179% | 103% | 341% | 118% |

Menu 21

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Chicken Tetrazzini | 239 | 26.29 | 20.61 | 5.73 | 53.52 | 11.11 | 22.25 | 46.36 | 1.47 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| Cracker | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Jelly | 77 | 0.11 | 20.10 | 0.03 | 0.00 | 0.30 | 0.00 | 2.00 | 0.06 |
| **Dairy Shake** | 416 | 18.70 | 65.00 | 9.00 | | | 12.00 | 400.00 | 0.28 |
| Access E | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Tea bag | 2 | 0.10 | 0.40 | 0.00 | | | 0.70 | 5.00 | 0.04 |
| Cream Sub | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Sugar | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| | | | | | | | | | |
| Total | 1202 | 52.31 | 168.59 | 34.27 | 106.50 | 11.41 | 98.43 | 678.19 | 5.23 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 100% | 157% | 115% | 64% | | 57% | 74% | 254% | 87% |

Menu 22

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| **Jumbalaya | 260 | 27.50 | 12.90 | 10.40 | | 8.33 | 0.24 | 49.60 | 3.04 |
| Candy | 233 | 3.00 | 36.75 | 8.13 | 5.00 | 10.00 | | 36.00 | 0.36 |
| Choc Cov Cookie | 210 | 2.29 | 25.85 | 11.28 | 8.71 | 0.19 | 2.82 | 26.93 | 1.05 |
| Cheese | 173 | 5.59 | 0.68 | 16.70 | 42.60 | 30.00 | 6.02 | 181.00 | 0.18 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1242 | 42.39 | 145.05 | 53.77 | 56.34 | 85.31 | 18.42 | 490.00 | 6.58 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 104% | 127% | 99% | 101% | | 427% | 14% | 184% | 110% |

Menu 23

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Chic Cavatelli | 274 | 21.61 | 24.50 | 10.33 | 82.32 | 7.98 | 5.38 | 30.35 | 1.50 |
| Pound Cake | 288 | 3.38 | 35.95 | 13.16 | 52.98 | 0.00 | 18.62 | 17.23 | 1.51 |
| MRE Pretzel Sticks (99 | 101 | 2.42 | 20.9 | 0.89 | -- | -- | 2.08 | 4 | 1.35 |
| Peanut Butter | 258 | 12.60 | 8.79 | 19.20 | 0.00 | 35.30 | 21.50 | 21.50 | 0.78 |
| Wheat Snack Bread | 186 | 3.54 | 26.06 | 5.79 | 0.03 | 0.09 | 8.88 | 186.41 | 1.72 |
| Beverage Base | 132 | 0.04 | 33.90 | 0.02 | 0.00 | 36.70 | 0.34 | 6.46 | 0.07 |
| Access A | | | | | | | | | |
| Tobasco | 0 | 0.03 | 0.06 | 0.02 | 0.00 | 0.00 | 0.12 | 0.60 | 0.06 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | |
| Total | 1288 | 44.03 | 159.01 | 50.84 | 135.32 | 80.07 | 56.92 | 269.56 | 7.10 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 107% | 132% | 108% | 95% | | 400% | 43% | 101% | 118% |

Menu 24

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| Meatloaf w/gravy | 326 | 29.10 | 18.40 | 14.90 | 74.94 | 6.30 | 9.37 | 35.22 | 2.39 |
| **Mashed Potato | | | | | | | | | |
| Toaster Pastry | 204 | 2.30 | 34.20 | 6.65 | -- | -- | 40.00 | 12.00 | 1.75 |
| Jelly | 77 | 0.11 | 20.10 | 0.03 | 0.00 | 0.30 | 0.00 | 2.00 | 0.06 |
| Cracker (veg) | 154 | 3.30 | 23.62 | 4.90 | 0.00 | 0.00 | 44.74 | 204.00 | 1.71 |
| Cocoa | 179 | 2.97 | 31.10 | 6.13 | 2.00 | 49.80 | 5.00 | 65.00 | 0.85 |
| Access B | | | | | | | | | |
| Grnd Red Pepper | 6 | 0.24 | 1.13 | 0.35 | 0 | 1.59 | 2.12 | 2.97 | 0.16 |
| Coffee | 4 | 0.21 | 0.70 | 0.01 | -- | 0.00 | 0.00 | 2.00 | 0.07 |
| Cream Sub | 22 | 0.19 | 2.15 | 1.42 | 0.00 | 0.00 | 0.00 | 1.00 | 0.03 |
| Sugar | 23 | 0.00 | 6.00 | -- | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Candy Caramels | 132 | 0.70 | 25.15 | 3.53 | 0.00 | 0.00 | 1.53 | 24.10 | 0.50 |
| | | | | | | | | | |
| Total | 1127 | 39.12 | 162.55 | 37.92 | 76.94 | 57.99 | 102.75 | 348.29 | 7.52 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| %MRDA | 94% | 117% | 111% | 71% | | 290% | 77% | 130% | 125% |

