

# **THE ATHLETE'S GUIDE TO SPORTS DIET AND NUTRITION**



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## **Disclaimer**

This guide is for informational purposes only and is not a substitute for medical advice. This guide is not intended to diagnose, prevent, treat, or cure any disease. You should consult your physician or other trained medical personnel before starting any dance, diet, fitness program, exercise program, sport program, supplementation program, and weight loss/gain program.



*Too many athletes end  
their athletic careers not  
because they want to, but  
because they have to.  
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you!*

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## What Do Professional Athlete's Have to Say about Diet and Nutrition?

Mike Green, Defenseman, Washington Capitals

"I've found that I'm not like everyone else," said Green, who reported to training camp last month weighing 204 pounds, just three more than the 201 pounds he checked in at a year earlier. **"I can't eat whatever I want and be fine. I have to make sure that I eat a certain way to perform at my best."**

Washington Post 10/15/09 p. D01

# INTRODUCTION

The **Nutrition for Football: The FIFA/F-MARC Consensus Statement (FIFA.com)** concisely explains the importance of sports diet and nutrition for all athletes:

*"Football players can stay healthy, avoid injury and achieve their performance goals by adopting good dietary habits. Players should choose foods that support consistent, intensive training and optimise match performance. What a player eats and drinks in the days and hours before a game, as well as during the game itself, can influence the result by reducing the effects of fatigue and allowing players to make the most of their physical and tactical skills. Food and fluid taken soon after a game and training can optimise recovery. **All players should have a nutrition plan that takes account of individual needs.**" (italics added)*

Nutrition is the one component of an athletic program where most people are misinformed or misunderstood. As an athlete, you are always looking for the edge over your opponent. Nutrition is that edge. It does not only impact strength, speed and stamina, but recovery as well. You, as athletes, are responsible for taking control. You must provide your body with optimal body fueling. A player who comes to practice without having eaten breakfast or lunch, or skimps on fluid intake during hot summer practices, is not going to reach his full potential – which ultimately affects the performance of the team as a whole.

The aim of this manual is to outline the basics of sports diet and nutrition with an emphasis on **practical application based on current scientific research.**

# **SECTION 1: MACRONUTRIENTS**

*When diet is wrong medicine is of no use. When diet is correct medicine is of no need. ~Ayurvedic Proverb*

## **METABOLISM: ENERGY IN vs. ENERGY OUT**

Metabolism describes all the chemical processes occurring within every living cell in the body that are necessary for the maintenance of life. The method by which the body converts the energy from food (energy in) into energy for work (energy out) is metabolism.

### **ENERGY = CALORIES**

All energy (the capacity to do work), whether it's to play sport or carry out any other activity, comes from three classes of food called **macronutrients**. These nutrients are better known as carbohydrates, fats and proteins. Each is important - not only to fuel athletic performance but also for overall health and well-being. The energy content of food is measured by a unit called a kilocalorie, which most of us call a calorie. A calorie is a measurement of the amount of heat required to raise 1 liter of water by 1 degree Celsius. Energy in food is supplied by fat, protein, carbohydrates. Protein and carbohydrates give approximately 4 calories of energy per gram. Fat gives 9 calories of energy per gram. To maintain a stable weight, energy intake from food must match energy expenditure from exercise and all other daily activities.

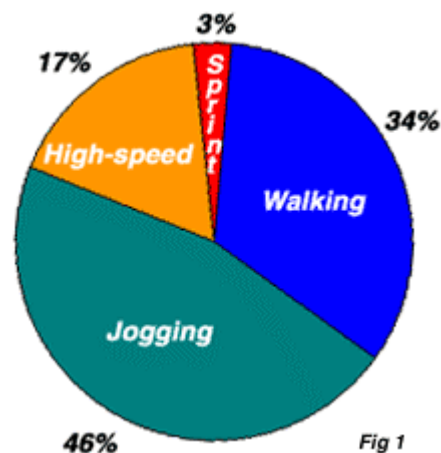
If caloric intake exceeds energy expenditure, weight gain results. This is called positive energy balance. If energy expenditure exceeds caloric intake, weight loss results. This is called negative energy balance. Manipulating these two factors is a key to attaining the ideal body weight and body composition for an athlete.

### **METABOLIC PATHWAYS = ENERGY SYSTEMS**

Determining how energy is going to be used by your body specific to the sport you play or the activity you perform will enable you to choose the best training program and most appropriate foods to eat. There are three basic energy systems used by the body:

- **ATP/PC (Adenosine Triphosphate Phospho-Creatine):** ATP has been called the "energy currency" of living organisms because it is the only thing that can release energy in our body. When we need energy, ATP releases one of its phosphate molecules and voila, energy is released. There is a limit to the amount of ATP in the body at any one time, so this system gives us energy for **activities that last up to about 10-15 seconds.**
- **Anaerobic Glycolysis:** The term anaerobic means "without oxygen" and the term glycolysis is derived from the Greek words for "sweet" (glyco) and "breaking down" or "loosening" (lysis). The glycolytic pathway requires the breakdown of stored glucose to produce ATP. This system breaks down muscle and liver glycogen stores without the use of oxygen. The byproduct of this system is lactic acid. Anaerobic Glycolysis is the primary energy source in **activities lasting between 30 seconds and 3 minutes.**
- **Aerobic Glycolysis:** After about 3 minutes of exercise, Aerobic Glycolysis is the dominant energy system. Aerobic Glycolysis produces energy by breaking down muscle and liver glycogen stores with oxygen present. Because oxygen is present when this system is in use, there is no build up of lactic acid. This system has the capacity to **produce energy for an hour or more.**

Let's take the example of soccer. During a soccer match a professional player may run between 5 and 7 miles. Are these miles run at a steady continuous pace? The following chart shows the different speeds at which these miles are run:



There are stops, starts, high speed runs, sprints, changes of direction, jogs, and walking.

