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UNIT 17

SPORTS NUTRITION APPROACH CONCEPTS AND EXAMPLES

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Learning Objectives

After completing this unit, you will be able to:

- Define and describe key terms related to sports nutrition approaches and concepts;
- Understand the Dynamic Nutrition Approach; and
- Discuss the Athlete-Type nutrition examples.



Introduction

The Dynamic Nutrition Approach is a scientifically founded nutrition model, which addresses the many aspects of nutrition, and provides a logical approach to follow based on exercise physiology, anatomy, and biochemistry of athletes. As you have read about in previous units, as with any scientific model, there is always room for growth related to any new discoveries and modification based on an individual athlete's specific needs. This is a vital consideration: any examples, guidelines, models, or other approaches in this course or other publications need fine-tuning to meet the specific needs of an athlete. What the Dynamic Nutrition Approach can offer is a framework to build a personalized sports nutrition plan from, with an awareness of the previously stated limitations and of the need for personalization and under a physician's and/or other health professionals' supervision.

For example, consider two athletes from different sports, an American football lineman weighing 300 pounds and a marathon runner weighing 150 pounds. The Dynamic Nutrition Approach provides sports nutrition examples for both types of athletes who have differences in nutritional requirements. This approach is dynamic in several ways that are reviewed in this unit, to provide a starting point example to build from and to personalize calories, macronutrients, micronutrients, and ergogenic bioactive substances. Note that the Dynamic Nutrition Approach is meant for healthy athletic adults and is not intended to treat any disorder or replace the advice of an athlete's physician, nutritionist, or another health practitioner.

Furthermore, the foods and number of meals in the examples are not intended to be followed exactly but do provide a potential starting



point to build a personalized nutrition program from. Instead of five meals/snacks (eating occasions) used in the examples, some athletes may determine that spreading out their daily food intake requires six meals/snacks (eating occasions) per day. In addition, each athlete will have different food preferences that need to be considered. Remember that a major reason the many prescribed diets in books fail is that after a few weeks of people trying to follow them, they may give up simply because they do not like the foods in these plans, and they do not have the expert understanding or supervision to make food substitutions. Moreover, it is important to note that the percentages of macronutrients in plan examples can be fine-tuned based on an individual's exact requirements determined by qualified expert examination. Similar to creating an effective personalized training program, the crucial word is "dynamic." Any information in this unit or other units is not intended for any adults with diseases or women who are pregnant or lactating or for people with other health conditions that require extra and/or special medical attention.

Sports Nutrition Legal Aspects

When you deal with others' health, a variety of legal issues exist that most fitness trainers and other health professionals are aware of. ISSA-certified fitness trainers are educated about many of these issues and procedures to address them, including liability insurance, client forms and disclosures, doctor approvals, team approvals, and limiting personal training activities within the applicable legal boundaries that may apply for health professionals. Similar and additional

legal issues related to sports nutrition can range from local, state, and federal health professional requirements to sports organization rules to lawsuit case law-based concerns for example. Although there may be a general position that developing and prescribing a sports nutrition program or providing input on an existing nutrition program of an adult client in good health, without diseases, may be permitted by non-licensed health professionals, this is something that should be verified in your location/venue.

Check with your liability insurance company about these issues and practice limitations and how to best effectively communicate concerns to your adult clients that protect your mutual interests from an insurance coverage standpoint, in addition to the other parties who may be involved. Suggestions or recommendations about sports nutrition products can be of legal concern, too. Consultation with the athlete's team compliance officer and team-published rules regarding sports nutrition guidelines and prohibitions should be gathered and reviewed to be knowledgeable about an athlete client's team and other legal requirements.

It is typical for athletic/fitness centers and athletic teams to have doctors and other licensed health professionals involved with the athlete training program development and activities. Working under the supervision of the team and/or clients doctor is important because doctors are the best equipped to identify via testing and, from their training, any health concerns that might arise—including but not limited to nutritional imbalances or deficiencies that could occur during intensive athletic training or stem from a person's special needs. However,

realistically, no guarantee of 100 percent safety and efficacy can be made for sports example nutrition approaches and products. There may be known and unknown health hazards related to food allergies, food intolerances, food sensitivities, microbial contamination, and chemical contamination, for example, that typically need to be considered. In addition, the demands of an adult athlete's training program and daily schedule can impose time constraints for achieving adequate nutrition intake—potential mission impossible conditions that hinder achieving an optimum sports nutrition program. Training schedule modifications can be worth investigating, as athletes typically have training programs that are unbalanced and/or excessive. “Optimum” training and nutrition programs for athletic performance are the goal, not excessive or extreme programs that can be counterproductive and even unhealthy, for example, too much resistance training or too much caffeine.

Effective communications with clients entails that the clients realize that a sports nutrition program takes time to develop at that, at times, some trial and error can be expected. Foods, including sports nutrition product suitability and usage, should be determined by the clients, their doctors, and with consultation with their team and sports organizations to determine these products are legal, safe, and effective. A starting point can be to first evaluate an athlete's training and nutrition program, to determine whether there are any obvious areas of concern with the nutrition basics, such as following a healthy diet, adequate caloric intake, carbohydrates, protein, essential fatty acids, water (hydration), vitamins and minerals; and the use of safe, effective, permitted, and otherwise legal sports nutrition

products. As the legal and medically supervised sports nutrition program continues to develop, it is a good idea for you to reconfirm legal, regulatory compliance, team rules, and scientific aspects each season. Additionally, it is crucial to clearly communicate to athlete clients about the need to maintain an “(illegal) drug-free” sports training and nutrition program. “Illegal drugs” may include illegal recreational drugs and legal drugs banned by sports organizations.

Intent of Examples and Guidelines

As noted throughout this course, and by independent experts and organizations such as the International Olympic Committee in its Nutrition in Sport Publication (2000), it is difficult and challenging to make specific recommendations that will meet the needs of all individuals in all situations. Therefore, the suggested approach is to formulate general guidelines about sports nutrition, with the understanding that these guidelines need to be adapted to best suit an individual athlete, under qualified health professional supervision. Thus, to summarize, the intent of examples, guidelines, and information from research studies; Health Canada's ingredient monographs; and other independent sources is solely academic and not meant to be used exactly for any individual person. Clinical practice approaches by qualified health professionals can be required to determine the exact sports nutrition needs of an individual, and monitor their health and athletic performance, adjusting individualized sports nutrition programs as need, on a case-by-case basis.

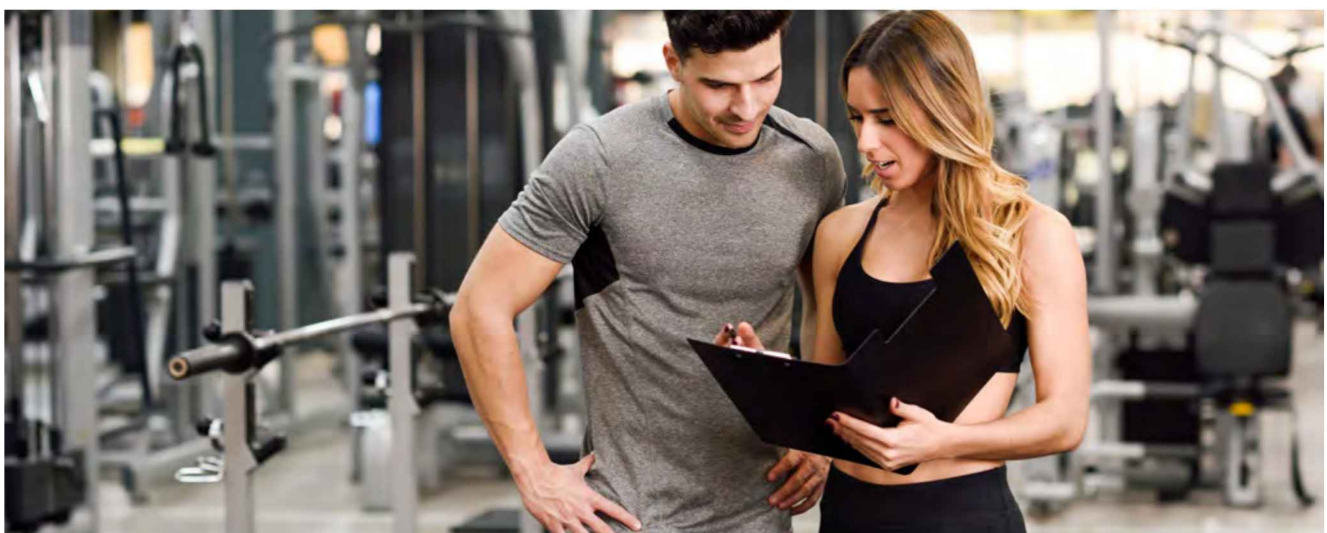
Sports Nutrition Is a Skill

What the thousands of scientific studies conducted over the past decades have shown is that when a person engages in athletic training and competition, the demands of physical activity will create above average nutrition requirements. Then, over the months and years and as the body develops, there are expected to be additional changes, requiring evaluation and updating of the nutrition requirements. Athletic conditioning therefore influences what food and supplements will work best for a specific athletic training program. For example, a marathon runner needs to eat different amounts of protein, carbohydrates, and fat than a power-lifter does. However, all athletes need to follow the rules of healthy eating and modify their dietary intakes so they can achieve maximum performance. It will take an ongoing effort to establish, fine-tune, maintain, and evolve an athlete's sports nutrition program.

It will also take time for fitness trainers and other health professionals to develop sports nutrition skills. It can take years of expert supervised training to become an expert in sports nutrition.

If you are new to sports nutrition, working with established experts is a good start. If you are already a sports nutrition expert, building and reconfirming your skills with courses like this and other continuing education efforts will help fine-tune these skills, as will your own research review education efforts.

Forming a local sports nutrition expert group/club can provide additional benefits for your sports nutrition skill development, and it can be fun to share knowledge with colleagues. It is sometimes useful to conduct a retrospective analysis of your approaches, along with being progressive. For example, look at what you were doing previously with your athlete clients and/or personal sports nutrition programs. Then run an analysis to confirm the time-tested sports nutrition practices and products that continue to work best. Doing so will also verify which practices or products did not produce measurable benefits and help you determine what can be applied for future sports nutrition program optimization.



Demystifying Nutrition

By this point in your learning efforts, you have discovered the many facets of nutrition and special considerations related to sports nutrition. You know about the macronutrients, micronutrients, and ergogenic nutrients. You know that a person's individual metabolism and activity levels determine his or her total caloric needs along with the amount of protein, carbohydrates, and fat to be consumed. As you read this unit, you will learn how to synthesize and use your new nutrition knowledge by using the Dynamic Nutrition Approach examples as a starting point to be personalized. Included is a general review of existing nutrition plans you have been introduced to. Look at why they may or may not be valid and answer the question:

Why So Many Diets?

This is the number one question that arises from students and clients related to sports nutrition and weight-loss diets. The answer is a simple one as it relates to weight-loss diets and to what most weight-loss diets share in common.

- First, the many weight-loss diets that currently exist prescribe a daily caloric intake, which is less than the total daily calories used. Following a calorie-restricted (deficient) diet will obviously result in some type of weight loss.
- Second, these fad weight-loss diets provide you with a structured plan to follow. When you have a problem with food control and overeating, structure is your best friend. Therefore, following a structured eating plan, which is low in calories, will result in weight loss.

With thousands of foods to choose from, you can easily see how many diets can exist using various food combinations and dieting angles. However, upon close examination, you'll see that many of these trendy diets may be deficient in important macronutrients and micronutrients. Most of these diets do not provide adequate nutrition and are not meant for individuals in a fitness or athletic training program because of this lack. These fad weight-loss diets can be too low in protein or carbohydrates, and some of them are too high in fat. They can also leave the dieter in a poor state of health, with a damaged metabolism from the lack of one or more essential nutrients. For example, fad diets low in protein can cause an unhealthy loss of lean body mass.

Typically, the weight lost from following a low-calorie fad diet consists of water weight, fat, and muscle mass. This is where the problem lies. Loss of muscle mass reduces the body's ability to burn calories. Therefore, when the fad dieter has lost weight, his or her body has a lower capacity to burn calories. As most dieters soon return to their old eating habits, they tend to gain more weight as body fat and can end up having a higher percentage body fat, even if they do not return to their previous weight. When you see what happens to a dieter who takes his or her body through a few cycles of fad diets, you can see why many adults have difficulty losing weight the third, fourth, and fifth times. Unit 18 presents a scientifically based and clinically verified approach to losing fat, one that also preserves and builds up the body's precious lean body mass. The unit also presents some of the nutritional diet aids that scientific studies have discovered can assist in the weight-loss process.

When you apply your new nutritional knowledge to understanding the nutrition plans that exist, you will be able to see what their good and bad points are. Remember, as humans, we can survive on different kinds of diets. But as stated in Unit 1, this course is not about tolerating mere survival diets; it is about applying scientific nutritional knowledge and following a quantitative nutrition plan best suited for healthy athletic performance needs.

What about The Many, Many Different Diet Approaches?

Each time this course was updated, questions arose from students about the various diet approaches published in books and offered as programs. One general answer to these is to apply your nutrition knowledge to determine what these diets supply in terms of total daily calories, amounts of macronutrients and the other essential nutrients, and other beneficial nutrition substances that may promote health and perhaps athletic performance benefits, too. When you break down and analyze the fad diets, you will find that the answers you seek will reveal themselves. When you strip the labels/titles and focus on understanding the nutrients the diets provide, you will see that some elements of these diets may even apply to a sports nutrition program, such as focusing on eating healthy whole foods. However, it's clear from analyzing the many diets over the decades that

most are too low in calories; are low in certain essential nutrients required in higher amounts by athletes, usually do not include the ergogenic ingredients, and can be insufficient and/or unbalanced in the required macronutrient profiles and amounts athletes need.

Note that some of these diets may be classified as elimination diets, for example the ones that eliminate a type or types of foods or food substances. There may be many reasons for following these; some are trendy, or some may have a valid medical purpose, like with food allergies or intolerances. These types of issues are ideally addressed by a person's doctor, nutritionist, and other related health professional to accurately determine whether elimination of certain foods is warranted for medical reasons.



Limitations of Research Studies

In terms of the growing body of sports nutrition research and related research studies, some is useful and some not. In many instances, research studies that use human subjects, animals, or test tubes are not necessarily designed or intended to be directly applied to the general population. Carefully read the actual research studies that attract your interest and the ones you are considering for application in a sports nutrition program. This means tracking down a copy of the study mentioned in articles or of an abstract found in a database like PubMed. You can even contact the researchers directly via their e-mail contact to request reprints of the study you are interested in and for follow-up questions. Sometimes they will respond, sometimes not. If not, studies are usually available for purchase online by the journals or from the service that offers a wide array of journal articles.

Another consideration is related to the type of subjects used in the research, for example, type of sport, and what level ability, such as recreational, college, professional, or Olympic. In addition, consider that there are specific types of sports and athletes for certain types of products, such as endurance energy drinks. Although there are certain similarities among athletes of different sports, it is not expected that a 150-pound long-distance athlete will have the same energy requirements or digestion and utilization ability compared with that of a 300-pound football player. Thus, when applying research results among the different athletes, think about how these common sports nutrition areas apply to the specific types of athletes,

athlete types, and generally. In other words, not all research and research results are intended to be used and may not apply to everybody.

In addition, be research study-minded when working with clients. After reading several research studies and becoming familiar with the formats and methods, you can take this approach with your clients. For example, when trying a nutritional intervention, like extra carbs or an ergogenic supplement like creatine, create a record-keeping approach to track improvements in athletic performance, exercise performance, or body composition changes to confirm the intervention is working. Before you know it, you may have enough data to publish in an article with ISSA or even to submit to a scientific journal. Teaming up with your colleagues can speed up the process and provide even more evidence via more subjects.

Sports Nutrition Plan Approach Examples

When this course was introduced in the 1990s, the situation regarding viable, scientifically based sports nutrition approaches was bleak, hit-or-miss, and evolving. Sure, there were some books along with massive amounts of misinformation or misapplication in the magazine articles. For example, while not technically an athletic performance sport, bodybuilding training and the associated nutrition and supplement approaches tend to dominate magazines, the Internet, and books. Although people active in the sport of bodybuilding are among the most dedicated types of athletes, building supersized muscles and achieving very low body fat levels are not primary goals in most other



athletic performance sports. However, when non-bodybuilding athletes are on their own, they often use these popularized bodybuilding nutrition and training approaches, which are not the most effective for them to achieve their athletic performance goals. Muscle size and low body fat levels are typically a side effect of a performance athlete's training, not the goal. The functioning and condition of the muscles to achieve the required athletic performance is a crucial goal while simultaneously optimizing muscle size and body fat levels.

Similar to other ISSA pioneering sports and fitness courses, thousands of health professionals throughout the world were influenced by this course and other education efforts by the authors. You will frequently find when reading articles and books that some of these expert authors and researchers have taken this course and are ISSA certified. A consideration when reviewing and evaluating sports nutrition and other nutrition approaches is to apply

the scientific principles learned in this and other courses, scientific studies, experience of colleagues, and your direct experience. It is impossible to create a general sports nutrition plan in writing that will be best suited for everybody. Examples in this course, other courses, and elsewhere are typically intended to be starting points that need to be personalized under doctor supervision and with direction of other applicable health and wellness professionals, which fitness trainers are part of, focused on determining an athlete's individual specific needs and personalized nutrition program, and for adequate medical monitoring of health and athletic performance.

Dietary Guidelines (2015–2020) and the Dynamic Nutrition Approach

As presented in Unit 16, healthy nutrition should form the basis of a sports nutrition program. When selecting foods to include in a sports nutrition program to provide the required carbohydrates, protein, fats, fiber, other essential nutrients, and other health-promoting substances, refer to the Dietary Guidelines to refine your selections. Moreover, consider new research findings along with findings implemented in other countries about the health-promoting foods and food substances, including dietary supplements. Research studies examining nutrition status of competitive adult athletes consistently report inadequacy of some essential nutrients and total daily calories. A continual effort must be made by the athlete and health professional team to achieve sports nutrition success. The following box provides a summary of the Key Recommendations of the Dietary Guidelines to consider.

Key Recommendations

Consume a healthy eating pattern that accounts for all foods and beverages within an appropriate calorie level.