| | Cals | Prot (g) | Carb (g) | Fat (g) | Chol (mg) | Vit C (mg) | Fola (mcg) | Calc (mg) | Iron (mg) |
|---|---|---|---|---|---|---|---|---|---|
| MRE XXII AVG | 1275 | 44.85 | 164.79 | 49.65 | 92.22 | 102.83 | 106.43 | 510.98 | 7.91 |
| MRDA | 1200 | 33.30 | 147.00 | 53.30 | | 20.00 | 133.00 | 267.00 | 6.00 |
| % MRDA | 106% | 135% | 112% | 93% | | 514% | 80% | 191% | 132% |

# APPENDIX B

## HEALTHY FOOD SUGGESTIONS

1) **General Rules of Thumb:**
   a) Must be **≤ 3 grams of fat per package**
   b) Must meet **at least one of the following** criteria:
      (1) Cannot have sugar, corn syrup or another sweetener as the first ingredient;
      (2) Must have at least 10% of a Daily Value for a nutrient, such as Vitamin A, Vitamin C, Iron or Calcium; or
      (3) Must have at least 2 grams of fiber per serving
   c) Recommend foods high in fiber (>5 g) and low in sodium (<140 mg) per serving

2) **Check It Out guidance on healthier choices:** (AFI 40-104, AF Form 3587/3588)
   **a) Entrees:** ≤ 15 g fat (cooked w/o added fat), ≤ 100 mg cholesterol
   **b) Non-Entrees**: ≤ 3 g fat (cooked w/o added fat), ≤ 10 mg cholesterol
   **c) ≤ 30 % total calories from fat**

3) **More Specific Guidance:**

   ***a) Healthy shopping guidelines: (Source: SupermarketSavvy.com references FDA's definition of "healthy" as the following:)***