Morten Bredsgaard Randers<sup>1</sup>, Jack Majgaard Jensen and Peter Krstrup. Computer Science and Match Analysis in Association Football. Journal of Sports Science and Medicine (2007) suppl. 10

So, what would be the best blend of macronutrients to each after a soccer match? Continue reading to find out.

## CARBOHYDRATES

**Carbohydrates (Carbs) are the main source of fuel for an athlete.** Most sports are stop-and-go activities with short burst of intense effort, followed by rest. Therefore, the primary fuel for sports is carbohydrates. When carbohydrate intake gets too low, your muscles run out of fuel (glycogen). Your body then starts to use fat and protein for fuel. Carbohydrates are protein sparing, so while we don't want to prevent the burning of fat, we also don't want to lose valuable muscle mass either or use all the protein we ingest for energy in lieu of muscle synthesis. We want the protein we eat to be used to repair and build muscle.

**Focus on Quality.** "Think whole grains and fiber, not carbs!" There is a huge difference between white bread and whole grain, high fiber bread; a sugar coated cereal and oatmeal; French fries vs. sweet potatoes. Processed white flour products and fat-free sugar filled products are TERRIBLE CHOICES! Eating nutrient dense carbs that contain vitamins, minerals, and fiber will spare protein and provide lasting energy.

*"There is a growing body of research that shows eating certain types of carbohydrates - like those found in potatoes and highly processed foods like white bread - can make you hungrier. That's because the body processes them more quickly - causing a spike in blood glucose, which in turn gives you a quick surge of energy. But then you crash and you're hungry again. And hunger is the primary reason diets fail." (Wall Street Journal 4/15/03 Personal Journal Page 1)*

**Fruits and Vegetables are Carbs.** Kids often shy away from them and parents don't always push them. However, research has suggested it can take as many as one dozen times to determine if a child likes a particular food. The key for a parent is to introduce kids to as many of these nutrient dense, colorful foods as possible!

### Try the following suggestions:

- Bread - Choose grainy varieties and sourdough
- Mixed Beans and peas
- Colorful Vegetables - Red, yellow and orange bell peppers, green beans, beets, yellow summer squash, zucchini, purple eggplant,

carrots, parsnips, red and green chili peppers... the colors mean carotenoids, and plenty of mixed carotenoids means more antioxidant coverage.

- Leafy, green Vegetables – Spinach, kale, sea kelp, turnip greens, collard/mustard/beet greens, chlorella, wheat grass, endive, alfalfa sprouts, spring green lettuces, and spirulina are low calorie and nutrient dense.
- Cruciferous Vegetables - Broccoli, broccoli rabe, cauliflower, bok choy, napa cabbage, Chinese cabbage, green and purple cabbages. Try mashed cauliflower instead of mashed potatoes!
- Super Fruits - Blackberries, blueberries, raspberries, pomegranates, cranberries, and acai are high in antioxidants, phytonutrients, enzymes, fiber and vitamins.
- Potatoes – Switch from white to sweet potatoes/yams. Try butternut, pumpkin, spaghetti or acorn squash too.
- Cereals – If the first or second ingredient is sugar, throw it away! Choose a cereal with as low a sugar content as possible with NO ARTIFICIAL SWEETENERS added.
- Rice - Switch to basmati, brown rice, Canadian long grain or couscous
- Sugar - Use honey, applesauce, or dried fruit to sweeten dishes
- Pasta - Try vegetable based or whole grain pasta.
- Whole grains like oatmeal, buckwheat, quinoa, kamut, millet, teff, amaranth, rye.
  - If you are gluten sensitive, the following are non-wheat grains: quinoa, rye, barley, buckwheat, and amaranth

The worst carbs are regular bread, sugar added foods, most cereals, fruit juices and bars, bagels, sodas and candy.

### **Carbohydrate Loading**

Carbohydrate loading is often used by long distance athletes to "pack" their muscles with energy. The actual process involves depleting the muscles of carbohydrate a week or so before the event with exhaustive exercise and a low-carbohydrate diet. Two to three days before the event the athlete switches to a very high-carbohydrate diet. In their depleted state, muscles take up more carbohydrate than they normally would giving the athlete a large store of energy. For most sports and events, carbohydrate loading is unnecessary. Only in ultra distance events is carbohydrate loading helpful.