A healthy eating pattern includes:

- A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other
- Fruits, especially whole fruits
- Grains, at least half of which are whole grains
- Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages
- A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products
- Oils

A healthy eating pattern limits:

- Saturated fats
- trans fats
- added sugars
- and sodium

Key recommendations that are quantitative are provided for several components of the diet that should be limited. These components are of particular public health concern in the United States, and the specified limits can help individuals achieve healthy eating patterns within calorie limits:

- Consume less than 10 percent of calories per day from added sugars
- Consume less than 10 percent of calories per day from saturated fats
- Consume less than 2,300 milligrams (mg) per day of sodium

Based on the general Key Recommendations, some healthy sports nutrition dilemmas may arise related to added sugars and salt intake. For example, endurance and other athletes training many hours per day and/or who have long duration events in which they expend high levels of glycogen-depleting energy demands and lose potentially detrimental amounts of electrolytes

via large amounts of sweating can require and benefit from simple carbohydrate and electrolyte beverages that result in higher added sugar and higher sodium daily intakes, especially during the athletic preseason and season. In general, most athletes will need higher sodium intakes of more than 2,300 mg per day, as previously reviewed in Unit 8. These issues are something



to consider, especially with athletes who may have family history or personal issues with health concerns related to added sugars and salt (sodium) dietary intake.

In addition, note that some sports nutrition products, like the nutrient powders and bars, may contain “added sugars.” This is something to look for when trying to maintain the balance of healthiest levels of adequate intake. The Dietary Guidelines notes the following regarding added sugars, “Healthy intake: Added sugars include syrups and other caloric sweeteners. When sugars are added to foods and beverages to sweeten them, they add calories without contributing essential nutrients. Consumption of added sugars can make it difficult for individuals to meet their nutrient needs while staying within calorie limits. Naturally occurring sugars, such as those in fruit or milk, are not added sugars. Specific examples of added sugars that can be listed as an ingredient include brown sugar, corn sweetener, corn syrup, dextrose, fructose, glucose, high-fructose corn syrup, honey, invert sugar, lactose, malt syrup, maltose, molasses, raw sugar, sucrose, trehalose, and turbinado sugar.” With a little work, combining whole foods sources, like fruits and no-added-sugar fruit juices, may serve to provide healthier simple carbohydrate sources, as might using the prepared sports nutrition products.

Daily Training Session versus Athletic Event Nutrition

For most sports, daily training dominates in terms of hours of physical activity versus during athletic event/competition days. The basic plan examples are intended as base diet starting point examples for day-to-day training, but can also be suited for competition preparation. In general, for the day of athletic competitions or events, and perhaps the previous day(s) too, higher carbohydrate can benefit most athletes of all types. For some of the model examples, this could mean increasing the daily carbohydrate content by 5 to 10 percent. Aside from helping to keep the body’s glycogen levels saturated and high-energy glucose available to meet the athlete’s energy demands, the higher carbohydrate diet is typically easier to digest and facilitates stomach emptying, which is an important factor for athletic performance. However, note that for some weight-class sports, coaches and athletes sometimes break the rules of sports nutrition by using potentially hazardous methods of dehydration and glycogen depletion to keep body weight lower than normal. These means should be avoided.

Speaking of glycogen, remember that even for sports that are shorter in duration, having the body’s glycogen supplies loaded up has certain metabolic advantages, versus having the body’s glycogen supplies low or depleted. When glycogen supplies are too low and run out during training or athletic competition, the body’s mental and physical performance is impaired, and athletic performance can be compromised/reduced. Immunity can be adversely affected, too. But when glycogen stores are simply low, a metabolic distraction or conflict can be caused

in which the glycogen-building biosynthesis pathways are highly active. During physical activity, energy production for peak athletic performance may be impaired. Low body glycogen stores may even have adverse effects, disrupting cognitive function and mood. It is certainly one of the many nutritional balancing acts that needs to be considered for a sports nutrition program.

ISSA's 1-2-3 Eating Rule of Thumb

If you are an ISSA-certified fitness trainer, then you are probably wondering how the 1-2-3 rule fits into this Dynamic Nutrition Approach. This general nutritional intake guideline, of approximately 1 part fats, 2 parts protein, and 3 parts carbohydrates, is valid for most people

who are weight training and exercising to lose excess body fat, build muscle, and maintain health. This approach is indeed revolutionary and evolutionary in many ways. (ISSA-certified fitness trainers learn about this in the CFT certification course.) If you follow this simple rule, you and your clients will maintain a diet that is low fat, moderate in protein, and high in carbohydrates, or another way to consider this would be: optimum fat, optimum protein, and optimum carbohydrates for an exercising individual. The lesson of the 1-2-3 rule is to have an easy way to put a priority on your nutritional thinking when purchasing foods, preparing meals, and eating out. This ratio can be modified depending on an individual's sports performance or fitness goals. The 1-2-3 approach is part of the Dynamic Nutrition Approach's foundation.



The Dynamic Nutrition Approach: A Bio-Energetic Model to Performance Nutrition

When athletes train for a sport, they are conditioning muscles to produce strength and contractions that generate motion specific to the physical demands of the sport. For example, a marathon runner needs to display a lower intensity muscular output that can be sustained for long periods. Compare this to the explosive strength needed for a hundred-meter sprinter to run a short distance as fast as humanly possible. In the sprinter, muscles are much larger compared with those of other runners, and there is a high-intensity muscle output over a very short time. This explosive strength generates tremendous power. Therefore, the type of physical conditioning results in promoting athletic performance abilities and shapes the size and bio-energetic conditioning of muscles. Other tissues and systems of the body also respond and develop in a sport-specific way. This affects what type of muscle fibers athletes develop and their metabolic functioning, in other words, anatomy and exercise/sport physiology. These are crucial concepts to consider and will help you in sports nutrition and athletic training and fitness development endeavors.

How does exercise affect muscle fiber development and composition?

Skeletal muscles are composed of two main types of muscle fibers, which are classified as slow-twitch and fast-twitch by exercise physiologists. Slow-twitch muscle fibers are the ones preferentially developed when you undertake long-distance training. This includes

walking, running, cycling, or swimming long distances, usually distances that take several or more minutes or longer to accomplish. However, running a mile in under four minutes has highly developed oxidative muscle fiber capacity too. This type of physical conditioning results in shaping muscles that are small and have a great many mitochondria packed into each slow-twitch muscle fiber. The muscle tissues consist of a high proportion of cardiovascular components needed to supply oxygen for aerobic metabolism and quickly clear away metabolic wastes. A well-conditioned oxidative athlete burns a great deal of energy-rich fatty acids for energy and can maintain muscle output for a long period. Glucose is also an important energy source for oxidative athletes, as are amino acids, such as the BCAAs.

Strength athletes require conditioning that will preferentially develop fast-twitch muscle fibers. Fast-twitch muscle fibers are capable of a large output of strength over a short period. However, metabolic waste products build up and cause muscle fatigue to quickly set in and impair strength performance. Fast-twitch muscle fibers have some oxidative capacity, the extent of which depends on training methods. The large muscles of power athletes are conditioned to utilize anaerobic energy pathways, such as the immediate energy systems, which use readily available adenosine triphosphate (ATP) and creatine phosphate (CP). Additionally, energy is derived from glycolysis, which makes energy from muscle glycogen (glucose) to make ATP molecules. Remember, too, that all athletes continually use fatty acids for energy. However,

power athletes tend to be more conditioned to use muscle glycogen during exercise. This in one reason strength athletes need to make sure that they are following a lower fat diet compared with the diet of oxidative athletes. In fact, this frustrates many people who are well-conditioned strength-training athletes, who struggle to keep off excess body fat due to their strength athlete anatomy and physiology.

Sports Nutrition Supplements Are Part of the Dynamic Nutrition Approach.

Scientific studies show that in addition to well-known benefits of maintaining proper health, athletes can also enhance physical and mental performance with sports nutrition supplements. Protein supplements offer a convenient and economical way to get daily high-quality protein intake. For strength athletes, several supplements can help achieve optimum muscle growth and repair muscle. For maximum aerobic energy,

which is of interest to long-distance athletes, there are special energy drinks that can be used, in addition to special metabolites. Some research even supports the use of supplement nutrition therapy to help reduce pain and inflammation, and to help heal some injuries. Some doctors include nutrition/supplements as part of their treatment programs.

The safety of supplements will always depend on an athlete's specific state of health, tolerance, proper use, and level of physical activity. It is also contingent on the fact that a person is using a "legal" sports nutrition product correctly and following the product's directions, not overdosing, and confirming proper use with a physician and other appropriate health professional. Keep in mind that research studies on supplements may be only performed over short periods—a few weeks or a few—months, with small number of subjects, dozens not thousands, and some research over years using thousands of subjects. This means that the long-term effects of using some supplements may not

Examples of Some Sports Nutrition Specialty Foods and Supplements for Potential Occasional Use Reviewed in Previous Units.	
Typically, one or more of these are used at a time, depending on the type of athletic performance and health goals.	
Carbohydrate/Electrolyte Sports Drinks & Gels	Beetroot Juice/Nitrate
Protein Supplements	Pycnogenol
Meal Replacements	Ginsengs
Nutrition Bars	Caffeine
Multivitamins/minerals	Essential Fatty acids
Probiotics	EPA & DHA
Add Your Additional Items:	

have been determined yet. Note that reference to the Canadian-approved ingredients and monographs has been made in previous units, which brings an additional level of credibility and independent expert review regarding safety and effectiveness and duration of use along with other concerns when applicable.

When taking supplements and some of the other sports nutrition products sold as foods, as a general rule, it is always important to follow the proper usage directions provided on the packaging/labeling, under doctor supervision, and to contact the company directly for additional use information when required. For many of the essential vitamins and minerals, you will find recommended daily values (DV) on the labels. In some instances, certain vitamins and minerals will need to be taken in at least 100 percent of the daily values and sometimes in higher amounts. When it comes to the newer or novel metabolite supplements found on the market such as creatine, although these nutrients are found naturally in the diet and are made and used in the body, more caution is needed for their safe use. It is a wise practice to be under the supervision of a physician, team physician, or other health professional to ensure a safe and effective sports nutrition and supplement program that will work for athletes, not against them.

Caffeine is an example of an ergogenic substance with a long history of use and backed by many clinical studies supporting several potential beneficial effects, which are reviewed in Unit 9. Some general points to reiterate here include the legal and healthy use of caffeine. The legal use relates to being legal under the conditions of the sports organizations and legal products.

Healthy use relates to using caffeine on an as-needed basis, under doctor supervision, in appropriate dosage forms and amounts. Because caffeine affects the nervous system and energy use, it is important to make sure athletes are first following optimal nutrition and training programs that result in maximum athletic performance to then rate the extra performance benefits of caffeine and the other ergogenic substances. Otherwise, caffeine use may mask nutrition or training program inadequacies, which could ironically lead to jeopardizing athletic performance and health when the body eventually crashes and needs time to recuperate from inappropriate caffeine use.

Nutrition Conditioning of Athletes

Similar to how the body makes changes in response to physical training and acclimates to environmental conditions, the body can take time to make anatomical, biochemical, and physiological adjustments to nutritional changes that are part of a sports nutrition program. Thus, as total daily caloric intake is increased, it will take time for the body to become efficient at processing the extra nutrients, including higher water intake. This includes eating occasions and any special sports nutrition practices before, during, and after training and events. For example, if a sport event is strenuous and long in duration and is expected to require intake of water and carbohydrate/electrolyte beverages during the event, this should be practiced during training to fine-tune the nutrition intake, and condition the body to process the nutrient intake. Testing different foods or nutrients or supplements may be required depending on how

the athlete responds to higher consumption of the foods he or she typically eats and new types of foods/supplements being tried.

Gastrointestinal upset, including gas and diarrhea, is an example of one of the common sports nutrition program or product symptoms reported occurring in some people. When gastrointestinal upset occurs and is reported by athlete clients, they need to work urgently with the health professional team to resolve the annoying condition, as health and athletic performance can be adversely affected—even with minor gastrointestinal upset conditions. Resolving such types of gastrointestinal upset may include adjusting a sports nutrition program to allow the athlete's gastrointestinal system to acclimate or even avoiding certain foods or products.

Rationale behind the Different Athlete-Type Sports Nutrition Plan Examples

The steps and following table summarize the main types of bio-energetic needs and macronutrient profiles to meet energy, growth, recovery, and performance demands. Keep in mind that these are categories to serve as a starting point and that each athlete can have different needs. However, by using this Athlete-Type bio-energetic sports nutrition model, you may achieve goals more quickly versus undertaking years of unscientific trial and error. This summary also follows the Dynamic Nutrition's Hierarchical approach. In other words, when you are designing a sports nutrition plan, the following approach will make the work



easy for you. Refer to the corresponding units for details about determining some of the items, such as body composition.

Step 1: Determine body composition.

Step 2: Determine daily caloric expenditure range for training and non-training days and for competition days.

Step 3: Define the bio-energetics the sport primarily demands for peak athletic performance, Athlete-Type, Anaerobic – Immediate Energy System, Anaerobic Glycolytic; Anaerobic Glycolytic – Oxidative Glycolytic, and Oxidative. Some examples of sports will follow.

Step 4: Determine daily protein intake estimate and the foods and supplements to achieve it. Remember from your lessons that protein requirements can differ between different athlete-types and among individual athletes.

Step 5: Determine daily carbohydrate estimate and the foods and supplements to achieve it. Remember to plan for carbohydrate beverage intake before, during, and after practice and for sport events as appropriate. Modulate carbohydrate type and amount with meals and snacks to attain specific nutrition goals.

Step 6: Determine fat (essential fatty acids) intake estimate and plan and select foods and cooking methods to achieve it. Keeping fat intake under 30 percent of total daily calories will be an ongoing skill to master. For certain sports, maintaining low fat intake during the season of about 15-20 percent of total daily calories can be challenging and requires extra effort to make sure athletes ingest adequate

amounts of the essential fatty acids and linoleic and alpha-linolenic acids. Add healthy sources of essential fatty acids, along with EPA and DHA as required for health.

Step 7: Maintain proper fluid intake estimate to meet daily requirements, as determined by amount of physical activity, environmental factors, and specific athletic training, performance, and health needs.

Step 8: Determine the needs for using special sports nutrition and dietary supplement products.

Step 9: Be consistent. Consistency is the key to a successful sports nutrition program.

Step 10: Make Champions. Being a champion is more than just winning. It is about living a certain lifestyle that leads to winning. This lifestyle includes a constant effort to improve all the factors (planning, physical, mental, athletic training, nutritional, spiritual, medical, social, etc.) that result in being the best an athlete can be. Planning is a major part of success in sports and life. Implementing a plan is one thing; the other is regularly measuring the outcome and identifying both strengths and areas of improvement.

Step 11: Repeat steps 1 to 10 periodically. As an athlete's body develops from training and from year to year aging, his or her body and nutrition requirements can change, even in a short period, so repeating steps 1 to 10 periodically is a good practice. Weekly can be an appropriate starting point, and then adjust appropriately after a collection of data is established for an athlete. Fine-tune the intervals.

Athlete-Type Sports Nutrition Plan Examples	
During Season	Scientific Rationale of the Athlete-Type Sports Nutrition Plan Examples
15% Fat 30% Protein 55% Carbohydrates	Anaerobic – Immediate Energy Sports. For individuals in sports in which explosive strength and power is required, immediately available ATP and CP anaerobic energy is used. High protein is required to maintain positive nitrogen balance and repair fragile fast-twitch muscle fibers. Low fat, high carbohydrate intake is suggested because these athletes use mostly muscle glycogen to replenish ATP and CP stores.
20% Fat 25% Protein 55% Carbohydrates	Anaerobic Glycolytic Sports. For individuals in sports in which explosive strength and power is required on a sustained or highly repetitive basis. Muscle glycogen is a primary source of energy for these athletes. High protein is required to maintain positive nitrogen balance and repair fast-twitch muscle fibers.
20% Fat 20% Protein 60% Carbohydrates	Anaerobic Glycolytic – Oxidative Glycolytic Sports. For individuals in sports in which the aerobic pathway is the predominant energy source, but glycolysis is also relied on. Fatty acids and muscle glycogen thus become important energy sources. Moderate protein intake is required to maintain positive nitrogen balance and repair muscle fibers. This is a good daily nutrient intake for cross-training sports or multi-energetic sports and for general health and fitness.
25% Fat 15% Protein 60% Carbohydrates	Oxidative Sports. For individuals in sports in which oxidative endurance is required for long-distance events. Slow twitch muscle fibers predominate. High carbohydrate is required to maintain glycogen stores. As endurance athletes utilize a high amount of fatty acids for energy, moderate dietary fat intake is warranted. Protein intake is lowest for this group of athletes, but is about twice as high as nonathletes.
Comments: Short-term use during athletic season, for healthy adults. Starting point to modify based on individual athlete needs, under qualified health practitioner supervision and approval, such as a doctor. Does not apply to special need sports, such as ultra-endurance and high-altitude sports and sporting events. Actual percent fat, protein, and carbohydrates can vary based on the individual.	

Dynamic Nutrition Athlete-Type Eating Plan Examples

Prescribed diets that are found in books, which include recipes and special foods over several weeks, are difficult to follow. Let's face it: most people try them for a few days, find following them frustrating, and shortly return to their old ways of eating. It seems that unless you are confined to an institution where someone else prepares all your meals every day, it's hard to follow most prescribed diets. Additionally, many

of the prescribed diets include foods you do not want to eat, which is another factor for the high failure rate. Finally, when confronted with real-life situations, (eating out, eating at friends' houses, or traveling) it's close too impossible to follow a month-long eating plan that someone else created without knowing a person's individual preferences.

With these issues in mind, look at the following examples. They use daily diet examples and food category lists to assist in selecting foods to meet sport-specific daily fat, protein, and carbohydrate intake goals. The daily diet examples illustrate how to spread out caloric intake on training days and demonstrate example foods to meet sport-specific daily nutrient intake.

There are two caloric examples for each of the four different diet types: 2,500 Calories per day and 3,500 Calories per day. The daily diet examples are dynamic, so you can easily add or subtract foods from these example diets to match your individual daily caloric intake. Individuals with enormous daily caloric requirements, like 5,000 Calories per day, or 7,000 Calories per day, can simply double the amounts of portions in the example 2,500 Calorie and 3,500-Calorie example diets, respectively. You can even modify the number of eating occasions to best suit individual needs, 5 to 6 times per day for example. Here is an example for which tracking body weight and body composition at regular intervals becomes important to determine whether the total daily caloric intake is too much, causing unwanted weight gain, or too little, causing unwanted weight loss—in addition to the other measures of athletic performance and health that are being tracked.

When following a doctor-approved nutrition program, it's expected to deviate somewhat from time to time. Athletes should be taught to start back on the right track at the next meal when this occurs. But to be successful, some planning is required, making sure that the refrigerator and pantry are well stocked with the required foods and supplements. Meeting daily nutrition goals

may also mean packing a brown bag meal to take for snacks and meals while out of the house.