   **BAGELS/ENG MUFFINS/MUFFINS/TORTILLAS**: ≤ 3 g fat; serving size: 1 slice/50 g
   **BAKERY PRODUCTS**: ≤ 3g fat, serving size: 4 oz/1 small slice
   **BEANS/LEGUMES**: ≤ 3 g fat, ≤ 480 mg sodium; serving size: ½ cup cooked
   **BEVERAGES**: 0 g fat, no added sugar; serving size: 1 cup
   **BREAD**: ≤ 3 g fat, ≤ 1 g saturated fat, ≥ 2.5 g fiber; serving size: 1 slice/50 g
   **BREAKFAST BARS/PASTRIES**: < 3 g fat; serving size: 1 bar
   **CHEESE (HARD/SOFT)**: ≤ 3g fat, ≤ 480 mg sodium; serving size: 1 oz/1 slice
   **CHIPS/PRETZELS**: ≤ 3g fat, ≤ 1g saturated fat; serving size: 1 oz
   **COLD CEREAL**: ≤ 3 g fat, ≥ 2.5 g fiber; serving size: 1 oz or 1/3 – 1.5 cup
   **CONDIMENTS:** ≤ 1 g fat, ≤ 360 mg sodium
   **COOKIES**: ≤ 3g fat, serving size: 1 oz
   **CRACKERS:** ≤ 3g fat, ≤ 1g saturated fat; serving size: varies—check label
   **EGGS/EGG SUB**: ≤ 3g fat, ≤ 1g saturated fat; 0 mg chol; serving size: 1 egg/equivalent
   **ENTREES**: ≤ 30% fat, ≤ 10% saturated fat, ≤ 90 mg chol, ≤ 600 mg sodium
   **FISH/SHELLFISH**: ≤ 5g fat, ≤ 2g saturated fat; serving size: 3.5 oz raw
   **FRUIT**: 0 g fat, no added sugar
   **GRAINS/FLOURS:** ≤ 3 g fat, 100% whole grain; serving size: ½ cup
   **HOT CEREAL**: ≤ 3 g fat, ≥ 2.5 g fiber
   **ICE CREAM/FROZEN YOGURT/SHERBET/SORBET/ITALIAN ICES**: ≤ 3 g fat; serving size: ½ cup
   **JAM/JELLY**: 0 g fat, serving size: 1 Tbsp regular, 2 Tbsp lite
   **MARGARINE/SPREADS**: ≤ 1 g saturated fat, claims trans fat-free; serving size: 1 Tbsp
   **MEAT (BEEF/POULTRY/PORK/FISH/GAME)**: ≤ 5g fat, ≤ 2g saturated fat; < 95 mg chol; serving size: 3.5 oz raw with fat trimmed
   **MILK**: ≤ 3g fat, ≤ 1g saturated fat; serving size: 1 cup
   **NUTS/SEEDS**: unsalted, ≤ 2 g saturated fat; serving size: 1 oz (high fat—moderation)
   **OILS**: ≤ 2 g saturated fat, more (or equal) MUFA than PUFA; serving size: 1 Tbsp
   **PANCAKE/WAFFLES**: ≤ 3 g fat, serving size: 1 unit
   **PASTA SAUCE**: ≤ 3g fat, ≤ 1g saturated fat; serving size: ½ cup
   **POPCORN/RICE CAKES**: ≤ 3g fat, ≤ 1g saturated fat; serving size: 3 cups popped
   **PROCESSED MEATS/ANALOGS**: ≤ 3 g fat, ≤ 1 g saturated fat; serving size: 3.5 oz
   **PUDDING/GELATIN**: ≤ 3g fat, serving size: ½ cup
   **SALAD DRESSING:** ≤ 3 g fat, ≤ 1 g saturated fat, serving size: 2 Tbsp

**SEASONINGS:** any without salt
**SOUP**: ≤ 3g fat, serving size: 1 cup prepared
**SPREADS**: < 4 g saturated fat, 25% reduced fat; serving size: 2 Tbsp (high fat—moderation)
**VEGETABLES:** ≤ 3 g fat, serving size: 1 cup raw, ½ cup cooked

***b) Energy Bars:***

***(1)*** **Bars** should have: ≤ 250 calories, ≤ 3 g saturated fat, ≤ 8 g fat, ≤ 20 g sugar, ≥ 7 g protein, ≥ 3 g fiber. (***Source – 15 Aug 03, Rubin, Karen W., "Start the Day Off Right: Healthy Breakfast," Foodservice Director, p. 38)***

(2) **High Protein Bars**: 15-30 g protein (preferably from whey, eggs, soy or casein), ≤ 5-7 g fat. (***Source – Applegate, Liz, "Encyclopedia of Sports & Fitness Nutrition.")***

(3) **Bars for Women**: < 200 calories, preferably fortified with nutrients women's diets lack (i.e., calcium, folic acid, iron), 8-15 g protein, < 5 g saturated fat. (***Source – Applegate, Liz, "Encyclopedia of Sports & Fitness Nutrition.")***

***(4)*** **Meal Replacement Bars**: should have ~35% of RDAs for vitamins & minerals, ≤ 5 g fat, ≥ 8-15 g protein. (***Source – Applegate, Liz, "Encyclopedia of Sports & Fitness Nutrition.")***

***c) FDA: What is the definition of "Healthy" when used on a food label?***

A "healthy" food must be low in fat and saturated fat and contain limited amounts of cholesterol and sodium. In addition, if it's a single-item food, it must provide at least 10 percent of one or more of vitamins A or C, iron, calcium, protein, or fiber. Exempt from this "10-percent" rule are certain raw, canned and frozen fruits and vegetables and certain cereal-grain products. These foods can be labeled "healthy," if they do not contain ingredients that change the nutritional profile, and, in the case of enriched grain products, conform to standards of identity, which call for certain required ingredients. If it's a meal-type product, such as frozen entrees and multi-course frozen dinners, it must provide 10 percent of two or three of these vitamins or minerals or of protein or fiber, in addition to meeting the other criteria. The sodium content cannot exceed 360 mg per serving for individual foods and 480 mg per serving for meal-type products.