# PROTEIN

In the world of athletics, no other macronutrient has received the same level of attention as protein. Everywhere you look, everything you see, tells us we need more and more protein, whether you're trying to lose weight or gain muscle. But how about for adolescent athletes; do they too have higher protein requirements like other fitness enthusiasts? As you know, they too are trying to improve performance, put some muscles on those bodies, and of course just improve overall health (at least we hope they are!).

Just because that bodybuilding star you saw in the latest magazine "requires" 300 grams of protein a day doesn't mean that you do.

**Excess protein does NOT build muscle bulk and strength exercise does.** High intensity strength training and not food stimulates muscle growth. Protein accounts for about 15% of a person's body weight and except for water is the largest component in human bodies.

**In sport, protein is important for recovery and restoration/repair.** Protein is used for building and repairing muscles, tendons, ligaments, red blood cells, skin, hair and finger nails and for synthesizing hormones. Protein is necessary for reducing the risk of iron deficiency anemia and to improve healing.

**Research shows that the harder an athlete trains, the greater the protein requirement.** The recommendations are **for endurance athletes** 0.55 to 0.65 grams of protein per pound of bodyweight and for **strength-training athletes** 0.7 to 0.8 grams of protein per pound of bodyweight. Consuming more protein than this serves no benefit and may be harmful in the long term.

**Timing of protein consumption is as important as quantity.** Protein should be eaten at least every 3-4 hours. The evening meal should contain slowly digesting protein that will allow a steady release of amino acids into your system well into the night. Dinner is a perfect time for steak or other meat dishes. In particular, the consumption of small servings of protein-rich snacks before and after training may help to optimise training responses and recovery. Consume quick-digesting proteins such as soy and whey immediately after training; this may be especially important for older athletes.

**A Note for Vegetarians - To get enough protein eat...**

- ✓ 5 or more servings of grain each day (1 serving= 1 slice bread; ½ cup cereal) ~3 g
- ✓ 3 or more servings of vegetables each day (1 serving= ½ cup cooked vegetables) ~2 g
- ✓ 2-3 servings of legumes (1 serving= ½ cup cooked beans, 10 oz. nuts, 1 cup soy milk) ~ 4-10 g

**Protein quality is important in determining responses to exercise, particularly resistance exercise.** High quality protein sources include:

- fish and other seafood
- low or non fat milk or yogurt
- chicken and turkey breast
- lean red meat
- tofu
- mixed nuts – almonds, walnuts, pecans, cashews
- eggs
- beans
- natural peanut butter and more.

The greater the variety in the diet, the better off they will be getting the most “bang for their buck” in terms of various amino acids and other nutrients. The worst proteins are fatty meat, fatty dairy, lunch meats and high soy diets.

## FAT

Almost all of what we read and hear about fats is negative and oversimplified. This has led to many misconceptions about fat. **Fat is a crucial nutrient for young athletes.** Fat is an essential energy source for the human body. Fat is the major energy source for the heart. Without fat, the human body simply would not work. The main functions of fat are insulation, protection of organs, formation of essential fatty acids (fats that cannot be produced by the body so they have to be supplied by the diet), hormone formation, vitamin formation, and energy storage. Fats are the most concentrated source of energy in the diet. They furnish twice the number of calories per gram compared to protein or carbohydrates. Fats should make up between 25% and 30% of your total daily caloric intake.

**Saturated fats** are found in foods such as red meat, egg yolks, cheese, butter, milk and commercially prepared cakes, pies and cookies. The typical western diet consists of almost 40% total fat. Of

this, 15% is made up of saturated fats, which is considered a major cause of coronary heart disease, diabetes and other degenerative illnesses. No more than 10% of the diet should come from saturated fats.

**Unsaturated fats** come in the form of monounsaturated fats and polyunsaturated fats. Monounsaturated fats can actually lower the risk of coronary heart disease and are found in foods like olive oil, canola oil, avocados, almonds and pecans.

**Essential fatty acids** are a class of polyunsaturated fats that have received a lot of attention in the media recently. They are thought to be cardio-protective and may help prevent a range of other illnesses. There are three types of essential fatty acids - Omega 3, Omega 6 and Omega 9. Omega 3 and Omega 6 must be consumed while the body can produce some Omega 9 on its own. Essential fatty acids are required for healthy cardiovascular, reproductive, immune, and nervous systems. Found in foods like walnuts, pumpkin seeds, Brazil nuts, sesame seeds, avocados, some dark leafy green vegetables and oily fish, the typical Western diet is often deficient of essential fatty acids.

Despite its bad press, **cholesterol** is actually essential for many important bodily functions. There are essentially two types of cholesterol - low-density lipoprotein (LDL) and high-density lipoprotein (HDL). LDL is known as the "bad" cholesterol because it carries and then deposits cholesterol at the artery walls. HDL on the other hand, is known as "good" cholesterol because it acts as a scavenger removing cholesterol from artery walls and transporting it to the liver to be excreted. The maximum amount of dietary cholesterol recommended each day is 300mg.

**There should be a balance of fats in one's diet, not a total omission.** Good fats include fish, whole eggs, olive oil, raw mixed nuts and natural peanut butter, and avocados.

Avoid excess fat in dairy products, mayonnaise, sour cream, dressings, sauces, and baked and fried goods.