The examples are summarized in a convenient format, which can be used when shopping and when eating out. Additionally, the food category lists include common foods to get started. To make the plans work the best, you need to add favorite foods to the list based on a person's food preferences and determine how much of these to eat to meet daily caloric and macronutrient goals. Many grocery foods have the nutrition information you need on their labels in the Nutrition Facts box found on most food products or on the Supplement Facts box found on dietary supplement products.

Another thing to remember when constructing nutrition plans is not to become overly concerned if you find that you cannot exactly get the foods to meet target caloric and macronutrient goals. You should realize that it's OK to be a little flexible. When scientists calculate the energy and macronutrient content of foods, many assumptions are made, and an acceptable range of error is to be expected. This means that when you deal with foods, the nutrition content information is not exact. However, when you deal with dietary supplements, the information is usually more accurate. But remember that a margin of error of plus or minus 10 percent is typical, and even up to a 20 percent margin of error has been known to occur. With some whole foods, even a higher margin of error can occur with caloric and nutrient content.

The example diets demonstrate how to spread out the calories throughout training days. Note that following a 15-30-55 diet does not mean



that each meal consists of 15% fat, 30% protein, and 55% carbohydrates. This is the total daily intake goal. The way the diets are structured focus on eating more carbohydrates around training time of day.

With the practice of ingesting a carbohydrate beverage (or similar sports nutritionals) before, during, and after training sessions and athletic events, an evaluation period may be needed to determine how an athlete's digestive system will respond. Note that it may take a few to several weeks to adjust to doing this. If athletes cannot "stomach" drinking a carbohydrate beverage before and during training or during events, then make sure they take in extra carbohydrates during the pre-training meal, during and directly after training, and for the subsequent meals/snacks to ensure adequate glycogen replenishment. Keep well hydrated during practice sessions by drinking water along with a carbohydrate drink when warranted

when sweating is excessive leading to weight loss during the workout.

Here's another point on beverage intake before, during, and after sporting events. For short-term, explosive sports like sprinting, wrestling, high jump, and martial arts, athletes may not need to drink carbohydrate beverages right before or during events, unless a benefit has been determined. Short-term sporting events/competitions usually are not reported to benefit from the glycogen-sparing effects of carbohydrate beverage ingestion. Note however that a psychological benefit may occur from consuming carbohydrate beverages for such athletic events, which generally are not at risk for glycogen depletion, and may benefit an athlete in other ways not directly related to muscle energetics. But for longer duration sports, generally more than an hour long, or during day-long tournaments, most types of athletes can benefit from carbohydrate ingestion



before and during the events. However, for all athletes, during daily practice and training, it is important to maintain carbohydrate beverage intake to maintain glycogen stores, as most training sessions last more than two hours in duration, in addition to taking in water and electrolytes. Finally, if a person finds it hard to stomach ingestion of a certain type of carbohydrate beverage, before and during training or a sporting event, experiment with different brands of drinks and different caloric amounts to evaluate a compatible source of activity-related intake.

When working from the following plan examples, remember that they are for illustration purposes only, and you will need to modify them to meet the exact nutrition and supplement needs of each adult athlete. There is no way to guess total daily and workout or event caloric expenditure in a book without working directly with an athlete. In addition, note that these plans are meant to be used by healthy adults, for only

a few months at a time, during the competitive seasons, and could also be suited for other athletic training phases, such as preseason. Most athletes can follow a 20% fat, 20 % protein, and 60% carbohydrate diet on the off-season. But because long-distance athletes tend to train all year, they can stick to their 25% fat, 15% protein, and 60% carbohydrate diet all year, except as otherwise directed by their health practitioners. Moreover, remember that the best macronutrient to eat three hours, plus or minus, before practice and competitions is low fat, moderate protein, and high in carbohydrates; low fiber; easy to digest but with some low to moderate glycemic index behavior for sustained blood glucose levels. Don't wait until right before a competition to determine what pregame meal works best; athletes must work on perfecting their sports nutrition program every day, like they do with their sports training. Each person has a different rate of digestion and assimilation, so individual meal timing and nutrient composition needs to be determined and prove effective well in advance of competitions. Comprehensive record keeping and analysis are required to determine the relationship between peak athletic performance and the sports nutrition program.

This table provides a summary of examples of how the different diets may best meet sport specific nutrition requirements for a year-round training program. The rationale for changing diets during the year in some sports is determined by the intensity of physical activity during the off-season, preseason, and competition season. For example, power athletes not intensively training may not require the same level of protein intake they do when intensively training.

Sport	Off-Season %Fat - %Protein - %Carb	Preseason %Fat - %Protein - %Carb	In-Season %Fat - %Protein - %Carb
Baseball	20-20-60	20-25-55	15-30-55
Basketball	20-20-60	20-20-60	20-25-55
Bodybuilding	20-25-55	15-30-55	10-15/30 to 40/50-55
Bowling	20-20-60	20-25-55	20-25-55
Boxing	20-20-60	15-30-55	15-30-55
Cycling-Sprint/Mid-Dist	20-20-60	20-25-55	20-25-55
Cycl-Long Dist	20-20-60	20-20-60	20-20-60
Dancing, Power	20-20-60	20-20-60	20-25-55
Dancing, Stamina	20-20-60	20-20-60	20-20-60
Equestrian, Power	20-20-60	20-25-55	20-25-55
Equestrian, Mid-Distance	20-20-60	20-20-60	20-20-60
Field Hockey, Power Players	20-20-60	20-25-55	20-25-55
Field Hockey, Mid-Dist. Players	20-20-60	20-20-60	20-20-60
Fitness, Power Exercisers	20-20-60	20-20-60	20-25-55
Fitness, Mid-distance Exercisers	20-20-60	20-20-60	20-20-60
Fitness, Endurance Exercisers	25-15-60	25-15-60	25-15-60
Football	20-20-60	15-30-55	15-30-55
Golf	20-20-60	20-20-60	20-25-55
Gymnastics	20-20-60	20-25-55	15-30-55
Hockey, Ice	20-20-60	20-20-60	20-25-55
Martial Arts	20-20-60	20-25-55	15-30-55
Motor Sports	20-20-60	20-20-60	20-25-55
Powerlifting	20-25-55	15-30-55	10-15/30 to 40/50-55
Racket Sports	20-20-60	20-25-55	20-25-55
Rock Climbing	20-20-60	20-25-55	20-25-55
Skiing, All Downhill Events	20-20-60	20-25-55	15-30-55
Skiing, Mid-Distance	20-20-60	20-25-55	20-25-55
Skiing, Endurance, Long Distance	25-15-60	25-15-60	25-15-60
Soccer, Power Positions	20-20-60	20-25-55	20-25-55
Soccer, Mid-Distance Positions	20-20-60	20-20-60	20-20-60
Swimming, Power/Sprint Events	20-20-60	20-25-55	15-30-55
Swimming, Mid-Distance Events	20-20-60	20-25-55	20-25-55
Swimming, Long-Distance Events	20-20-60	20-20-60	20-20-60
Tennis	20-20-60	20-25-55	20-25-55
Track & Field, Power/Sprint Events	20-20-60	20-25-55	15-30-55
Track & Field, Mid-Distance Events	20-20-60	20-25-55	20-25-55
Track & Field, Long-Distance Events	25-15-60	25-15-60	25-15-60
Triathlon	25-15-60	25-15-60	25-15-60
Volleyball	20-20-60	20-25-55	20-25-55
Weightlifting	20-25-55	15-30-55	10-15/30 to 40/50-55
Wrestling	20-20-60	20-25-55	15-30-55
Athlete 1			
Athlete 2			

15% Fat, 30% Protein, 55% Carbohydrate Athlete-Type Sports Nutrition Plan Examples

The 15% fat, 30% protein, 55% carbohydrate daily nutrition plan can be suitable for massive power athletes, driven by the extremely short-term immediate energy system. Athletes such as football players, powerlifters, sprinters, and bodybuilders will do best following this nutrition plan during the season. When training or competing, these athletes rely primarily on the immediate, and to a lesser extent, the glycolytic energy systems. They have massive muscles, with highly developed fast-twitch muscle fibers. Because of this, these athletes require a high amount of protein to maintain positive nitrogen balance and to repair their fragile fast-twitch muscle fibers. Because muscle glycogen is the primary energy source used for replenishing the ATP and CP stores, a diet that is low in fat and rich in carbohydrates is indicated. It should be low in fat because not much fat is used up during training and competition and rich in carbohydrates because the muscles' supply of glycogen needs to be restored every day, or performance and recovery will be impaired.

Note: Although many athletes are reported to be at risk or deficient in either total daily calories and/or one or more of the essential nutrients, low carbohydrate intake is a top concern. Therefore, as a reminder, the following has been added to each eating occasion in the examples: (Extra carbohydrates as required.) Extra carbohydrates may be required at one or more of the eating occasions depending on whether the total daily intake requirements have been met or whether extra carbs are needed to prepare for long training sessions or events to reduce glycogen use, or post training session or events to replenish glycogen levels.

15% Fat, 30% Protein, 55% Carbohydrate Training Days Examples (for illustration only)

2,500 Calories Per Day Eating Plan Example

15% Fat, 375 Calories, 42 grams

30% Protein, 750 Cal, 188 grams

55% Carbohydrates, 1,375 Cal, 344 grams

3,500 Calories Per Day Eating Plan Example

15% Fat, 525 Calories, 58 grams

30% Protein, 1,050 Cal, 263 grams

55% Carbohydrates, 1,925 Cal, 481 grams

Trainig Days

Breakfast—Meal Goal: 500 cal, 40g P, 62.5g C, 10g F

- Take dietary supplements as required
- 2 c. Egg alternative, Fleishmann's Egg Beaters Vegetable Omelet, 200 cal, 28g P 20g C, 0g F
- 1 slice Canadian Bacon, 86 cal, 11.3g P, 0.6g C, 3.9g F
- 4 oz Boiled potato, no skin, 99 cal, 2.1g P, 22.8g C, 0.1g F
- 1/2 T. Butter, 50 cal, 0.1g P, 0g C, 5.7g F
- 6 oz Grapefruit juice, 60 cal, 1g P, 15g C, 0g F.

Breakfast—Meal Goal: 573 Cal, 51g P, 64g C, 13g F

- Take dietary supplements as required
- 2 1/2 c. Egg alternative, Fleishmann's Egg Beaters Vegetable Omelet, 250 cal, 35 g P, 25g C, 0gF
- 1 slice Canadian Bacon, 86 cal, 12g P, 0g C, 3.9g F
- 4 oz Boiled potato no skin, 99 cal, 2.1g P, 22.8 g C, 0.1g F
- 2/3 T. Butter, 67 cal, 0.1g P, 0g C, 7.6g F
- 12 oz Grapefruit Juice, 120 cal, 2g P, 30g C, 0g F.

Morning Snack—Meal Goal: 225 cal, 30g P,15g C, 5g F

- Take dietary supplements as required.
- Protein Nutrition Bar, Low Calorie, 225 cal, 30g P, 15g C, 5g F.

Morning Snack—Meal Goal: 470, 40g P, 64g C, 6g F

- Take dietary supplements as required
- Protein Nutrition Bar, Medium Calorie, 470 calories, 40g P, 64g C, 6g F.

Lunch—Meal Goal: 500 cal, 40 g P, 62.5 g C, 10g F

- Take dietary supplements as required.
- 1 orange, medium, 62 cal, 1.2g P, 15.4g C, 0.2g F
- 2 slices, bread, whole grain, 170 cal, 7.8g P, 34.8g C, 3.2g F
- 4 oz chicken breast, no skin, 124 cal, 26g P, 0g C, 1.6g F
- 1 T. Salad Dressing, oil & vinegar, 45 cal, 0g P, 1g C, 4g F
- 2 oz, Lettuce, iceberg, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 4 oz, broccoli spears (Birds Eye), 30 cal, 4g P, 6g C, 0g F
- 2 oz carrot, raw, 24 cal, 0.6g P, 5.8g C, 0.2g F.

Lunch—Meal Goal: 573 Cal, 51g P, 64g C, 13g F

- Take dietary supplements.
- 1 orange, medium, 62 cal, 1.2g P, 15.4g C, 0.2g F
- 2 slices, bread, whole grain, 170 cal, 7.8g P, 34.8g C, 3.2g F
- 6 oz chicken breast, no skin, 186 cal, 39g P, 0g C, 2.4g F
- 1 1/2 T., Salad Dressing, (Seven Seas), oil & vinegar, 68 cal, 0g P, 1.5g C, 6g F
- 2 oz, Lettuce, iceberg, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 4 oz, broccoli spears (Birds Eye), 30 cal, 4g P, 6g C, 0g F
- 2 oz carrot, raw, 24 cal, 0.6g P, 5.8g C, 0.2g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, Low Calorie, 225 cal, 30 g P, 15 g C, 5 g F
- THEN BCAAs supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 16 oz during workout, 400 cal, 0g P, 100g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, Medium Calorie, 470 cal, 40g P, 64g C, 6g F
- THEN BCAAs supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 20 oz during workout, 500 cal, 0g P, 125g C, 0g F.

Dinner—Meal Goal: 650 cal, 48g P, 87.5g C, 12g F

- Take dietary supplements.
- 1 lean pork chop, (Master Choice), 120 cal, 22g P, 0g C, 4g F
- 8 oz, Baked Beans, Barbecue (B&M), 260 cal, 15g P, 48g C, 6g F
- 6 oz Spinach, 36 cal, 4.8g P, 6g C, 0.6g F
- 1 Tomato, 26 cal, 1g P, 5.7g C, 0.4g F
- 8 oz Skim Milk, 86 cal, 8.4g P, 11.9g C, 0.4g F
- 4 oz, fruit cocktail, canned, in light syrup, Cal 65, 0.5g P, 16.9g C, 0.1g F.

Dinner—Meal Goal: 914 cal, 81g P, 100g C, 20g F

- Take dietary supplements.
- 2 1/2 lean pork chops, (Master Choice), 300 cal, 55g P, 0g C, 10g F
- 8 oz, Baked Beans, Barbecue (B&M), 260 cal, 15g P, 48g C, 6g F
- 6 oz Spinach, 36 cal, 4.8g P, 6g C, 0.6g F
- 1 Tomato, 26 cal, 1g P, 5.7g C, 0.4g F
- 8 oz Skim Milk, 86 cal, 8.4g P, 11.9g C, 0.4g F
- 4 oz, fruit cocktail, canned, in light syrup, Cal 65, 0.5g P, 16.9g C, 0.1g F.

Additional meal/snack/sports nutritionals, supplements. (Extra carbohydrates as required).

Additional meal/snack/sports nutritionals, supplements. (Extra carbohydrates as required).

Note that pre-workout and post-workout caloric beverages will add to the total daily caloric intake, as will extra caloric drinks during the workout. Changes are required for each athlete.

20% Fat, 25% Protein, 55% Carbohydrate Athlete-Type Sports Nutrition Plan Examples

The 20% fat, 25% protein, 55% carbohydrate daily nutrition plan can be suitable for individuals who participate in sports and fitness activities that require explosive strength and power on a sustained or highly repetitive basis. When training for or during competition, these individuals rely primarily on the glycolytic energy systems. Muscle glycogen is their primary source of energy. These individuals need to consume large amounts of protein to maintain a positive nitrogen balance and to repair their fragile fast-twitch muscle fibers.

Note: Although many athletes are reported to be at risk or deficient in either total daily calories and/or one or more of the essential nutrients, low carbohydrate intake is a top concern. Therefore, as a reminder, the following has been added to each eating occasion in the examples (Extra carbohydrates as required): Extra carbohydrates may be required at one or more of the eating occasions depending on whether the total daily intake requirements have been met or whether extra carbs are needed to prepare for long training sessions or events to reduce glycogen use, or post training session or events to replenish glycogen levels.

15% Fat, 25% Protein, 55% Carbohydrate: Examples (for illustration only)

2,500 Calories Per Day Eating Plan Example

20% Fat, 500 Calories, 56 grams

25% Protein, 625 Calories, 156 grams

55% Carbohydrates, 1375 Calories, 344 grams

3,500 Calories Per Day Eating Plan Example

20% Fat, 700 Calories, 78 grams

25% Protein, 875 Cal, 219 grams

55% Carbohydrates, 1925 Cal, 481 grams

Trainig Days

Breakfast—Meal Goal: 465 Calories, 27g P, 60g C, 13g F

- Take dietary supplements as required.
- 1 cup Egg alternative, Fleishmann's Egg Beaters Vegetable Omelet, 100 cal, 14g P 10g C, 0g F
- 1 slice Canadian Bacon, 86 cal, 12g P, 0g C, 4g F
- 4 oz Boiled potato, pulp, 117 cal, 2g P, 28g C, 0g F
- 2/3 tbsp Butter, 81 cal, 0g P, 0g C, 9g F
- 9 oz Grapefruit juice, 90 cal, 0g P, 22.5g C, 0g F.

Breakfast—Meal Goal: 579 cal, 38.5g P, 61g C, 18.5g F

- Take dietary supplements as required.
- 1 1/2 cups Egg alternative, Fleishmann's Egg Beaters Vegetable Omelet, 150 cal, 21 g P, 15g C, 0g F
- 1 slice Canadian Bacon, 86 cal, 12g P, 0g C, 4g F
- 4 oz Boiled potato pulp, 117 cal, 2g P, 28 g C, 0g F
- 1 tbsp Butter, 100 cal, 0g P, 0g C, 11.4g F
- 6 oz Grapefruit Juice, 60 cal, 0g P, 15g C, 0g F
- 4 oz Milk, 2%, 60 cal, 4g P, 5.5g C, 2g F.

Morning Snack—Meal Goal: 225 cal, 30g P, 15g C, 5g F

- Take dietary supplements as required.
- Protein Nutrition Bar, Medium Calorie, 470 calories, 40g P, 64g C, 6g F.

Morning Snack—Meal Goal: 470, 40g P, 64g C, 6g F

- Take dietary supplements as required
- Protein Nutrition Bar, Low Calorie, 225 cal, 30g P, 15g C, 5g F.

Lunch—Meal Goal: 465 cal, 27g P, 60g C, 13g F

- Take dietary supplements as required.
- 1 orange, medium, 62 cal, 1g P, 13g C, 0g F
- 2 slices, bread, whole grain, 170 cal, 8g P, 34g C, 3g F
- 2 oz chicken breast, no skin, 62 cal, 13g P, 0g C, 1g F
- 2 tbsps, Salad Dressing, (Seven Seas), oil & vinegar, 90 cal, 0g P, 2g C, 8g F
- 2 oz, Lettuce, iceberg, trimmed, 8 cal, 0.5g P, 1.5g C, 0g F
- 4 oz, broccoli spears (Birds Eye), 30 cal, 4g P, 6g C, 0g F
- 2 oz carrot, raw, 24 cal, 1g P, 6g C, 0g F.