## SECTION 2: HOW TO READ A FOOD LABEL

If there is one thing you learn from this manual it should be how to read a food label. It never ceases to amaze us how uninformed most athletes are about their diet and nutrition.

Here is an example of a food label:

Sample label for  
Macaroni & Cheese

① **Start Here** →

② **Check Calories**

③ **Limit these Nutrients**

④ **Get Enough of these Nutrients**

⑤ **Footnote**

<b>Nutrition Facts</b>	
Serving Size 1 cup (228g)	
Servings Per Container 2	
<b>Amount Per Serving</b>	
<b>Calories</b> 250	Calories from Fat 110
	<b>% Daily Value*</b>
<b>Total Fat</b> 12g	<b>18%</b>
Saturated Fat 3g	<b>15%</b>
Trans Fat 3g	
<b>Cholesterol</b> 30mg	<b>10%</b>
<b>Sodium</b> 470mg	<b>20%</b>
<b>Total Carbohydrate</b> 31g	<b>10%</b>
Dietary Fiber 0g	<b>0%</b>
Sugars 5g	
<b>Protein</b> 5g	
Vitamin A	<b>4%</b>
Vitamin C	<b>2%</b>
Calcium	<b>20%</b>
Iron	<b>4%</b>

\* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

⑥ **Quick Guide to % DV**

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- 5% or less is Low
- 20% or more is High

**1. Serving size:** This is important! All the information on the label is for one serving of the food – 1 cup.

**2. Amount per Serving:** This tells you how many total calories there are in the food – 250 - and how many of those calories are from fat - 110.

**Calories:** The total number of calories **per serving - 250.**

**Calories from Fat:** The total number of calories **per serving** from fat. Please note that this label does NOT give the PERCENT of the total calories per serving from fat. It tells you calories per serving - 250 and calories from fat - 110. It does not tell you that 44% of the total calories are from fat. You must figure this percentage for yourself.

E.g.  $110/250 = .44 \times 100 = 44\%$ .

**3. This part of the label tells you the total grams of fat, the grams of saturated fat, the grams of trans fat, the mg of cholesterol and the mg of sodium.** Eating too much fat, saturated fat, *trans* fat, cholesterol, or sodium may increase your risk of certain chronic diseases, like heart disease, some cancers, or high blood pressure. The maximum recommended amount of cholesterol per day is 300 mg and sodium is about 1,100 to 3,000 milligrams. This is the amount of sodium found in 1/2 to 1 1/2 teaspoons of salt. A single gram (g) of salt contains 0.4 grams (0.4g) of sodium and 0.6 grams (0.6g) of chloride.

**4. Get enough fiber, Vitamin A, Vitamin C, Calcium, Iron**

**5 & 6. The % Daily Value** just means that the percentages you see on a label are based on a diet of 2000 calories per day.

**Ingredient List:** Under the food label is a list of the ingredients in the food. Ingredients are listed in descending order of weight from the most to the least. Here is a list of ingredients to avoid:

1. Hydrogenated vegetable oil (or partially hydrogenated vegetable oil)
2. High fructose corn syrup, corn syrup
3. Monosodium glutamate (MSG)
4. Sodium Nitrate
5. All artificial sweeteners: aspartame (Equal, Nutrasweet), acesulfame potassium (ACK, Sweet One<sup>®</sup>, and Sunett<sup>®</sup>,

- acesulfame K), Saccharin (Sweet'N Low, SugarTwin), Sucralose (Splenda), Neotame
- 6. Olestra
- 7. Potassium Bromate
- 8. Artificial colorings: Blue 1 & 2, Yellow 6, Red 3

**Understanding Labels:**

The FDA provides guidelines about the claims and descriptions manufacturers may use in food labeling to promote their products:

Claim	Requirements that must be met before using the claim in food labeling
<b>Fat-Free</b>	Less than 0.5 grams of fat per serving, with no added fat or oil
<b>Low fat</b>	3 grams or less of fat per serving
<b>Less fat</b>	25% or less fat than the comparison food
<b>Saturated Fat Free</b>	Less than 0.5 grams of saturated fat and 0.5 grams of trans-fatty acids per serving
<b>Cholesterol-Free</b>	Less than 2 mg cholesterol per serving, and 2 grams or less saturated fat per serving
<b>Low Cholesterol</b>	20 mg or less cholesterol per serving and 2 grams or less saturated fat per serving
<b>Reduced Calorie</b>	At least 25% fewer calories per serving than the comparison food
<b>Low Calorie</b>	40 calories or less per serving
<b>Extra Lean</b>	Less than 5 grams of fat, 2 grams of saturated fat, and 95 mg of cholesterol per (100 gram) serving of meat, poultry or seafood
<b>Lean</b>	Less than 10 grams of fat, 4.5 g of saturated fat, and 95 mg of cholesterol per (100 gram) serving of meat, poultry or seafood
<b>Light (fat)</b>	50% or less of the fat than in the comparison food (ex: 50% less fat than our regular cheese)
<b>Light (calories)</b>	1/3 fewer calories than the comparison food
<b>High-Fiber</b>	5 grams or more fiber per serving
<b>Sugar-Free</b>	Less than 0.5 grams of sugar per serving
<b>Sodium-Free or Salt-Free</b>	Less than 5 mg of sodium per serving
<b>Low Sodium</b>	140 mg or less per serving
<b>Very Low Sodium</b>	35 mg or less per serving
<b>Healthy</b>	A food low in fat, saturated fat, cholesterol and sodium, and contains at least 10% of the Daily Values for vitamin A, vitamin C, iron, calcium, protein or fiber.
<b>"High", "Rich in" or</b>	20% or more of the Daily Value for a given nutrient per serving

<b>"Excellent Source"</b>	
<b>"Less", "Fewer" or "Reduced"</b>	At least 25% less of a given nutrient or calories than the comparison food
<b>"Low", "Little", "Few", or "Low Source of"</b>	An amount that would allow frequent consumption of the food without exceeding the Daily Value for the nutrient – but can only make the claim as it applies to all similar foods
<b>"Good Source Of", "More", or "Added"</b>	The food provides 10% more of the Daily Value for a given nutrient than the comparison food

From <http://www.healthchecksyste.ms.com/label.htm>

*"You Americans, you have the best food in the world available to you, yet you eat the worst!"*

~Angel Spassov, Bulgarian Strength Coach

## **SECTION 3: PRE AND POST COMPETITION MEALS**

Long gone are the days when athletes thought that eating a big steak before a game would provide them with lots of energy. Today's elite sports men and women follow a strict diet, particularly on the day of a competitive match or event. While diet won't turn poor athletes into great ones, it can make the difference between performing poorly and tapping your full potential.

### **All Day Fueling**

Unlike professional athletes who practice during the day, younger athletes don't take the field or hit the gym until after school. Since bodies don't run well on empty, eating every 3 to 4 hours is necessary to properly fuel both the body and mind.

- Eat within 1 hour of waking up.
- Eat a healthy meal at lunch - Whole grains, vegetables, red meat, chicken, fish
- Recent research has proven the importance of a good carbohydrate and protein meal or drink before and after a workout/practice. The ratio of carbohydrate to protein should be about 4:1 for endurance athletes and about 2:1 for strength athletes. A good guide for the amount of carbs and protein is:
  - Carbs: 5 grams/ 10 pounds of bodyweight
  - Protein: 2.5 grams/ 10 pounds of bodyweight

### **Pre-Competition Foods**

**Rule #1: Never introduce any new foods on game day.**

**Rule #2: Always follow rule #1.**

Don't make the mistake of trying a new food or supplement because you just read about it or someone just told you how great it is. Many athletes have made this mistake with disastrous consequences.

The primary goal for providing athletes with a pre-game meal is to fuel the body for competition. Here are some general rules to follow:

1. Allow enough time for digestion. Eat the meal at least three hours before an event.
2. Choose a meal that's high in starch. Starch is easy to digest and helps steady the levels of blood sugar.

3. Consume only moderate amounts of protein (no more than 30 – 40 grams). Protein foods take longer to digest than starch. Too much protein may lead to increased urine production, which can add to dehydration.
4. Avoid fried, fatty foods. They take too long to digest and will leave you with a full, heavy stomach.
5. Avoid sugary foods. If eaten without other foods, sweets can cause rapid energy swings in blood sugar levels and ultimately result in low blood sugar and less energy.
6. Watch out for foods that produce gas. Certain raw vegetables, fruits, or beans may cause problems for some young athletes.

#### Sample Pre-Game Meals:

- Turkey or ham subs, fruit salad, frozen yogurt
- Eggs, waffles, ham, fruit
- Pasta with red meat sauce, grilled chicken, salad and fruit
- 8-ounce cuts of steak with carbohydrates on the side.

### **Post-Competition Meals**

After you have been tearing up your muscles during practice or a game, they are primed for a quick and easy to digest meal, preferably a protein and simple carb drink. This way your body can go from a catabolic (tearing down) state to an anabolic (repair and growth) state and begin to synthesize lean tissue. Within one to two hours, eat a healthy meal of grains, protein, and veggies. It takes about 20 hours and about 600 grams of carbohydrates (not in one big meal!) to fully replenish glycogen depleted in muscles. In addition, the muscle repair process will continue over the next 48-96 hours, so this is why eating healthy whole food meals all the time is so important.

#### **Post Practice/Game Drink/Snack:**

Current research estimates for the best recovery are:

- Carbs – about 0.4 grams per pound body weight
- Protein – about 0.2 grams per pound body weight

**Drink** – Liquid supplemental formulas are palatable, easy to consume, easy on the stomach, nutrient dense, and easily absorbed; providing all the nutrition you need at this time. The faster the protein and carbohydrates get to the muscle, the better your chances for muscle building and recovery.

**Snack** – Suggestions include peanut butter crackers, trail mix, yogurt with cereal, a bagel with cream cheese or peanut butter, or a sports bar containing the right proportion.