Lunch—Meal Goal: 579 cal, 38.5g P, 61g C, 18.5g F

- Take dietary supplements as required.
- 1 orange, medium, 62 cal, 1g P, 13g C, 0g F
- 1 roll, Hoagie, 210 cal, 8g P, 34g C, 5g F
- 4 oz chicken breast, no skin, 124 cal, 26g P, 0g C, 2g F
- 3 tbsps, Salad Dressing, (Seven Seas), oil & vinegar, 135 cal, 0g P, 3g C, 12g F
- 2 oz, Lettuce, iceberg, trimmed, 8 cal, 0.5g P, 1.5g C, 0g F
- 4 oz, broccoli spears (Birds Eye), 30 cal, 4g P, 6g C, 0g F
- 2 oz carrot, raw, 24 cal, 1g P, 6g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, Low Calorie, 225 cal, 30 g P, 15 g C, 5 g F
- THEN BCAAs supplement 30 minutes before workout, with water.
- Workout carbohydrate sports drink, high calorie, 16 oz during workout, 400 cal, 0g P, 100g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, Medium Calorie, 470 cal, 40g P, 55g C, 10g F
- THEN BCAAs supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 20 oz during workout, 500 cal, 0g P, 125g C, 0g F.

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Note that pre-workout and post-workout caloric beverages will add to the total daily caloric intake, as will extra caloric drinks during the workout. Changes are required for each athlete.

Dinner—Meal Goal: 724 cal, 42g P, 94g C, 20g F

- Take dietary supplements as required.
- 3 oz Beef, Bottom Round, prime, untrimmed, 192 cal, 17.1g P, 0g C, 13.2g F
- 2 oz pasta, 210 cal, 9g P, 41g C, 1g F
- 4 oz pasta sauce, (Ragu), Mushroom Thick and Hearty, 100 cal, 2g P, 15g C, 3g F
- 12 oz Spinach, 72 cal, 9.6g P, 12g C, 1.2g F
- 8 oz Skim Milk, 86 cal, 8.4g P, 11.9g C, 0.4g F
- 4 oz, fruit cocktail, canned, in light syrup, Cal 65, 0.5g P, 16.9g C, 0.1g F.

Dinner—Meal Goal: 901 cal, 62g P, 98g C, 29g F

- Take dietary supplements as required.
- 5 oz Beef, Bottom Round, prime, trimmed, 225 cal, 31g P, 0g C, 10.5g F
- 2 oz pasta, 210 cal, 9g P, 41g C, 1g F
- 1/2 tbsp olive oil, cal 60, 0g P, 0g C, 7g F
- 4 oz pasta sauce, (Ragu), Mushroom Thick and Hearty, 100 cal, 2g P, 15g C, 3g F
- 12 oz Spinach, 72 cal, 9.6g P, 12g C, 1.2g F
- 8 oz Milk, whole, 150 cal, 8g P, 11g C, 8g F
- 4 oz, fruit cocktail, canned, in light syrup, Cal 65, 0.5g P, 16.9g C, 0.1g F.

20% Fat, 20% Protein, 60% Carbohydrate Athlete-Type Sports Nutrition Plan Examples

The 20% fat, 20% protein, 60% carbohydrate daily nutrition plan can be suitable for individuals who participate in sports or fitness activities that require explosive strength and power on a sustained or highly repetitive basis. However, although these individuals rely to some extent on the glycolytic energy systems, they also depend primarily on the oxidative energy systems. Fatty acids and muscle glycogen are these individuals' primary fuel sources during activity. Therefore, these athletes need to consume just moderate amounts of protein to maintain positive nitrogen balance and to repair their fragile fast-twitch muscle fibers.

Note: Although many athletes are reported to be at risk or deficient in either total daily calories and/or one or more of the essential nutrients, low carbohydrate intake is a top concern. Therefore, as a reminder, the following has been added to each eating occasion in the examples: (Extra carbohydrates as required.) Extra carbohydrates may be required at one or more of the eating occasions. This will depend on whether the total daily intake requirements have been met, whether extra carbs are needed to prepare for long training sessions or events to reduce glycogen use or for post training sessions or events to replenish glycogen levels.

20% Fat, 20% Protein, 60% Carbohydrate: Examples (for illustration only)

2,500 Calories Per Day Eating Plan Example

20% Fat, 500 Calories, 56 grams

20% Protein, 500 Cal, 125 grams

60% Carbohydrates, 1500 Cal, 375 grams

3,500 Calories Per Day Eating Plan Example

20% Fat, 700 Calories, 78 grams

20% Protein, 700 Cal, 175 grams

60% Carbohydrates, 2100 Cal, 525 grams

Trainig Days

Breakfast—Meal Goal: 475 cal, 23.5g P, 67g C, 12.5g F

- Take dietary supplements as required.
- 3 pancakes, buttermilk, Hungry Jack, prepared, 200 cal, 6g P, 28g C, 7g F
- 3 oz ham, fresh, trimmed, 117 cal, 18g P, 0g C, 4.5g F
- 8 oz Vegetable juice (V8), 47 cal, 1.3g P, 10.7g C, 0g F
- 3 1/2 tbsp Pancake Syrup, (Hungry Jack), lite, 88 cal, 0g P, 24.5g C, 0g F.

Breakfast—Meal Goal: 489 cal, 36g P, 52.5g C, 15g F

- Take dietary supplements as required.
- 3 pancakes, buttermilk, Hungry Jack, prepared, 200 cal, 6g P, 28g C, 7g F
- 4 oz ham, fresh, trimmed, 156 cal, 24g P, 0g C, 6g F
- 8 oz skim milk, 86 cal, 8.4g P, 11.9g C, 0.4g F
- 2 tbsp Pancake syrup, (Hungry Jack), lite, 50 cal, 0g P, 14g C, 0g F.

Morning Snack—Meal Goals: 270 cal, 12gP, 45gC, 6g F

- Take dietary supplements as required
- 1 Food Bar, (Earth Grains), Banana apple walnut, 270 cal, 12g P, 45g C, 6g F.

Morning Snack—Meal Goals: 440 cal, 16gP, 68gC, 12gF

- Take dietary supplements as required.
- 1 Food Bar, Pemmican, carob-cocoa, (Bear Valley), 440 cal, 16g P, 68g C, 12g F.

Lunch—Meal Goal: 425 cal, 23.5g P, 67g C, 12.5g F

- Take dietary supplements as required.
- 1/2 oz American cheese, 55 cal, 3 g P, 0.5 g C, 4.5g F
- 1 sandwich roll, 123 cal, 4.5g P, 21.6g C, 3.3 g F
- 3 slices, turkey (Tyson), 60 cal, 12g P, 0.9 g C, 1.2g F
- 2 oz Iceberg lettuce, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 3 tablespoon mustard, 30 cal, 3g P, 3g C, 3g F
- 2 oz Apricot Dried (Del Monte), 140 cal, 2g P, 35g C, 0g F.

Lunch—Meal Goal: 489 cal, 36g P, 52.5g C, 15g F

- Take dietary supplements as required.
- 1/2 oz American Cheese, 55 cal, 3 g P, 0.5g C, 4.5 g F
- 1 sandwich roll, 123 cal, 4.5g P, 21.6 g C, 3.3 g F
- 6 slices, turkey (Tyson), 120 cal, 24 g P, 1.8g C, 2.4g F
- 2 oz Iceberg lettuce, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 3 T. mustard, 30 cal, 3g P, 3g C, 3g F
- 1 banana, w/o skin, 105 cal, 1.2g P, 26.7g C, 0.6g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, High Calorie, 548 cal, 30g P, 80g C, 12g F
- THEN BCAA's supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 20 oz during workout, 500 cal, 0g P, 125g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, Low Calorie, 225 cal, 30g P, 15g C, 5g F
- THEN BCAA's supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 16 oz during workout, 400 cal, 0g P, 100g C, 0g F.

Dinner—Meal Goal: 748 cal, 36g P, 106g C, 20g F

- Take dietary supplements. as required
- 4 oz tuna, bluefin, 164 cal, 26.4 g P, 0g C, 5.6g F
- 1 tomato, 4.75 oz, 26 cal, 1g P, 5.7g C, 0.4g F
- 8 oz Iceberg lettuce, trimmed, 32 cal, 2.4g P, 4.8g C, 0.8g F
- 2 oz onion, trimmed, 22 cal, 0.6g P, 4.8g C, 0.2g F
- 3 oz brown rice, 315 cal, 6.9g P, 65.7g C, 2.4g F
- 6 oz cauliflower, 42 cal, 23.6g P, 8.4g C, 0.6 g F
- 2 T. Salad dressing, (Seven Seas), oil & vinegar, 90 cal, 0g P, 2 g C, 8g F
- 3 oz grape juice, 60 cal, 0g P, 15g C, 0g F.

Dinner—Meal Goal: 1,034 cal, 57g P, 147g C, 24g F

- Take dietary supplements as required.
- 6 oz tuna, bluefin, 246 cal, 39.6 g P, 0g C, 8.4g F
- 1 tomato, 4.75 oz, 26 cal, 1g P, 5.7g C, 0.4g F
- 8 oz Iceberg lettuce, trimmed, 32 cal, 2.4g P, 4.8g C, 0.8g F
- 2 oz onion, trimmed, 22 cal, 0.6g P, 4.8g C, 0.2g F
- 1 oz garbanzo bean, 103 cal, 5.5g P, 17.2 g C, 1.7g F
- 3 oz brown rice, 315 cal, 6.9g P, 65.7g C, 2.4g F
- 6 oz cauliflower, 42 cal, 3.6g P, 8.4g C, 0.6 g F
- 2 T. Salad dressing, (Seven Seas), oil & vinegar, 90 cal, 0g P, 2 g C, 8g F
- 3 oz grape juice, 60 cal, 0g P, 15g C, 0g F.

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Note that pre-workout and post-workout caloric beverages will add to the total daily caloric intake, as will extra caloric drinks during the workout. Changes are required for each athlete.

25% Fat, 15% Protein, 60% Carbohydrate Athlete-Type Sports Nutrition Plan Examples

The 25% fat, 15% protein, 60% carbohydrate daily nutrition plan can be useful for individuals who participate in aerobic sports or fitness activities. When training or during competition, these individuals rely primarily on oxidative energy systems. Their muscles are composed of highly developed slow-twitch muscle fibers. Because of this, these individuals need to consume large amounts of carbohydrates to maintain their glycogen stores, due to the long duration of training and events. However, fatty acids are their primary source of energy, so they should consume a moderate amount of healthy fats and oils. The amount of protein for this group of individuals is the lowest of the four plans, but is still about two times more than non-athletes require.

Note: Although many athletes are reported to be at risk or deficient in either total daily calories and or one or more of the essential nutrients, low carbohydrate intake is a top concern. Therefore, as a reminder the following has been added to each eating occasion in the examples: (Extra carbohydrates as required.). Extra carbohydrates may be required at one or more of the eating occasions depending if the total daily intake requirements have not been met, or if extra carbs are needed to prepare for long training sessions or events to reduce glycogen use, or post training session or events to replenish glycogen levels.

25% Fat, 15% Protein, 60% Carbohydrate: Examples (for illustration only)

2,500 Calories Per Day Eating Plan Example

25% Fat, 625 Calories, 69 grams

15% Protein, 375 Cal, 94 grams

60% Carbohydrates, 1500 Cal, 375 grams

3,500 Calories Per Day Eating Plan Example

25% Fat, 875 Calories, 97 grams

15% Protein, 525 Cal, 131 grams

60% Carbohydrates, 2100 Cal, 525 grams

Trainig Days

Breakfast—Meal Goal: 440 cal, 20g P, 50g C, 16.5g F

- Take dietary supplements as required.
- 3 pancakes, buttermilk, Hungry Jack, prepared, 200 cal, 6g P, 28g C, 7g F
- 2 oz ham, fresh, trimmed, 78 cal, 12g P, 0g C, 3g F
- 12 oz Vegetable juice (V8), 70 cal, 2g P, 16g C, 0g F
- 2 T. Pancake Syrup, (Hungry Jack), lite, 50 cal, 0g P, 14g C, 0g F
- 1/2 tablespoon butter, 50 cal, 0.1g P, 0g C, 5.7g F.

Morning Snack—Meal goal: 230 cal, 10gP, 45gC, 2.5g F

- Take dietary supplements as required.
- 1 Power Bar, 230 cal, 10g P, 45g C, 2.5g F.

Lunch—Meal Goal: 440 cal, 20g P, 50g C, 16.5g F

- Take dietary supplements as required.
- 1 oz American cheese, 110 cal, 6g P, 1g C, 9g F
- 1 sandwich roll, 123 cal, 4.5g P, 21.6g C, 3.3 g F
- 2 slices, turkey (Tyson), 40 cal, 8g P, 0.6 g C, 0.8g F
- 2 oz Iceberg lettuce, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 2 T. mustard, 20 cal, 2g P, 2g C, 2g F
- 2 oz Apricot Dried (Del Monte), 140 cal, 2g P, 35g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- 1 Food Bar, (Earth Grains), Banana Apple Walnut, 270 cal, 12 g P, 45 g C, 6 g F
- THEN BCAA's supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 16 oz during workout, 400 cal, 0g P, 100g C, 0g F.

Dinner—Meal Goal: 720 cal, 32g P, 85g C, 27.5g F

- Take dietary supplements as required.
- 3 oz tuna, bluefin, 123 cal, 19.8g P, 0g C, 4.2g F
- 1 tomato, 4.75 oz, 26 cal, 1g P, 5.7g C, 0.4g F
- 4 oz Iceberg lettuce, trimmed, 16 cal, 1.2g P, 2.4g C, 0.4g F
- 2 oz onion, trimmed, 22 cal, 0.6g P, 4.8g C, 0.2g F
- 3 oz brown rice, 315 cal, 6.9g P, 65.7g C, 2.4g F
- 6 oz cauliflower, 42 cal, 3.6g P, 8.4g C, 0.6 g F
- 4 T. Salad dressing, (Seven Seas), oil & vinegar, 180 cal, 0g P, 4 g C, 16g F.

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Breakfast—Meal Goal: 550 cal, 24g P, 70g C, 20.5g F

- Take dietary supplements as required.
- 3 pancakes, buttermilk, Hungry Jack, prepared, 200 cal, 6g P, 28g C, 7g F
- 3 oz ham, fresh, trimmed, 117 cal, 18g P, 0g C, 4.5g F
- 12 oz Vegetable juice (V8), 70 cal, 2g P, 16g C, 0g F
- 4 T. Pancake Syrup, (Hungry Jack), lite, 100 cal, 0g P, 25g C, 0g F
- 2/3 tablespoon butter, 67 cal, 0.1g P, 0g C, 7.6g F.

Morning Snack—Meal Goal: 440 cal, 16gP, 68gC, 12g F

- Take dietary supplements as required.
- 1 Food Bar, Pemmician, carob-cocoa, (Bear Valley), 440 cal, 16g P, 68g C, 12g F.

Lunch—Meal Goal: 560 cal, 24g P, 70g C, 20.5g F

- Take dietary supplements as required.
- 1 oz slice American cheese, 110 cal, 6g P, 1g C, 9g F
- 1 sandwich roll, 123 cal, 4.5g P, 21.6g C, 3.3 g F
- 3 slices, turkey (Tyson), 60 cal, 12g P, 0.9 g C, 1.2g F
- 2 oz Iceberg lettuce, trimmed, 8 cal, 0.6g P, 1.2g C, 0.2g F
- 2 tbsp mustard, 32 cal, 2g P, 2g C, 2g F
- 2 oz Apricot Dried (Del Monte), 140 cal, 2g P, 35g C, 0g F
- 1/3 tablespoon safflower oil, 40 cal, 0g P, 0g C, 4.7g F
- 6 oz grapefruit juice, 60 cal, 1.0g P, 15g C, 0g F.

Pre-Training Snack— 2 1/2 hours before training.

- Protein Drink, High Calorie, 548 cal, 30g P, 80g C, 12g F
- THEN BCAA's supplement 30 minutes before workout with water.
- Workout carbohydrate sports drink, high calorie, 20 oz during workout, 500 cal, 0g P, 125g C, 0g F.

Dinner—Meal Goal: 892 cal, 37g P, 112g C, 32g F

- Take dietary supplements as required.
- 3 oz tuna, bluefin, 123 cal, 19.8g P, 0g C, 4.2g F
- 1 tomato, 4.75 oz, 26 cal, 1g P, 5.7g C, 0.4g F
- 4 oz Iceberg lettuce, trimmed, 16 cal, 1.2g P, 2.4g C, 0.4g F
- 2 oz onion, trimmed, 22 cal, 0.6g P, 4.8g C, 0.2g F
- 4 oz brown rice, 420 cal, 9.2g P, 87.6g C, 4g F
- 6 oz cauliflower, 42 cal, 3.6g P, 8.4g C, 0.6 g F
- 5 T. Salad dressing, (Seven Seas), oil & vinegar, 225 cal, 0g P, 5 g C, 20g F.

Additional meal/snack/sports nutritionals, supplements.
(Extra carbohydrates as required).

Note that pre-workout and post-workout caloric beverages will add to the total daily caloric intake, as will extra caloric drinks during the workout. Changes are required for each athlete.