**Post Practice/Game Meal:**

This is usually the hungriest time for the players, some good choices include:

- Steak kebabs, rice, veggies
- Salmon, green beans, and corn
- Roast beef, mashed potatoes and salad
- Hamburgers, grilled chicken sandwiches, sweet potato, veggies

*Let food be thy medicine, thy medicine shall be thy food. ~Hippocrates*

## **SECTION 4: HYDRATION REQUIREMENTS**

With all the information available, there are still errors made in hydration at the Olympic and professional level down to the little league level of sports. Athletes can lose between 2-3 quarts (up to 1 oz per minute) of sweat during 90 minutes of intense exercise, particularly in hot and humid conditions (the body can only absorb 1 oz per 3-4 minutes). They can also lose as much as 4½-6½ lbs in bodyweight during the same period.

For an Athlete, excessive sweating is an every day occurrence which must be followed by the replenishment of the lost water to stop the body from overheating. When sweat evaporates from the skin, it cools down the body and regulates the body temperature. If the athlete has not drunk enough water, the body will begin to overheat leading to diminished performance and, at worst, be life threatening!

### **Proper Hydration Guidelines**

7 – 14 days before training	Acclimate to the heat! Gradually increase the intensity of training.
2 to 3 hours before practice	Drink 16 ounces of water
1 hour before the practice	Drink 8 ounces of water
15 minutes before the practice	Drink 4 ounces of water
Immediately before the practice	Weigh yourself
Every 10 to 20 minutes during practice	Drink 4 ounces of water
Practices longer than 60 to 90 minutes	Drink 4 ounces of sports drink every 10 to 20 minutes
Immediately after practice	Weigh yourself again
For every pound of weight loss	Drink 16 to 24 ounces for every pound of weight loss – see below
The rest of the day	<b>Keep sipping water throughout the day!</b> For example, if you lose 3 pounds you cannot guzzle 48 to 72 ounces in one sitting. This amount is the minimum you must consume throughout the remainder of the day. <b>You should drink enough H2O to urinate at least 4 times per day.</b>
Next Morning	Weigh yourself again. Make sure you have fully rehydrated.

## Avoiding dehydration

Dehydration is caused due to the lack of adequate drinking water. Signs of dehydration are a lack of energy, headaches, dizziness, and disorientation. The following chart shows how the body is affected through increasing levels of dehydration.

1-2% body weight loss – thirst, increased body temperature, weakness  
3-4% body weight loss - low performance, dry mouth, irritability  
5-7% body weight loss – GI problems, nausea, vomiting cramps, dizziness  
7-10% body weight loss – loss of coordination, disorientation, heat stroke

## Sports Drinks

The ideal sports drink should contain **6-8% carbohydrate**.

- To calculate the carbohydrate percentage of any beverage:
- Divide the number of grams of carbohydrate per serving (in milliliters) and multiply by 100
- E.g. 14 grams per 8oz. (1oz.x30=milliliters)  
 $14/240 \text{ ml} \times 100 = 5.83$  or 6%

It should also contain a small amount of salt. Sodium concentration in the blood can reduce due to sweating and drinking lots of diluted fluids. If it gets too low it can lead to nausea, headaches and blurred vision. Adding just a pinch of salt can offset this potential danger.

Sodium is also an **electrolyte**. Electrolytes help control the passage of water between body compartments and they also help to maintain the acid-base balance of the body. Electrolytes (or lack of them) have been associated with muscle cramps in the latter stages of sport games.

## How to Make Your Own Sports Drinks

**Recipe 1** (from <http://lifehacker.com/5334003/make-your-own-sports-drink-on-the-cheap>)

1/4 cup sugar  
1/4 teaspoon salt  
1/4 cup orange juice  
1/4 cup hot water  
2 tablespoons lemon juice  
3 1/2 cups cold water

As for the preparation, dissolve the sugar and salt in the hot water (using a quart pitcher), then add in the remaining ingredients and cold water. According to the NYT, "the drink contains about 50 calories and 110 mg of sodium per 8 ounces, approximately the same as for most sports drinks."

**Recipe 2** (from <http://www.webmd.com/hw-popup/rehydration-drinks?navbar=hw86827>)

You can make an inexpensive rehydration drink at home. But do not give this homemade drink to children younger than 12.

Measure all ingredients precisely. Small variations can make the drink less effective or even harmful. Mix the following:

1 quart (950 mL) water

½ teaspoon (2.5 g) baking soda

½ teaspoon (2.5 g) table salt

¼ teaspoon (1.25 g) salt substitute (potassium-based), such as Lite Salt or Morton Salt Substitute

2 tablespoons (30 g) sugar

## HEAT INJURY PREVENTION GUIDE

- Weigh the athletes before and after practice and replace each pound lost with 16 - 24 oz of water. This water must be sipped throughout the remainder of the day after practice to get the best absorption. Dehydration can occur over several days to weeks of practice and incomplete rehydration (observe urine color - if dark yellow, hydrate). This is why athletes can die in weather in the 70's with little humidity.
- An electrolyte replacement drink may be needed in practices greater than one hour if the athlete is a salty sweater (white rim on cap or armpit of shirt – if in doubt, lick your sweaty skin – if it tastes salty use an electrolyte replacement).
- Acclimate to the heat over 7 - 14 days:
  - Days 1 – 5: One practice per day, three hour maximum time limit.
  - Days 1 – 2: No protective gear except a helmet allowed.
  - Days 3 – 5: Helmets and shoulder pads only.
  - Day 6: Full gear and full contact allowed.
  - Days 6 – 14: Two-a-day practices must be followed the next day by a single practice day or a rest day. On two-a-day practice days each practice session must not exceed three hours (maximum five hours total daily practice time) and the two practice sessions must be separated by at least three hours in a cool environment.
- Coaches must pay attention to the heat index - be very careful when in the red zone – walk through only, no vigorous practice!
- Have a kiddie pool (Toys-R-Us for \$15.00) filled with water and ice ready for athletes for break time and after practice. At minimum, the athletes should walk through it and if necessary perform full body immersion.
- If the field has no shaded areas, get an EZ Up tent. Break time must be in the shade.
- Have a buddy system to quickly recognize a problem. Football teams are large and it is difficult for the coaches to observe everyone.
- Parents, athletes and coaches must know these guidelines.