Date: _____		Type of day: training ☐ or nontraining ☐		
Macronutrients ratio to follow: 15:30:55 ☐ 20:25:55 ☐ 20:20:60 ☐ or 25:15:60 ☐				
Daily goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat				
Breakfast				
Meal goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat				
FOOD AND PORTION	CALORIES	PROTEIN (GRAMS)	CARBS (GRAMS)	FAT (GRAMS)
Meal subtotals				
Supplements taken with or after meal: _____				

Morning Snack				
Meal goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat				
FOOD AND PORTION	CALORIES	PROTEIN (GRAMS)	CARBS (GRAMS)	FAT (GRAMS)
Meal subtotals				
Supplements taken with or after meal: _____				

Lunch				
Meal goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat				
FOOD AND PORTION	CALORIES	PROTEIN (GRAMS)	CARBS (GRAMS)	FAT (GRAMS)
Meal subtotals				
Supplements taken with or after meal: _____				

Afternoon Snack

Meal goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat

FOOD AND PORTION	CALORIES	PROTEIN (GRAMS)	CARBS (GRAMS)	FAT (GRAMS)

Meal subtotals

Supplements taken with or after meal:

Dinner

Meal goals: _____ calories, _____ grams protein, grams carbohydrates, _____ and grams fat

FOOD AND PORTION	CALORIES	PROTEIN (GRAMS)	CARBS (GRAMS)	FAT (GRAMS)

Meal subtotals

Supplements taken with or after meal:

GRAND TOTALS

Notes:

Nutrient/Supplement Intake Worksheet Example			
NUTRIENT / INGREDIENT EXAMPLES	AMOUNTS FROM Supplements/Food		DAILY TOTALS / NOTES
Vitamin A (preformed, such as retinol)			
Beta Carotene			
Vitamin B1 (thiamin)			
Vitamin B2 (riboflavin)			
Vitamin B3 (niacin)			
Vitamin B5 (pantothenic acid)			
Vitamin B6 (pyridoxine)			
Vitamin B12 (cobalamin)			
Biotin			
Folate			
Vitamin C			
Vitamin D			
Vitamin E			
Vitamin K			
Boron			
Calcium			
Chromium			
Copper			
Iodine			
Iron			
Magnesium			
Manganese			
Molybdenum			
Phosphorus			
Potassium			
Selenium			
Sodium			
Zinc			
Protein			

NUTRIENT / INGREDIENT EXAMPLES	AMOUNTS FROM Supplements/Food		DAILY TOTALS / NOTES
Carbohydrates			
Fiber			
Glutamic acid			
Glutamine			
Branched-Chain Amino Acids (BCAAs)			
Fat			
Alpha-linolenic acid			
Docosahexaenoic acid (DHA)			
Eicosapentaenoic acid (EPA)			
Gamma linolenic acid (GLA)			
Linoleic acid			
Inositol			
Choline			
Pycnogenol ®			
Coenzyme Q10			
L-carnitine			
Beta-Alanine			
Creatine			
Glucosamine			
Chondroitin Sulfate			
BHMB			
Bicarbonate			
Caffeine			
Gamma Oryzanol / Ferulic Acid			
Ginsengs			
Nitrates (e.g., Beet Root)			

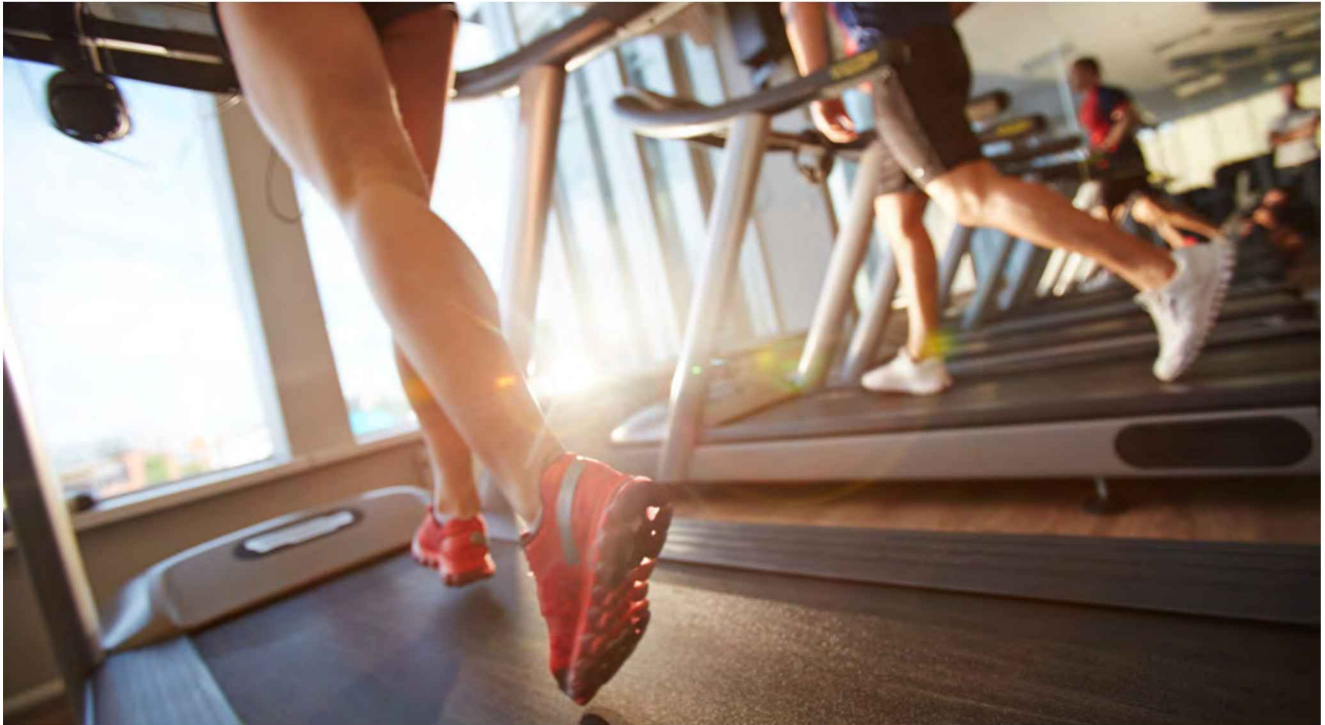


Percentages versus Amounts per Pound/Kilogram of Body Weight

A frequent question from students and a topic of debate among experts is about percentages of fats, protein, and carbohydrates versus grams per kilogram of body weight (mass) for determining a sports nutrition diet. The simple answer is that they both have value. In some ways, these two approaches are different sides of the same coin so to speak. Both approaches end up with quantitative amounts. Although both approaches have strong points in support of them and their viability, there is feasibility to use both approaches for double-checking, for analysis, and for calculations.

The percentage approach, based on actual daily calorie expenditure needs, is tied to a metabolic measurement and can make constructing a program an easier task. Percentages based on the actual daily energy expenditure help provide adequate calories and carbohydrates, with protein and fats falling into place. Because the percentage approach has been introduced, it has caught on and can be found being used in various forms by athletic organizations, in scientific research, and in textbooks (McArdle 2007, IOC 2000, Weatherwax-Fall 2006). This includes the trend for sports nutrition programs that are higher carbohydrate, lower fat, and higher protein, relatively speaking. In addition, there are different percentages or percentage ranges for different types of athletes, such as for endurance and strength athletes and multi-energetic sports.

However, the grams per kilogram of body weight or lean body mass is also important, especially for protein as reviewed in Unit 4, which is based on lean body mass. This helps provide a cross-check to the percentage approach. Therefore, using both methods can be useful, especially during the initial stage of determining an athlete's nutrition requirements. One major limitation of the grams per kilogram of body weight approach is variations in the body fat of individuals and having to rely on making estimates of activity and actual caloric expenditure. Furthermore, day-to-day differences in total caloric expenditure based on physical activity / training variations may be challenging to estimate. Some examples of grams per kilogram of body weight will be provided in the following macronutrients section. Grams per kilogram of lean body mass can be considered a preferred approach when body composition data are gathered.



Another issue worth repeating here concerns sports nutrition for day-to-day training/workouts/exercise and for athletic events/competitions. Examples in this unit and others are primarily offered as a guide for day-to-day training sports nutrition. These examples can also serve to build from for pre-competition day and competition day sports nutrition, as noted in the respective units. Interestingly, for some sports, the daily calories can be more for training days than for competitions/events, and for other sports, the daily calories can be more for competitions/events than for training days.

Another point is that as daily caloric intake requirements become very high, further adjustments to the relative intakes of fats, carbohydrates, and protein are required. For example, reducing protein and increasing fats and carbohydrates may be required as high protein intake maxes out. This area of sports nutrition fine-tuning is challenging but worth the effort and can be a major factor for achieving peak athletic performance, in addition to training and other athletic performance factors. Using rates of intake based on body weight or body mass implies that individuals are in good shape, with athletic body fat levels. Some norming of the rates may be needed when dealing with athletes with excess body fat levels, by estimating ideal body weight using normal body fat ranges.

Macronutrients – Some Summary Points

To start, the following reference tables provide a summary of how the different macronutrient percentages result in total daily grams based on various daily caloric intakes. This provides a quick summary that can be used for nutrition planning. Some additional information regarding macronutrients is also included below.

Total Daily Caloric Intake Example Values	Protein Daily Intake at 15% of Total Daily Calories (Calories and Amount)	Protein Daily Intake at 20% of Total Daily Calories (Calories and Amount)
2,000 Calories	300 Cals, 75 grams	400 Cals, 100 grams
2,500 Calories	375 Cals, 94 grams	500 Cals, 125 grams
3,000 Calories	450 Cals, 113 grams	600 Cals, 150 grams
3,500 Calories	525 Cals, 131 grams	700 Cals, 175 grams
4,000 Calories	600 Cals, 150 grams	800 Cals, 200 grams
Total Daily Caloric Intake Example Values	Protein Daily Intake at 25% of Total Daily Calories (Calories and Amount)	Protein Daily Intake at 30% of Total Daily Calories (Calories and Amount)
2,000 Calories	500 Cals, 125 grams	600 Cals, 150 grams
2,500 Calories	625 Cals, 156 grams	750 Cals, 188 grams
3,000 Calories	750 Cals, 188 grams	900 Cals, 225 grams
3,500 Calories	875 Cals, 219 grams	1050 Cals, 263 grams
4,000 Calories	1000 Cals, 250 grams	1200 Cals, 300 grams
Protein Daily Intake was calculated as follows, Total Daily Caloric Intake times 0.15, 0.20, 0.25, or 0.30. Example: 3,000 Calories $\times$ 0.20 = 600 Calories. Protein Daily Intake in grams was calculated as follows, Total Daily Caloric Intake divided by 4 calories per gram. Example: 600 Calories / 4 calories per gram = 150 grams		

Total Daily Caloric Intake Example Values	Carbohydrate Daily Intake at 55% of Total Daily Calories (Calories and Amount)	Carbohydrate Daily Intake at 60% of Total Daily Calories (Calories and Amount)
2,000 Calories	1,100 Cals, 275 grams	1200 Cals, 300 grams
2,500 Calories	1,375 Cals, 374 grams	1,500 Cals, 375 grams
3,000 Calories	1,650 Cals, 413 grams	1,800 Cals, 450 grams
3,500 Calories	1,925 Cals, 481 grams	2,100 Cals, 525 grams
4,000 Calories	2,200 Cals, 550 grams	2,400 Cals, 600 grams
4,500 Calories	2,475 Cals, 619 grams	2,700 Cals, 675 grams
Carbohydrate Daily Intake was calculated as follows, Total Daily Caloric Intake times 0.55 or 0.60. Example: 3,000 Calories $\times$ 0.60 = 1,800 Calories. Carbohydrate Daily Intake in grams was calculated as follows, Total Daily Caloric Intake divided by 4 calories per gram. Example: 1,800 Calories / 4 calories per gram = 450 grams		

Total Daily Caloric Intake Example Values	Fat Daily Intake at 15% of Total Daily Calories (Calories and Amount)	Fat Daily Intake at 20% of Total Daily Calories (Calories and Amount)	Fat Daily Intake at 25% of Total Daily Calories (Calories and Amount)
2,000 Calories	300 Cals, 33 grams	400 Cals, 44 grams	500 Cals, 56 grams
2,500 Calories	375 Cals, 42 grams	500 Cals, 56 grams	625 Cals, 69 grams
3,000 Calories	450 Cals, 50 grams	600 Cals, 67 grams	750 Cals, 83 grams
3,500 Calories	525 Cals, 58 grams	700 Cals, 78 grams	875 Cals, 97 grams
4,000 Calories	600 Cals, 67 grams	800 Cals, 89 grams	1000 Cals, 111 grams
Fat Daily Intake was calculated as follows, Total Daily Caloric Intake times 0.15, 0.20, or 0.25. Example: 3,000 Calories $\times$ 0.20 = 600 Calories. Fat Daily Intake in grams was calculated as follows, Total Daily Caloric Intake divided by 9 calories per gram. Example: 600 Calories / 9 calories per gram = 67 grams Focus on consuming essential fatty acids, EPA, DHA, and other healthy unsaturated fats/oils.			

The following information is intended to provide some summary level information regarding the macronutrients. Refer to the main units for more detailed information. Be mindful that even though a body of scientific research evidence exists for “guidelines” and “examples,” each athlete needs his/her sports nutrition program to be customized and refined. Another consideration to keep in mind is that the research evidence may be biased to a certain athlete-type. For example, based on the volume of research, carbohydrate, hydration, and electrolyte intake research during athletic events has historically been conducted on long-distance endurance athletes. Furthermore, the muscle-building and strength-training research using a variety of subjects (untrained, trained, recreational athletes, and elite athletes) with showing increases in strength or muscle mass did not necessarily evaluate for increases in athletic performance outcomes. However, the principles and insights gained from the various research studies may apply to other athletes too, during both athletic events and training sessions.

Another general point concerns pre-, during, and post-training session or athletic event nutrition approaches. No single approach works for everybody the same way, and guideline information is intended to provide concepts and general points of reference that need to be personalized for each athlete and tested to result in optimizing athletic performance. This information should therefore be considered introductory, and these advanced topics can require years of specialized education and experience to master.

Training, which creates the extra nutritional demands of athletes, should be scheduled into two or more shorter sessions per day when possible, versus a very long, exhaustive session that makes it difficult to prevent nutrient depletion. In addition, it is necessary to modulate (alternate) training intensity from day to day (low, medium, and high intensities) to avoid overtraining syndrome and allow for adequate recovery and injury prevention. Of course, event/competition days have established schedules



and require the best efforts to provide adequate nutrition intake for peak athletic performance, health, and recovery: this includes athletes bringing along to events an adequate sports nutrition supply. The goals of athletic training are generally for attaining and maintaining the required athletic performance conditioning and skills, plus good health. They are not for dangerously over-working the body or intentionally creating circumstances that prevent or curtail achieving adequate nutrition status that may be counterproductive to an athlete's health and athletic performance.

Water/Hydration

The amount of water a person can ingest at one time and during a certain time frame depends on the size of the stomach, stomach emptying rate, intestinal absorption rate, use in the body, and rate excretion via the kidneys and sweating. Thus, any hydration reference numbers should not be considered suitable for everyone and requires personalization. Water is certainly one of the nutrients for which too much or too little of can have acute (immediate) negative effects on health and athletic performance, and just the right amount is required for optimal hydration resulting in the conditions for optimal athletic performance.

Some practical points to consider once an athlete's daily water intake is established is to have athletes carry water and other suitable beverages with them and consume adequate water throughout the day as required. Trips to the bathroom will also increase and should be planned for. The color of the urine is one indicator of adequate hydration, and appropriate urine color charts can be consulted that may

be posted in locker rooms or provided by the team doctor. During rest and low activity, water intake from hour to hour is relatively constant, under similar climate conditions. Water intake increases during physical activity as the rate of sweating and the amount of water lost through the skin increases.

Other noncaloric beverages, such as tea, coffee, or adding lemon juice to water, and caloric/nutrient beverages when appropriate, offer an option to help avoid water consumption fatigue that can occur when just drinking plain water. Drinking multi-nutrient beverages can provide convenience to help with calorie and essential nutrient intake, as athletes can even experience eating fatigue, which leads to caloric and important nutrient deficiencies that lead to symptoms.

Another consideration is during long duration training and events in which hydration plus carbohydrate and electrolytes intake is important. This balancing act can require use of water plus a carbohydrate/electrolytes sports beverage to maintain adequate hydration levels, alternating intake to maximize water intake, carbohydrate intake, and electrolyte intake. This is related to how the stomach emptying rate is slowed as the concentration of substances in a beverage is increased. More on this in the following section.

But note that realistically during some of the longer athletic events, especially during hotter and more humid climate conditions that increase the rate of sweating, 100 percent of hydration, carbohydrate, and electrolyte replenishment is not always possible. Another dose of reality to be considered is this: should an athlete even be involved in these long duration

events that put their health at risk? As a matter of fitness trainer practice, serious thought should be given to determine whether taking on athletes involved in such potentially hazardous sports should be avoided. During the more controlled athletic training sessions, with adequate planning, dehydration and nutrient depletion should be able to be avoided or minimized to avoid unhealthy and athletic performance limiting conditions.

In addition to the various hydration-related information provided in Unit 6, some additional hydration intake guideline examples published in the scientific literature and from team guidelines you may encounter include the following: two to four hours before exercise, 5 to 10 milliliters per kilogram of body weight; rate of water intake in small amounts 150–200 milliliters every 10 to 20 minutes; 15 minutes before exercise, 300 to 800 milliliters when not possible to drink during exercise; during exercise 0.4 to 0.8 liters per hour, or maybe higher; after exercise, at an individual's appropriate rate of fluid intake during a few or more hours to regain water lost that resulted in loss of body weight during exercise, in appropriate divided dosages, which can include hydration from other beverages in addition to water.

As with other sports nutrition consumption issues, take time to determine what is required for each athlete and what rate of intakes best suits each athlete. Seek to perfect the hydration approach during training sessions that will work best during athletic events. Include sodium and other electrolytes as needed, keeping in mind that eating occasions should supply these and other essential nutrients too. However, during training sessions and events that are

long in duration and incur a high volume of sweating accompanied by loss of sodium in particular, electrolytes in energy drinks or other appropriate beverages or dosage forms pre-, during, and post-training may be required to prevent electrolyte depletion that is detrimental to health and or athletic performance. Similar to carbohydrate content in a beverage, electrolyte content can slow down the stomach-emptying rate depending on the total concentration of the beverage, and needs to be factored in.

Electrolytes

Unit 8 presented information about the main electrolytes with daily reference intakes that include sodium, chloride, and potassium. Additionally, other minerals like magnesium and sulfate are sometimes grouped in. Because electrolytes and other essential nutrients are vital for health and performance, the focus on electrolytes for athletes is related to maintaining adequate intake to compensate for increased physical activity and electrolytes that may be excreted in higher amounts via an increased amount of sweating during exercise. Usually meal and supplement intake provides the majority of electrolyte intake. Electrolytes are also a common ingredient in sports drinks used during exercise, which usually contain sodium, chloride and potassium, and carbohydrates. Some sports drinks contain additional minerals, vitamins, amino acids, and other substances, such as caffeine.

Electrolyte depletion can become a concern when inadequate daily intake occurs and possibly during long bouts of exercise or athletic events or any physical activity accompanied by a high rate of sweating and loss of electrolytes

via sweat. D. J. Casa and coworkers (2005) noted an example of sodium loss during endurance exercise of about 460 mg/L to 1,840 mg/L during endurance exercise. At this rate of loss, it is possible for an athlete to lose a few to several grams of sodium at high rates of sweating over two or more hours of continuous exercise. As with hydration requirements, estimating electrolyte requirements will involve various measurements and calculations by trained health professionals. This may even include collecting and analyzing the electrolyte content of an athlete's sweat.

Carbohydrates

As carbohydrates, especially glucose, are a primary high-energy substrate for all types of athletes, daily adequate intake is vital for peak athletic performance. For the “anaerobic” and “aerobic” athletes, glucose is the primarily high-energy fuel source. As previously mentioned, during strenuous, short-term strength athletic activities, glucose is a primary fuel for anaerobic energy production. However, glucose is also a primary high-energy fuel for aerobic energy production, too, in addition to the slower metabolized fatty acids and, to a minor extent, amino acids, like the BCAAs. With longer duration aerobic (oxidative) athletic events and training, fatty acids also contribute to energy production; however, glucose helps maintain athletic performance at a higher level. Glucose plus specialized glycose polymers and/or sucrose, and/or some fructose can provide additional energy substrate, especially during the longer duration endurance events, those lasting more than 90 minutes.

Regarding the glycemic index, ingestion of carbohydrate sources and meals in the low to medium GI range will be a good nutrition practice to maintain sustained healthy blood glucose levels. Periodic use of high GI foods and sports nutritionals, like energy drinks, can provide a quicker source of energy when required. But remember that the GI for individual foods can change when added into a mixed food meal with other foods of different GI values. The GI of a mixed meal will generally trend in the direction of reducing GI, especially when lower GI foods are mixed with higher GI foods and when mixed with proteins and fats that slow down the stomach emptying rate.

Regarding some additional carbohydrate intake information, extra carbohydrates for athletes had been acknowledged and practiced for many decades, so an abundance of research and different rates of intakes are published in research and guidelines. For athletes training about two to five hours a day, a range of carbohydrate intake guidelines commonly reported is 6 to 12 grams per kilogram of body weight per day—the lower part of the range for shorter duration training sessions, and smaller athletes, and the upper part of the range for longer duration training, and larger athletes.

PDP: Pre-During-Post Exercise, Training, Workouts, Events, and Competitions

While maintaining consistency from meal to meal (eating occasion to eating occasion) is an essential foundation of a healthy sport nutrition program, pre-, during, and post-exercise

nutrition is an area of additional focus. With some exceptions, PDP is similar for most athlete-types for exercise, training, and workouts, but with some differences with athletic events and competitions, for example, long-duration endurance athletic events compared with short-duration strength athlete events.

Yes, for all athletes, an inadequate sports nutrition program from meal to meal and PDP can deplete an athlete's energy supply, electrolytes, protein, and other essential nutrients, leading to reduced physical and mental performance, reduced recovery, and compromised health. Thus, even if meal-to-meal nutrition is "adequate," "inadequate" PDP nutrition can have adverse effects, especially for hydration status, glycogen stores, and electrolytes. Note that when an athletic event or training session is longer in duration and higher in intensity, 100 percent hydration /nutrient depletion prevention is not always possible.

Therefore, the following will serve to summarize some of the major PDP sports nutrition issues. Note that PDP related to exercise, training, and workouts is just as important as PDP that is related to athletic events and competitions is. When athletes neglect training session-related PDP, this may lead to training in a depleted state, resulting in suboptimum athletic performance. PDP related to athletic events and competitions will vary based on the type of sport. Some sports like long endurance events require a comprehensive program of hydration, carbohydrates, and electrolytes, whereas for some sports with athletic events that are short in duration, like a wrestling match or sprinting, going in to the event well-nourished benefits



peak athletic performance and health. However, during a short duration event, sports drinks may not be needed or practical. In addition, some sporting events during which athletes have a fluid swishing around in their stomachs, or even the extra weight, may suffer in terms of athletic performance.

A good starting point for fitness trainers working with athletes is to consult with the PDP that is used by the athlete's team or may be prescribed by other health professionals working with the athlete. In addition to your independent expert review, if the team PDP is adequate, discussing it with your athlete clients and making efforts to encourage them to follow their PDP during training sessions and athletic events are warranted. Additionally, getting feedback from the athletes is vital for determining whether the team-prescribed PDP is resulting in improved training and athletic performance during events, including feedback on any gastrointestinal upset or other issues that need to be resolved for best results. Opportunities for improvement may also be identified for consideration and discussion.

Hypoglycemia: low blood sugar.

It is important to note that athletes may encounter low blood sugar levels at the start of their training or events even when undertaking a reasonable carbohydrate-focused PDP routine. If an athlete encounters diet-induced **hypoglycemia** (or from other reasons), reduced athletic performance can occur when the athletes begin their activities because of the low available energy substrate in the blood and glucose and perhaps due to energy-storing insulin levels competing with energy-liberating glucagon levels. Therefore, how an athlete is expected to respond to a PDP nutrition program needs to be evaluated during training sessions to determine a PDP nutrition program that works best. Note that 100 percent certainty cannot be expected for event days, even when a program has been proven during training sessions. While a few approaches exist that could address energy-draining hypoglycemia, in healthy people, one example would be to, at the start of athletic training or events, have the athlete move around at a warm-up level of activity and to then have him or her start slowly ingesting an appropriate carbohydrate/electrolyte beverage to achieve and maintain a normal blood sugar level. The exercising muscles stimulating glucagon levels along with the exogenous carbohydrate source may overcome the hypoglycemia condition. Changing the timing and composition of the pre-event meal and sports nutritionals may also be warranted if hypoglycemia occurs at the start of training sessions or athletic events. Of course, the team doctor should be consulted to determine the cause and best course of action.

Pre-Event Meal/Sports Nutritionals

Although all athletes should get their pre-event meal composition and timing perfected, this is especially important for athletes undergoing long duration events that may deplete their glycogen supplies during athletic events and training, usually continuous events lasting 90 minutes or more. However, all athletes should strive to time the pre-event meal in a way in which it has cleared their gastrointestinal systems because if food is still being digested, blood and energy will be diverted away from exercising muscles and could also create gastrointestinal upset, resulting in decreased athletic performance.

A major goal of the pre-event meal emphasizes carbohydrates to make sure adequate glycogen stores are present when athletes start their competitions along with blood glucose levels to provide exogenous

energy substrate. The pre-event meal therefore should be timed properly so it is completely digested and absorbed in to the body, before the athletic event begins. This may take three hours, plus or minus, assuming the meal is higher in carbohydrates. Ingestion of other sports nutritionals or smaller snacks that are consumed closer to training sessions of events, 60 minutes plus or minus, for example, need to ideally be cleared from the stomach at the start of athletic activity, marked by the warm-up period. Pre-training meals can be similar to pre-event meals in conditioning the digestive system, as can protein and an appropriate healthy fat content, which will not significantly slow down the stomach emptying rate.

Carbohydrate Intake during Long Duration Events and Training Sessions

During events and training sessions, the body uses carbohydrates, fatty acids, and some minor amounts of amino acids for energy. The extent of the proportional energy substrate use will depend on the type of physical activity and duration, with longer duration physical activity increasing the risk of depleting glycogen stores and reducing mental and physical performance. To help to spare the body's internal stores of energy, especially glucose from glycogen, athletes can ingest exogenous energy in the form an energy drink is. Carbohydrate ingestion during events and training sessions usually is accomplished by consuming dilute carbohydrate/electrolyte beverages. Depending on several factors, examples of ranges of carbohydrate beverage intake is about 6 to 12 ounces every 15 to 20 minutes. Carbohydrate beverages need to be diluted; 4 to 8 percent

solutions, to empty from the stomach quickly, with the lower percentage drinks usually emptying from the stomach more quickly. This is about what most sports beverages contain, but you can check with the manufacturer to confirm this. Higher percentage solutions may also be suitable depending on the individual's beverage digestion ability during physical activity. Observations suggest that even short duration sport athletes not at risk for glycogen depletion may benefit from sipping small amounts of a carbohydrate energy drink, as doing so may promote neurological benefits. There is even some emerging research using carbohydrate beverage mouth rinsing, which will be interesting to report on in the future as more research develops.

Some additional reference intakes, based on endurance athletes include 30 to 60 grams per hour carbohydrate, for events 1 to 2.5 hours in duration and up to 90 grams per hour carbohydrate for events more than 2.5 hours in duration. These guidelines should be adjusted for each athlete but are starting points found published in the scientific literature. As indicated in the 2017 Trommelen study below, higher rates of exogenous carbohydrate may be possible. (Note that larger team sport and strength athletes may have the potential for higher per hour carbohydrate digestion and utilization rates.)

Regarding the type of carbohydrate, for elite level performance, ones up to a couple to a few hours in duration, glucose-containing beverages will provide the fastest available energy. As studies with endurance athletes have reported exogenous glucose use during events to be about 1 to 1.2 grams per minute, 60 to 72 grams per hour would be a starting point range for just glucose.

Because the intensity of the continuous exercise is low to moderate, and longer in duration, over about two hours, the mixed-carbohydrate source may have an advantage because some recent research indicates that the total amount of ingested carbohydrate per hour that can be used for energy may be at a higher rate of use. This was indicated in test beverages containing high amounts of glucose, sucrose, or fructose (see Trommelen study overview below). Fast digesting glycose polymers are also used in some energy drinks. All athlete needs to evaluate what works best for them individually, especially ultra-endurance athletes who as a group have extremely special event nutrition needs that can only be determined by working directly with a sports nutrition expert.

It is interesting to note that energy requirements during exercise or events are relatively constant, whereas hydration needs can vary depending on rates of sweating, which can vary from day to day. Thus, becoming more sophisticated with fluid, electrolyte, and energy substrate intake during exercise will require making estimates based on climate conditions and expected rates of sweating for each day. This can be challenging for outside sporting events and usually more constant for inside sporting events.

Research efforts are constantly being conducted to fine-tune approaches for maximum use of exogenous energy sources during exercise, such as carbohydrates during events and training sessions. For example, J. Trommelen and coworkers (2017) reported in their research that co-ingestion of glucose plus sucrose and glucose plus fructose resulted in higher oxidation rates compared with ingestion of glucose alone, during 180 minutes of endurance-type cycling exercise using trained male cyclists. The cyclists exercised

at a moderate level of intensity. The researchers observed that both the glucose-plus-sucrose and glucose-plus-fructose treatments resulted in higher total oxidation rates, versus just glucose treatments, which reconfirmed previous study results. The increase of oxidation rates was more pronounced during the latter 120 minutes of exercise, which is to be expected. The researchers noted some limitations of this study, such as its not being an exercise performance study, that fructose takes extra energy to be converted into lactate or glucose before being used in exercising muscles, and that a fructose group was not included. An interesting observation was that fatty acid metabolism was highest in the water-only group, and then the next highest was in the glucose-only group, followed by the mixed-carbohydrate groups. Moreover, upper gastric distress scores were highest for glucose only, versus glucose plus sucrose or fructose, and for water only.

Rates of carbohydrate ingestion and oxidation from the study are as follows:

- Rates of ingestion: 1.8 grams per minute glucose; 1.2 grams per minute glucose & 0.6 grams per minute fructose; 0.6 grams per minute glucose & 1.2 grams per minute sucrose. [Total fluid/experimental drinks provided during 180 minutes was about 2.25 liters per subject. Rate of fluid intake was 600 ml during first three minutes of exercise, followed by 150 ml every fifteen minutes.]
- Rates of exogenous carbohydrate oxidation: glucose-only peak oxidation rate was 0.96 grams per minute; glucose & fructose peak-oxidation rate was 1.4 grams per minute; and glucose and sucrose peak-oxidation rate was 1.29 grams per minute. (Note that endogenous carbohydrate oxidation was also estimated and reported in the study.)

An interesting point of these research results is that the exogenous mixed simple carbohydrate intake resulted in higher oxidation rates (energy use) versus those of just glucose. But this highest oxidation rate was less than the 1.8 grams per minute rate of intake.

The researchers review additional measurements and data that can be found by reading the entire study. For example, Figure 2 in their study report provides an illustration of the relative contribution of substrates to total energy expenditure. An interesting trend from the illustration is that when compared with water only, more carbohydrates (endogenous and exogenous) contribute to energy expenditure in all the carbohydrate treatment groups and to less endogenous fat. In addition, the water-only treatment had a higher percentage of endogenous carbohydrate oxidation compared with that of the carbohydrate treatment groups. Thus, ingestion of exogenous carbohydrates helped “spare” or use less endogenous carbohydrate and fat for energy. But remember to keep the added sugars under control by avoiding excessive intake of added sugars.

Post-Event or Post-Exercise Meal

There are some misconceptions about post-exercise eating. One is that there is only a tiny window of opportunity to replenish glycogen; some people are led to think that it is a matter of minutes, but it is longer. It is true that after-exercise glycogen replenishment can be at a higher rate with a post-exercise meal, but the time of this window runs up to a couple of hours, a period in which athletes should be eating as part of their routine. Additionally, glycogen stores can be replenished ongoing from meal

to meal when food composition and caloric content is adequate. Therefore, it is beneficial to be able to time post-exercise or post-event meals to be consumed within about one hour after exercise, depending on the workout length and intensity and depending on any post-exercise water and on carbohydrate/protein/electrolyte drinks ingested directly after training/events. This may then require the post-training meal to be in the 30-minute to two-hour range. Some people like to think of post-exercise or post-event supplements and meals as several courses spread out over an hour or more, eating slowly to not overwhelm the stomach. Moreover, consuming a post-workout beverage that contains carbohydrates and protein, first, followed by a complete post-exercise meal will allow for optimal muscle recovery. This will get carbohydrates, protein, and other nutrients into your body fast, in an easy-to-digest hydrated form for rehydration. This is done in addition to ingesting plain water. Some post-training /event carbohydrate and protein supplement intake examples include 15 to 25 grams of high-quality protein and 1 to 1.5 grams per kilogram of bodyweight. This is more important if the post-exercise meal is delayed.

Post-exercise meals or sports nutrition drinks for post-exercise consumption can be high in carbohydrates and moderate in protein, and low in fat, something that will be easily and quickly digested. In addition, high glycemic index carbohydrates will further increase the rate of glycogen replenishment in the post-exercise period. Some athletes may also need to increase their consumption of salty foods to help replace the sodium lost during high sweat-loss exercise or events, along with potassium and other essential vitamins and minerals. This is

why the consumption of a complete post-exercise meal with supplements is desirable for optimum nutrient replenishment in general. The GI value of meals following the post-exercise meals are less critical and can range from high to medium to low GI values based on nutritional preference. Generally, for weight loss, or athletes with weight management issues, medium to lower GI meals will promote better appetite control and a higher rate of fat metabolism. Starting by eating carbohydrates first during the meal can favor faster carbohydrate digestion, whereas eating protein first and any mixed macronutrient meal can start to slow down stomach emptying. So even meal to meal, there is potentially a conflict between intake of water and nutrients, based on the rate of stomach emptying and intestinal absorption and assimilation.

Protein

The issue of protein intake can become complicated when including whole proteins and extra amino acid supplementation. In short, the key to maintaining adequate protein intake is to divide the daily high-quality protein intake requirement of an athlete over the several daily eating occasions of meals, snacks and sports nutrition products, which may include consumption of protein drinks and protein bars and high-protein meal replacements. This will provide a steady supply of amino acids to the body's tissues and amino acid pool. Additional specialized supplements previously reviewed include BCAAs, essential amino acid blends, some individual amino acids, and the various protein sports nutrition products with added amino acids and other nutrients and ergogenic substances.

High-quality protein consumption should be emphasized. This can be provided by a combination of conventional healthy protein foods and protein supplements, such as whey, casein, egg, high-quality soy isolates, and various protein combinations. This last item may include fortification with individual amino acids, such as the essential amino acids. The other factor of high-quality proteins is healthy fat content, minimizing protein food sources that are high in saturated fats.

Regarding some additional protein intake information, although it has taken many years for the academic researchers and various sports organizations to break away and recognize that the low RDA protein intake for adults (0.8 grams per kilogram of body weight per day) is not sufficient for athletes, with some still in catch-up mode, the overall trend has been to increase the protein intake guidelines for athletes in the 1.2 to 2 grams per kilogram of body weight per day range, or higher, as a general sports nutrition approach. Note that this course was among the first to establish higher protein intake requirements for athletes, decades ago. In addition, various studies reported a further breakdown based on athlete type, similar to the Dynamic Nutrition Approach. This includes, for example, 1 to 1.6 grams per kilogram of body weight per day for endurance training/exercise; 1.4 to 1.7 grams per kilogram of body weight per day for intermittent stamina type sports; and 1.6 to 2 grams per kilogram of body weight per day for power and strength training/exercise. Regarding even higher protein intake, J. Antonio and coworkers (2015) reported their results of safety and efficacy of a high protein diet of 3.4 grams per kilogram of body weight per day using

male and female subjects who were resistance training, during an eight-week treatment period of a high-protein diet and resistance training. J. Antonio and coworkers (2016) also reported on another high protein intake study conducted over a year, in a crossover design. During this study, the high-protein diet was followed for two months, and four months, at a rate of 3.32 grams per kilogram of body weight per day. Among various health parameters tested during the study periods, there were no harmful effects found regarding measures of blood lipids and liver and kidney function. For bodybuilders during contest preparation, E. R. Helms and coworkers (2014) provided evidence-based nutrition recommendations for protein of 2.3 to 3.1 grams per kilograms of lean body weight per day, especially for periods of calorie restriction to help reduce loss of lean body mass.

Remember that short-term use of higher protein diets for athletes is intended to achieve multiple goals in addition to just maintaining positive nitrogen balance. These goals include increasing lean body mass, including muscle mass; preventing loss of lean body mass during high-intensity, long duration training during the preseason and season; lowering body fat; compensating for amino acids that are used for energy; and supporting progressive, compensatory improvements from athletic training. Higher protein diets for healthy athletes should be for short-term use such as a few months to several months and monitored closely by a doctor to determine whether any side effects occur and whether changes to the diet or treatment are needed. Extra water intake can be required with higher dietary protein intake.

What about protein intake during training sessions or athletic events?

As previously reviewed, spacing protein intake over several eating occasions provides a steady supply of amino acids required for growth, maintenance, and other protein/amino acid-related functions. This approach should cover the pre-training and post-training training session/athletic event eating occasions, in addition to eating main meals and/or snacks. This leaves the time at training sessions and during athletic events periods—for these, the sports nutrition focus has usually been on hydration, carbohydrates and electrolytes, and certain ergogenic substances.