### References

- Preseason Heat-Acclimatization Guidelines for Secondary School Athletics, Journal of the National Athletic Trainers Association, June 2009, pp.332-333.
- NOAA's National Weather Service Heat Index Table.
- Prevention of Heat Illness, NCAA 2008-2009 Sports Medicine Handbook, pp.30-32.

*Men of lean habit of body are commonly a long time healthy, having good appetites and strong stomachs for digestion. ~Tobias Venner*

## **SECTION 5: VITAMINS AND MINERALS**

Thirteen different vitamins have been identified and studied to date. They are classed as either **fat-soluble** (vitamins A, D, E, K) or **water-soluble** (vitamin B complex, vitamin C). Together they are responsible for blood clotting, neuromuscular function, healthy skin, teeth and bones and numerous other bodily functions.

A well-balanced diet should provide most of all the vitamins regardless of age and level of physical activity. During periods of intense training, **these needs increase, so choosing your foods and supplements carefully can make all the difference in your performance.**

### **Free Radicals, Antioxidants & Exercise**

Free radicals are highly reactive molecules that can cause damage to the cells and are thought to accelerate the aging process and contribute to cancer, heart disease and diabetes. They are found in cigarette smoke, environmental pollution and some medications. Exercise may also increase the production of free radicals.

The body has an elaborate defence system against free radicals in the form of antioxidant enzymes. Vitamins A, C and E are known as antioxidant vitamins and can protect the cells against free radical damage. Although foods like citrus fruits, green vegetables and nuts contain antioxidant vitamins, some athletes feel the need to take a supplement due to the high level of training they undergo.

Although exercise is thought to increase free radical production, it also appears to increase the body's antioxidant defence system at the same time. However, there is some research to suggest that a vitamin E supplement can reduce harmful free radical production associated with exercise. Whether this offers any overall health benefits is still unclear. Over 40 years of research has failed to show that vitamin supplementation can offer any sort of performance enhancement when a nutritionally balanced diet is present. Some vitamins (such as vitamin C) taken in excess can actually be harmful. The recommendation is to eat a well balanced diet rich in fresh fruit and vegetables.

### **Minerals**

Minerals account for roughly 4% of a person's body mass. They provide the structure for forming bone and teeth. They also help muscles to contract, maintain normal heart rhythm and control the acid-base balance as well as other important bodily functions.

Minerals are classed as either **major** or **trace** depending on how much is required per day. Major minerals include calcium, phosphorus, sodium, potassium and magnesium. Trace minerals include iron, zinc, copper, selenium and chromium.

### **Calcium**

The typical Western diet contains too little calcium. The RDA for calcium is 800-1000 mg for adults and 1200 mg for adolescents. The average adult consumes just 500-700 mg per day and for many it's as little as 300 mg per day. Calcium deficiency can lead to a condition called osteoporosis - a weakening of the bones. Exercise actually helps to maintain healthy bone density.

### **Sodium**

Most adults consume too much sodium (found in abundance in processed foods), which can lead to high blood pressure. The RDA of 1100-3300 mg is equivalent to 0.5-1.5 teaspoons of table salt. Most people consume more than 2 teaspoons from processed foods even when table salt isn't used as seasoning.

### **Iron**

Iron helps the blood to carry oxygen so an iron deficiency (called anaemia) can lead to fatigue even with mild exercise. Some research has suggested that heavy exercise training creates an increased demand for iron. However, even in elite athletes, supplements are unnecessary if the diet contains iron-rich foods.

As with vitamins there is no convincing research to suggest taking mineral supplements can improve sporting performance. Exceeding the recommended daily allowance can also be potentially harmful. The only exception is adding a small amount of sodium to sports drinks during hot weather ( $\frac{1}{4}$  -  $\frac{1}{2}$  teaspoon per liter of water).

**This article by Dr. Joel Wallach is quite interesting...**

"Exercise without supplementation is suicide!" These are the words of Dr. Joel D. Wallach. EXERCISE WITHOUT COMPLETE AND OPTIMAL SUPPLEMENTATION IS SELF DESTRUCTIVE, and suicide. Farmers and ranchers very systematically put in vitamins, minerals and trace minerals in animal feeds to prevent and cure disease and illnesses. They learned that all working and producing animals, (all the way from the cow to the race horse), need additional nutrients above and beyond subsistence and maintenance levels. The same goes, and more

so with humans. In many studies done we find an increase in the frequency and severity of sports injuries, behavioral problems, degenerative diseases, and even death in athletes because of this neglect....