There are then two main considerations regarding “protein during,” that is, during training sessions and during athletic events. The current consensus published in independent research studies and reviews indicates that protein supplementation during exercise does not appear to promote immediate/acute athletic performance benefits, especially when compared with other nutrients, like carbohydrate, or some of the ergogenic substances previously reviewed (van Loon 2014, Beck 2015, Thomas 2016).

However, in terms of training sessions, there could be potential benefits from some protein intake during exercise with carbohydrates, related to potentially reducing muscle damage, enhancing recovery, and promoting muscle protein synthesis. Potential benefit could be expected for longer duration training sessions that can have greater depletion effects on the amino acid pool, for both endurance and strength sports, assuming this is not at the expense of hydration, electrolyte, and

carbohydrate supply. This would need to be determined from working with individual athletes on a cost-benefit evaluation basis, ideally in the off-season or early preseason as to not interfere with athletic performance during the season. Traditionally, it is common among some strength athletes to drink low-concentration protein or protein multi-nutrient- containing beverages during training sessions, especially among athletes with shorter duration training sessions who are not at risk for dehydration or glycogen depletion. Note that while being an advanced specialty topic not covered in this course, it is worth mentioning the potential benefits for ultra-endurance athletes of drinking low-concentration protein or protein nutrient-containing beverages, which along with other nutrients during the long training sessions and athletic events, could help reduce tissue breakdown and promote recovery.

Fats

The term “fat” is frequently used in a way that follows conventional usage, not to mean only saturated fats. An example of conventional usage of the term fats is on food and supplement product labeling, which includes saturated and unsaturated fats. Regarding dietary fats, the focus should be the healthy lipids, including the essential fatty acids, EPA, DHA, and other unsaturated fatty acids.

Controlling total daily fat intake results from emphasizing carbohydrate and protein intake, so fat intake comes in on the low side of the range. Recall that although fats are important, athletes’ diets can be too high in fats and inadequate in carbohydrate and protein content. If for individual reasons, fat intake needs to be

increased above the basic plan goals, the good news when it comes to fat content is that it is easy to increase it in the diet. Adding healthy oils to foods and in cooking, taking healthy fat supplements, and eating healthy fat food sources like nuts and nut butters, avocados, and oily fish, for example, is fairly straightforward. Just pay attention to how the extra dietary fat affects stomach emptying rate, which may be longer when the fat content of a meal is increased, in addition to other factors.

Meal Timing and Training Timing

Each athlete needs to determine what works best for his or her personal rate of digestion from working with the health professional team. Note that in general, a person’s rate of digestion is expected to increase as daily physical activity increases; this is the body’s mechanism to make sure the increased nutrition demands can be met. Thus, there can be variation in the amounts consumed per eating occasion and rate of intake from eating occasion to eating occasion. Achieving the optimum intake of total daily calories and required nutrients involves expert evaluation and planning. Sports nutrition coaching is involved, which athletes sometimes refer to as sports nutrition nagging. Even what would seem to be the simplest nutrition factor, adequate hydration, is often deficient for many athletes in training. In addition, if athletes need to eat or drink fluids during their competition, this needs to be part of their training to condition the gastrointestinal system to process nutrition during athletic performance.

Many athletes who do not consume the required fluids, and sometimes the solid sports nutritionals during their training



periods that are required during competitions/events, experience gastrointestinal upset during competitions from not having properly conditioned the gastrointestinal system. In addition to conditioning an athlete's digestive system during training, this allows for fine-tuning the fluids and foods that promote easy digestion and enhanced athletic performance versus the opposite. Remember that athletic competitions may be a regular season event or daylong or multiple-day tournaments. Then there are the very physical and nutritionally demanding multi-day endurance event sports like the Tour de France that require a very sophisticated sports nutrition program involving daily medical monitoring by highly qualified health professionals.

Calorie and macronutrient modulation is an important part of an athlete's sports nutrition program, which is dynamic in nature. Day to

day, caloric intake requirements will typically be different depending on an athlete's training duration and intensity and on other daily physical activity demands, which are sometimes tragically overlooked and can cause detrimental caloric and nutrient deficiencies. Modulating the relative proportions of fat, carbohydrate, and protein, especially before, during, and after training or competitions, is required. Then there is the specialized practice of glycogen supercompensation reviewed in Unit 19, along with the general approach of increasing carbohydrates before and the day of athletic events/competitions.

A good starting point example for meal scheduling or timing is the "Clock Approach"

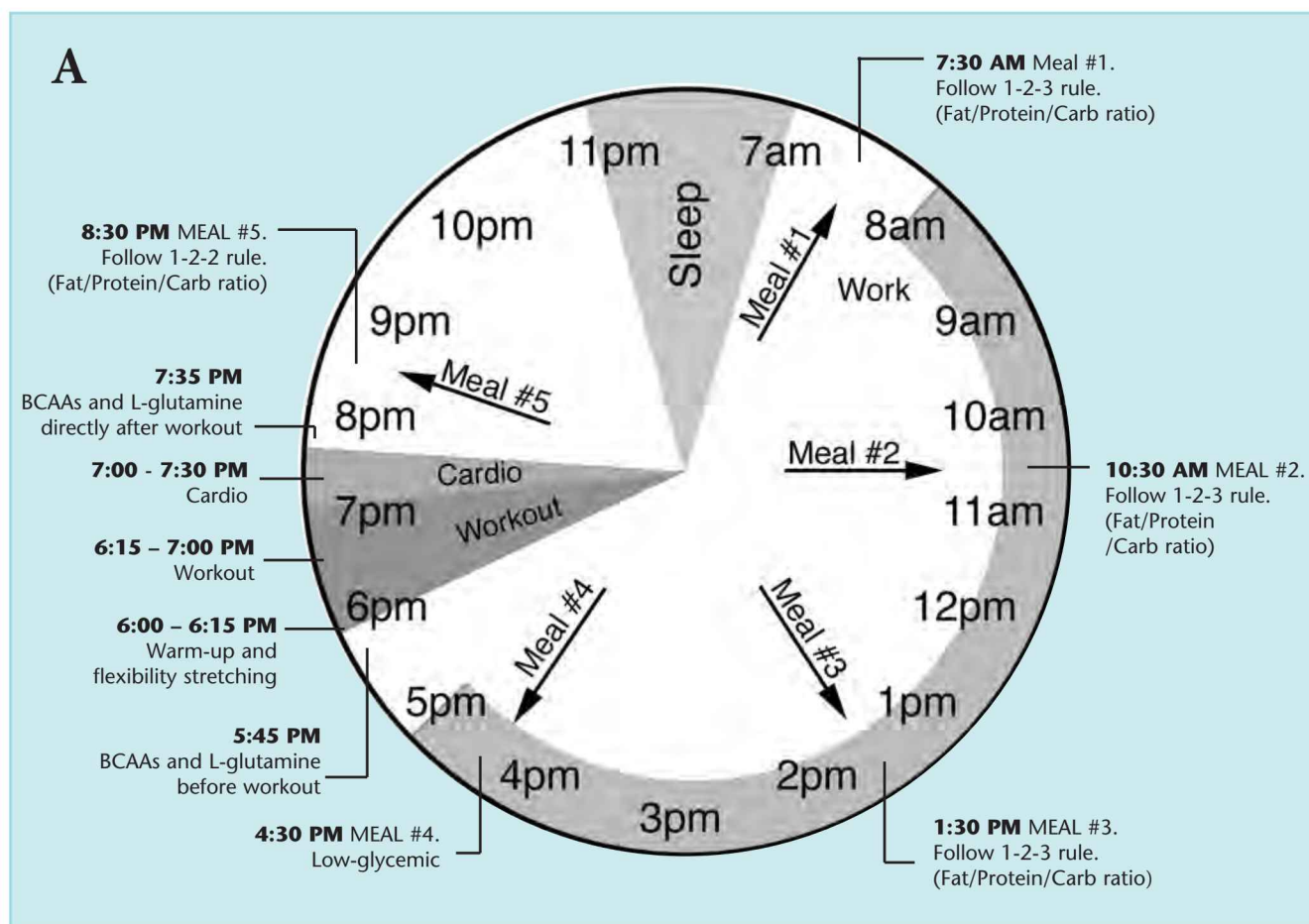
"Clock Approach" **Meal Scheduling Examples**

The Clock Approach was developed by Dr. Hatfield to help as a visual aid to align nutrition with training and competition schedules. This can best be done by consuming five or six meals each day. Pay attention to maintaining adequate blood sugar levels. Following a meal, blood sugar will be elevated. This will allow a person to perform physical activity without the loss of energy. Of course, the more intense the physical activity, the quicker these blood sugar levels will drop. If you learn to listen to your body, you will realize that your blood sugar is low and that replenishment is needed.

As a starting point, a meal every three or so hours is suggested, which can be plus or minus based on an individual's rate of digestion and meal composition. Pace caloric intake for the hours following the meal, for example, the meal

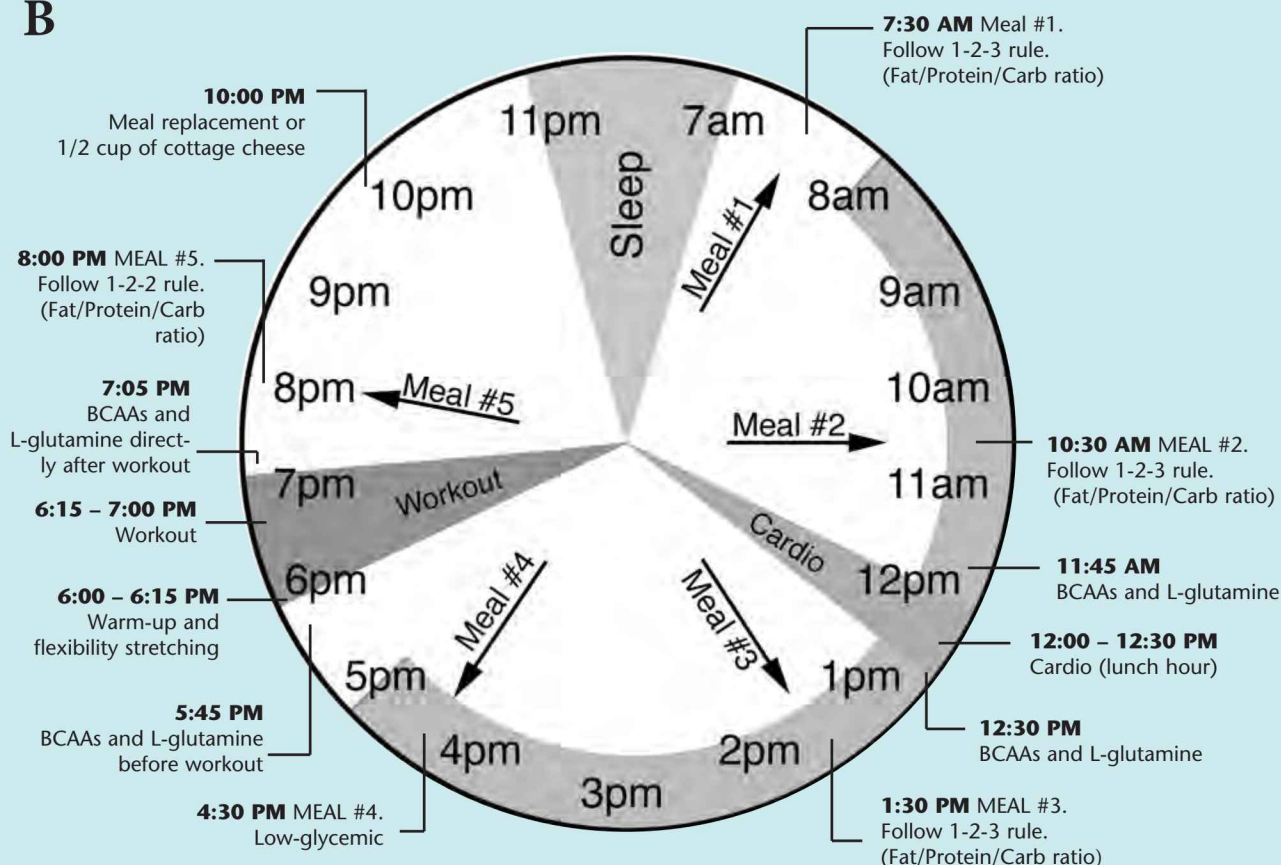
prior to a low-energy activity or a sedentary activity like sitting will be fewer calories compared with the meal prior to a high-activity athletic training. Simply ask, “What am I going to do in the next three hours?” By carefully evaluating your next three hours of activity, you can determine approximately how many calories to consume at the present meal.

The following Clocks include examples for different numbers of workouts per day, with meals following the 1-2-3 rule of Fat/Protein/Carb ratio, noting that meals can be fine-tuned using the Dynamic Nutrition Approaches for the different athlete-types.

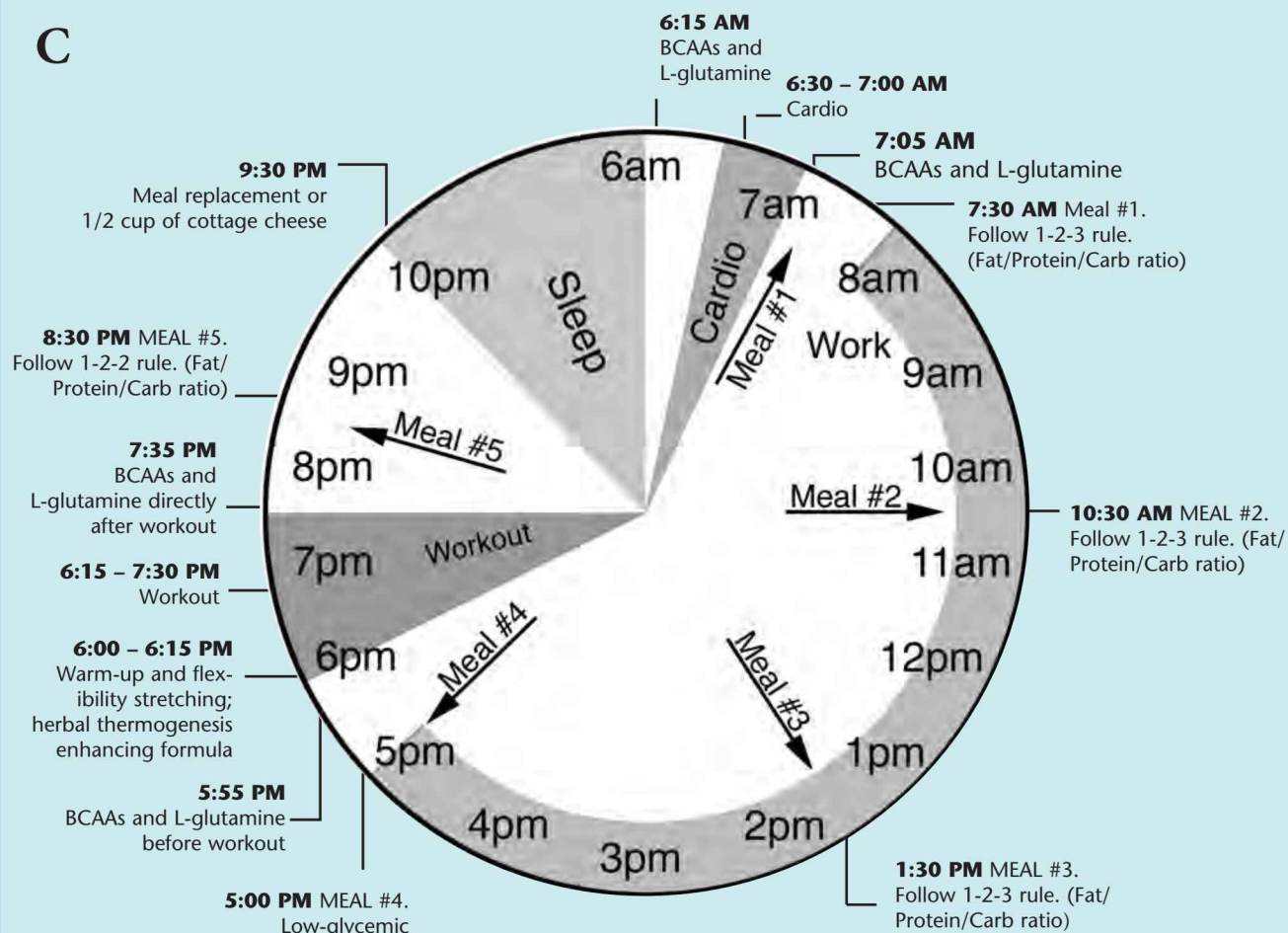


Clock A, above. Clock B top right. Clock C, bottom right.

B



C



Sports Nutrition Fine-Tuning Is Ongoing

Based on new ingredients, new sports nutrition products, new research discoveries, and new sports nutrition insights, one thing is certain: fine-tuning an athlete's sports nutrition program will be an ongoing effort. Even when the point is reached when 99 percent optimization is achieved, it is that extra 1 percent that could

be the championship edge an athlete needs to achieve his or her athletic performance goals. The “Alkalinity Nutrition Factor” information box is a good example of progressive sports nutrition research that goes beyond conventional nutrition thinking.

The Alkalinity Nutrition Factor Throughout this course, and in most conventional thinking about nutrition, the major focus is on achieving daily intake of the essential, semi-essential nutrients, and specialty ergogenic ingredients for optimum health and maximum performance, too. But aside from this essential nutrient focus, an additional line of thinking concerns how diets affect the acidity or alkalinity of the body. Acid-alkaline diets and food factors come arise as a topic in general for health purposes and as related to sports and athletic performance. Books have been and will continue to be written about this subject of growing interest, and research is being conducted as well.

At a simple level of explanation, the idea is, with pH 7 being neutral, the body (body fluids) could be in a healthier condition when on the alkaline side of the pH scale for body fluids (7+) versus the acid side (7-). The thought is that when the body's pH is alkaline, this could be healthier, and when the body's pH is acid, this could be unhealthy. Origins of acid-alkaline balance are thought to be rooted in traditional health approaches dating back thousands of years.

A core point of achieving and maintaining alkalinity is eating the right balance of acid forming foods and alkaline forming foods to maintain a body that is overall alkaline. There are many facets to this, and modern research is slowly but surely being conducted to provide additional evidence to the appropriateness of the alkalinity-forming diet approach. Note that while this is independent of essential nutrients, there is a relationship. For example, body acidity may disrupt calcium in the bones, possibly causing bone calcium to be released to support the body's calcium-based buffering system. Acid body plus inadequate calcium intake is even more of a problem for bone health. Moreover, disruption of calcium ions in the nervous system may be adversely affected from body acidity, one of the possible factors leading to exercise-related fatigue, such as with the lowering of pH in the exercising muscles and the rest of the body.

Speculation aside, the point of bringing this topic to your attention is leading up to a 2015 research study by Susan L. Caciano and coworkers, titled “Effects of Dietary Acid Load on Exercise Metabolism and Anaerobic Exercise Performance.” The researchers noted that urine pH relates to dietary acid-base load, and during the study, the alkaline-promoting diet was designed to promote a urine pH greater than or equal to pH of 7.0, and the acid-promoting diet was designed to promote urine pH less than or equal to 6.0. The alkalinity-promoting diet was high in fruits and vegetables and low in meats, grains, and cheese, which can promote systemic acidity. Note too that bicarbonates reviewed in Unit 9 have been proven to promote alkalinity and benefit some types of athletic performance. Furthermore, there is some research examining the alkalinity-promoting effects of the “greens drinks” being sold in health product stores, which are becoming more popular with health-minded people (see Anton 2013 reference for an example). It is important to realize that although this research is interesting, it is considered experimental and evolving, and the research subjects were under close medical supervision in the Caciano 2015 experiment.

It took several days for subjects to achieve either acid or alkaline urine pH from the respective diets. Subjects then underwent anaerobic exercise-performance testing. Anaerobic exercise performance testing consisted of running time-to-exhaustion lasting one to four minutes on a treadmill wherein running speed was constant and the incline was increased until fatigue was achieved in a graded exercise design. The alkaline-promoting diet subjects experienced improvement in anaerobic exercise performance by 21 percent compared to the acid promoting diet subjects.



Food Lists

The foods lists can be used to make food substitutions to the eating plans listed above based on individual athlete requirements. You should also include healthy favorite foods and foods that are readily available. Make additions to these lists to include suitable foods that are the athlete's favorites. Be sure to refer to the Dietary Guidelines document in the appendix. The food lists begin on the next page.

Note that the actual calorie and nutrient content for conventional foods can vary up to 20 percent or more, higher or lower; many agricultural factors contribute to this variation. Nutrient content variation of supplement products tends to be less, due to the high standard of manufacturing and quality control testing requirements.

When possible, choose organic foods, range-fed organic, whole grains, and whole unprocessed foods.

High-Protein Foods: Beef, Lamb, Poultry, Fish, Pork.					
Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Abalone	3 oz	89	14.5	5.1	0.7
Bacon Alternative (Louis Rich)	1 strip	32	2.4	0.3	2.4
Bacon Bits (Hormel)	1 oz	117	12	1	7
Bacon, Canadian-Style	1 slices	86	11.3	0.6	3.9
Bass, Freshwater	1 oz	32	5.3	0	1
Bass, Sea	1 oz	27	5.2	0	0.6
Beef, Flank, untrimmed	1 oz	51	5.6	0	3
Beef, Bottom Round, prime, trimmed	1 oz	45	6.2	0	2.1
Beef, Bottom Round, prime, untrimmed	1 oz	64	5.7	0	4.4
Beef, Sirloin, prime, trimmed	1 oz	44	6	0	2
Beef, Tenderloin, choice, untrimmed	1 oz	82	5	0	6.7
Beef, Corned (Hillshire Farm)	1 oz	31	6	0	0.4
Beef, Roast, sliced (Healthy Deli)	1 oz	30	6.4	0.2	0.4
Buffalo	1 oz	31	6.1	0	0.5
Bluefish	1 oz	35	5.7	0	1.2
Burger, vegetarian, Harvest Burger (Green Giant)	1 burger	140	18	8	4
Chicken, breast, no skin	1 oz	31	6.5	0	0.4
Chicken, breast, with skin	1 oz	49	5.9	0	2.6
Chicken, sliced, (Tyson Hickory smoked)	1 slice	25	4	0.8	1
Cod	1 oz	23	5	0	0.2
Deer	1 oz	34	6.4	0	0.7
Egg (chicken)	1 large	75	6.3	0.6	5
Egg, white (chicken)	1 large	17	3.5	0.3	0
Egg, Alternative (Fleishmann's) Egg Beaters vegetable omelet	1/2 cup	50	7	5	0
Flounder	3 oz	77	16	0	1
Frankfurter, low fat, (Healthy Choice)	1 frank	70	8	5	2
Halibut	1 oz	31	5.9	0	0.6
Ham, fresh trimmed	1 oz	39	6	0	1.5
Ham, sliced (Kahn's)	1 slice	30	5	1	1
Pork, Tenderloin, trimmed	1 oz	34	5.9	0	1
Pork Chops (Master Choice)	1 chop	120	22	0	4
Tofu, soybean curd cake	1 oz	22	2.3	0.5	1.4
Tuna, bluefin	1 oz	41	6.6	0	1.4
Tuna, canned in soybean oil, solid, drained (Star-Kist)	2 oz	150	13	0	13
Tuna, canned, white, in water, drained, diet (Star-Kist)	2 oz	70	15	0	1
Turkey, light meat, no skin	1 oz	33	6.7	0	0.4
Turkey, dark meat, no skin	1 oz	35	5.7	0	1.2
Turkey, sliced, (Tyson)	1 slice	20	4	0.3	0.4

**Foods High In Complex Carbohydrates:
Breads, Crackers, Cereals, Grains, Starchy Vegetables, And Starchy Fruits.**

Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Bagel, Onion 3.5-inch diameter	1 bagel	195	7.5	37.9	1.1
Bagel, Plain 3.5-inch diameter	1 bagel	195	7.5	37.9	1.1
Bagel, Frozen (Lender's)	1 bagel	150	6	30	1
Bagel Chips (Burns & Ricker)	1 oz	130	4	20	4
Biscuit, commercially baked	1 oz	103	1.8	13.8	4.7
Hamburger bun	1 bun	123	3.7	21.6	2.2
Bread, white	1 slice	70	3	13	1
Bread, whole wheat	1 slice	60	3	11	1
Bread, bran	1 oz	100	4	19	1
Bread, French	1 oz	78	2.5	14.7	0.9
Bread, whole grain	1 slice	85	3.9	17.4	1.6
Bread, rye	1 slice	80	3	16	1
Cake, Free & Light frozen (Sara Lee)	1/8 cake	110	2	26	0
Cake, pound, Free & Light (Sara Lee)	1/10 cake	70	1	17	0
Cereal, All Bran extra fiber (Kellogg's)	1 oz	50	4	22	0
Cereal, Basic 4 (General Mills)	3/4 cup	130	3	28	2
Cereal, Corn Flakes	1 oz	110	2.3	24.4	0.1
Cereal, Grape-nuts (Post)	1 oz	101	3.3	23.3	0.1
Cereal MultiGrain Cheerios (General Mills)	1 oz	100	2	23	1
Cracker, saltine (Premium) Fat-free	4 crackers	50	1	12	0
English Muffin, plain (Thomas')	1 muffin	130	4.3	25.4	1.3
Frankfurter bun	1 bun	123	3.7	21.6	2.2
Oatmeal, plain, instant	1 oz	100	5.8	18	2
Roll, Hoagie	1 roll	210	8	34	5
Roll, Kaiser	1 roll	184	7	35.4	2.9
Roll, Sandwich	1 roll	123	4.5	21.6	3.3
Grits, dry (Arrowhead Mills)	2 oz	200	5	43	1
Pancake, buttermilk, (Hungry Jack), prepared, with skim milk, oil, egg whites	3 pancakes	200	6	28	7
Pancake, extra light, (Hungry Jack), prepared with skim milk, oil, egg whites	3 pancakes	170	6	28	4
Pasta linguine and spaghetti, dry	2 oz	210	9	41	1
Popcorn, microwave, (Jiffy Pop), Natural, popped.	4 cups	140	3	17	7
Popcorn, microwave, (Jolly Time), light	3 cups	60	2	12	2
Potato, baked in skin	4 oz	124	2.6	28.6	0.1
Potato, boiled, no skin	4 oz	99	2.1	22.8	0.1
Potato, sweet, baked, pulp only	4 oz	117	2	27.5	0.1
Pretzels, most types	1 oz	110	3	23	1
Rice, Brown, dry	1 oz	103	2.3	22	1
Rice, White, dry	1 oz	105	2	23	0.2

Vegetables and Beans					
Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Adzuki Bean, raw	1 oz	93	5.6	17.8	tr
Arugula	1 leaf	1	0.1	0.1	0
Baked Beans, canned , Tomato (Campbell's)	8 oz	200	10	43	3
Baked Beans, canned, Barbecue (B&M)	8 oz	260	15	48	6
Baked Beans, canned, pea, small (Friends)	8 oz	360	17	62	4
Baked Beans, canned, Showboat (Bush's Best)	8 oz	160	12	38	<1
Baked Beans, canned, Vegetarian (B&M)	8 oz	230	14	50	3
Black Bean, raw	1 oz	97	6.1	17.7	0.4
Broccoli, fresh, raw, trimmed	1 oz	8	0.8	1.5	0.1
Broccoli, frozen, spears (Birds Eye)	4 oz	30	4	6	0
Cabbage, raw	1 oz	5	0.3	0.9	0.1
Carrot, raw	1 oz	12	0.3	2.9	0.1
Cauliflower, raw	1 oz	7	0.6	1.4	0.1
Celery, raw	1 oz	5	0.2	1	0
Corn, frozen (Health Valley)	1/2 cup	76	2	17	0
Garbanzo Bean, raw	1 oz	103	5.5	17.2	1.7
Lettuce, iceberg, trimmed	1 oz	4	0.3	0.6	0.1
Lettuce, romaine, trimmed	1 oz	5	0.5	0.7	0.1
Lima Bean, raw	1 oz	32	2	5.7	0.2
Lima Bean, frozen (Green Giant)	1/2 cup	80	6	18	0
Onion, raw, trimmed	1 oz	11	0.3	2.4	0.1
Spinach, untrimmed	1 oz	6	0.2	1	0.1
Tomato, 2 3/4inch dia, 4.75 oz	1 tomato	26	1	5.7	0.4
Turkey, sliced, (Tyson)	1 slice	20	4	0.3	0.4

Fruit: Whole Fruits and Sauces					
Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Apple Sauce (Mott's) Natural	6 oz	80	0	20	0
Apricot pitted	1 oz	14	0.4	3.2	0.1
Apricot Dried (Del Monte)	2 oz	140	2	35	0
Asparagus Frozen (Birds Eye)	3.3 oz	25	3	4	0
Blueberry	1 oz	16	0.2	4	0.1
Fruit Cocktail, canned, in light syrup	4 oz	65	0.5	16.9	0.1
Grapefruit	1/2 fruit	50	1	13	0
Orange	1 med	62	1.2	15.5	0
Pasta Sauce, (Hunt's) Homestyle	4 oz	60	2	10	2
Pasta Sauce, (Ragu), Mushroom Thick and Hearty	4 oz	100	2	15	3

Dairy: Cheese, Milk, Yogurt

Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Cheese, American	1 oz	110	6	1	9
Cheese, American Cheddar	1 oz	113	7	0.4	9.3
Cheese, parmesan, grated	1 oz	128	11.6	1	8.4
Cheese, Swiss	1 oz	105	8	1	7.7
Cottage Cheese, large curd	4 oz	117	14.1	3	5.1
Cottage Cheese, large curd, 1%	1 oz	20	3.5	0.8	0.3
Cottage Cheese, large curd, 2%	1 oz	25	3.9	1	0.5
Cream Cheese	1 oz	98	2.1	0.7	9.8
Cream Cheese, fat-free	1 oz	30	6	2	0
Butter, Salted	1 tbsp	100	0.1	0	11.4
Milk, Skim	8 oz	86	8.4	11.9	0.4
Milk, 1%	8 oz	102	8	11.7	2.6
Milk, 2%	8 oz	121	8.1	11.7	4.7
Milk, Whole	8 oz	150	8	11	8
Yogurt, Plain (Dannon), low fat	8 oz	140	10	16	4
Yogurt, Plain (Dannon), nonfat	8 oz	110	11	16	0
Yogurt, Mixed Berry (Breyers), low fat	8 oz	250	9	48	2

Spreads and Sauces

Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Catsup	1 tbsp	16	0.2	4.1	0.1
Margarine (Land O'Lakes)	1 tbsp	35	0	0	4
Mayonnaise	1 tbsp	100	0	0	11
Mustard	1 tbsp	10	1	1	1
Olive oil	1 tbsp	120	0	0	14
Pancake syrup (Hungry Jack), lite	2 tbsp	50	0	14	0
Pancake syrup (Hungry Jack), regular	2 tbsp	100	0	26	0
Safflower oil	1 tbsp	120	0	0	14
Salad Dressing, (Kraft), Blue Cheese "Free"	1 tbsp	16	0	4	0
Salad Dressing, (Kraft), French, reduced calorie	1 tbsp	20	0	3	1
Salad Dressing, (Seven Seas), oil & vinegar	1 tbsp	45	0	1	4
Salad Dressing, (Wish-Bone), Blue Cheese, Chunky	1 tbsp	75	0.4	0.7	7.9
Salad Dressing, (Wish-Bone), Italian	1 tbsp	46	0	1.5	4.5
Steak Sauce, (A1)	1 tbsp	18	0	4	0



Beverages					
Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Apple Juice,(Knudsen&Sons),natural	8 oz	85	<1	21	0
Apple Juice (Ocean Spray)	6 oz	90	0	23	0
Apple Grape Juice (Red Cheek)	6 oz	109	0.3	27	0
Banana, w/o skin	1 fruit	105	1.2	26.7	0.6
Cranberry Juice	8 oz	125	<1	31	0
Carbohydrate Sports Drink, low calorie	8 oz	50	0	13	0
Carbohydrate Sports Drink, medium calorie	8 oz	100	0	25	0
Carbohydrate Sports Drink, high calorie	16 oz	400	0	100	0
Grape Juice	6 oz	120	0	30	0
Grapefruit Juice	6 oz	60	1	15	0
Orange Juice	6 oz	120	0	30	0
Vegetable Juice (V8)	6 oz	35	1	8	0

Mixed Foods					
Food	Serving Size	Calories	Protein (Grams)	Carbs (Grams)	Fat (Grams)
Beef, corned hash, canned (Libby's)	8 oz	420	19	21	28
Chili, canned w/ chicken (Stagg)	7.5 oz	200	14	21	6
Chili, canned vegetarian (HealthValley)	5 oz	90	10	12	0
Food-bar, banana apple walnut, "Bagel Power Bar" (Earth Grains)	1 bar	270	12	45	6
Food-bar, Pemmican, carob-cocoa (Bear Valley)	1 bar	440	16	68	12
Food-bar, raspberry, fat free (Health Valley)	1 bar	140	3	33	0
Pizza, frozen, Three Cheese (Lean Cuisine)	5.5 oz	330	23	38	10
Protein Drink, low calorie, powder	2 oz	225	30	15	5
Protein Drink, medium calorie	4 oz	470	40	64	6
Protein Drink, high calorie	5 oz	548	30	80	12
Protein Nutrition Bar, low calorie	1 bar	225	30	15	5
Protein Nutrition Bar, medium calorie	1 bar	470	40	64	6
Protein Nutrition Bar, high calorie	1 bar	548	30	80	12
Power Bar	1 bar	230	10	45	2.5

2017 Advice about Eating Fish Guidelines from the FDA and EPA

Although the advice about eating fish, including shellfish, issued by the FDA and EPA focuses on avoiding and/or reducing potentially harmful intake of mercury and is geared toward women of childbearing age, it will be useful for everybody who wants to reduce mercury in his or her diet. The following chart categorizes fish and seafood into three main categories: Best Choices, Good Choices, and Choices to Avoid. Additional information can be found at the FDA's website:

<http://www.fda.gov/Food/FoodborneIllnessContaminants/Metals/ucm393070.htm#supporting>

Advice About Eating Fish

What Pregnant Women & Parents Should Know

Fish and other protein-rich foods have nutrients that can help your child's growth and development.

For women of childbearing age (about 16-49 years old), especially pregnant and breastfeeding women, and for parents and caregivers of young children.

- *Eat 2 to 3 servings of fish a week from the "Best Choices" list OR 1 serving from the "Good Choices" list.*
- *Eat a variety of fish.*
- *Serve 1 to 2 servings of fish a week to children, starting at age 2.*
- *If you eat fish caught by family or friends, check for fish advisories. If there is no advisory, eat only one serving and no other fish that week.**

Use this chart!

You can use this chart to help you choose which fish to eat, and how often to eat them, based on their mercury levels. The "Best Choices" have the lowest levels of mercury.

What is a serving?

To find out, use the palm of your hand!



For an adult
4 ounces



For children,
ages 4 to 7
2 ounces

Best Choices EAT 2 TO 3 SERVINGS A WEEK			OR	Good Choices EAT 1 SERVING A WEEK		
Anchovy	Herring	Scallop		Bluefish	Monkfish	Tilefish (Atlantic Ocean)
Atlantic croaker	Lobster, American and spiny	Shad		Buffalofish	Rockfish	Tuna, albacore/white tuna, canned and fresh/frozen
Atlantic mackerel	Mullet	Shrimp		Carp	Sablefish	Tuna, yellowfin
Black sea bass	Oyster	Skate		Chilean sea bass/Patagonian toothfish	Sheepshead	Weakfish/seatrout
Butterfish	Pacific chub mackerel	Smelt		Grouper	Snapper	White croaker/Pacific croaker
Catfish	Perch, freshwater and ocean	Sole		Halibut	Spanish mackerel	
Clam	Pickering	Squid		Mahi mahi/dolphinfish	Striped bass (ocean)	
Cod	Plaice	Tilapia				
Crab	Pollock	Trout, freshwater				
Crawfish	Salmon	Tuna, canned light (includes skipjack)				
Flounder	Sardine	Whitefish				
Haddock		Whiting				
Hake						
				Choices to Avoid HIGHEST MERCURY LEVELS		
				King mackerel	Shark	Tilefish (Gulf of Mexico)
				Marlin	Swordfish	Tuna, bigeye
				Orange roughy		

*Some fish caught by family and friends, such as larger carp, catfish, trout and perch, are more likely to have fish advisories due to mercury or other contaminants. State advisories will tell you how often you can safely eat those fish.

www.FDA.gov/fishadvice
www.EPA.gov/fishadvice



THIS ADVICE REFERS TO FISH AND SHELLFISH COLLECTIVELY AS "FISH." / ADVICE UPDATED JANUARY 2017



Conclusion

The Dynamic Nutrition Approach offers a comprehensive scientific evidence-based approach, which can be used as a starting point when developing a personalized sports nutrition program, by qualified health professionals, and under the athlete's doctor supervision.

Key Word

Hypoglycemia