Unsupplemented high-output athletes are more susceptible to emotional, traumatic, and degenerative diseases than the classic couch potato (or is that potato?). Certainly the average weekend athlete with common sense would not throw their life away by not supplementing with the known 103 essential nutrients each day (72 minerals, 16 vitamins, 12 essential amino acids and 3 essential fatty acids). Certainly then, the highly conditioned and trained serious athlete who invests considerable amount of time and money in their training and fitness programs would not throw their health or lives away by not supplementing. Yet the majority of people who exercise do not supplement because they have bought into the medical dogma that if "you eat right, you do not need to supplement, you can get everything you need from the four food groups" (WHICH IN MOST CASES IS TONS AND TONS OF TOO MANY CARBS).....

Or if you supplement "it only gives you expensive urine". Our farm and range soils are so depleted of nutrients, as a result of 100 to 200 years of intensive farming without appropriate mineral replacement. Why is it they cannot seem to make the connection that the food on their plate is anemic in nutrients? Two and two still equals four, so be smart as an athlete and supplement. Not only will it enhance your performance but it could save your life.

*The longer I live the less confidence I have in drugs and the greater is my confidence in the regulation and administration of diet and regimen.*

~John Redman Coxe, 1800

## **SECTION 6: SPORTS SUPPLEMENTS**

**A supplement is something added to the diet to make up for a nutritional deficiency.** Unfortunately, there are no regulations that guarantee the safety or purity of something sold as a supplement. In addition, just because the supplement is advertised as “natural” does NOT mean it is safe. It is difficult to wade through all the claims and research to make an informed decision about what actually works. Look for products that have one or more of the following seals on the label:



United States Pharmacopeia



Consumer Lab

**GMP**

Good Manufacturing Practices

**Because supplements are something added to the diet to make up for a nutritional deficiency, before going out and buying the latest 'magic pill in a bottle,' an athlete would be wise to evaluate his or her diet.** Manufacturers make extravagant claims about sports supplements which are by and large hogwash! That being said, below are some common supplements that can be of benefit to athletes and have a track record of safety.

### **Protein Powder**

**Protein powder is best used just before and just after a training session.** Otherwise, most athletes can get more than enough protein by eating the proper foods. Below is a list of different types of protein powder and when they are best used:

**Whey** - When your body needs protein the most, and whey is digested very quickly (about 30 minutes). This is the best type of powder to use just before and just after training.

**Casein** - Casein is digested very slowly (over 2 - 7 hours). It's the best protein supplement to use before bed because the longest time your body goes without protein is during the night while you are sleeping.

**Egg** - Egg protein (albumen) digests at a medium pace (1.5-3 hours) so it's a good anytime protein to provide a good sustained release.

**Soy** - Soy protein is the vegetarian's friend because it's one of the only complete protein sources derived from plants. Soy is a good overall protein, although it's not as effective in terms of absorption as whey or egg albumen. Additionally, soy has many recognized health benefits for women.

**Blends** - Either protein supplements are straight whey, soy, egg, or casein; or they are a combination of any or all of these kinds of proteins. What can a blend of proteins offer that a straight protein cannot? Basically, different rates of digestion. This means you can take a blended protein any time to get quick, medium, and prolonged absorption of protein.

## **Creatine**

Creatine was discovered in 1832, but athletes have been taking it - in hopes of improving their performances - for only the last 10 years. Research has shown that creatine supplementation can indeed increase muscular strength and power and improve performances in relatively short-duration, high-intensity activities. The potential benefits of creatine supplementation for longer-duration, lower-intensity exertion (i.e., for endurance-type athletes) is undetermined.

"Muscle cells use creatine to form CrP [creatine phosphate - see discussion of Metabolic Pathways in Section 1], a high-energy compound which can be used to rapidly synthesize ATP, the 'energy currency' utilized by all cells in the human body. Whenever a nerve cell fires, a muscle fibre contracts, or a kidney cell actively filters some urine, ATP 'pays the bills' (i.e., furnishes the energy needed to carry out the activity)." (<http://www.pponline.co.uk/encyc/0864.htm>)

Most studies have employed a loading method of supplementation of 20-30 g/day for 5-7 days, followed by 5 g/day of creatine to maintain muscle CrP levels.

## **L-Glutamine**

L-Glutamine is the most abundant amino acid found in muscle tissue. It helps prevent muscle wasting and improves recovery. The better and quicker you recovery, the sooner and harder you can hit it in the gym! Glutamine is safe to take year-round. Glutamine should not be taken at the same time as creatine because they compete for receptors to be absorbed. About 5 grams per day is enough.

## **Branched Chain Amino Acids**

Amino acids are the building blocks of protein. They aid in repair, growth, and development of muscle tissue. The branched chain amino acids are leucine, isoleucine, and valine. These amino acids may help to diminish muscle damage, increase protein synthesis, and promote recovery.

## **Caffeine**

Discussing supplements would not be complete without mentioning caffeine. Research shows that caffeine acts as a stimulant, increases alertness, delays fatigue, might spare muscle glycogen, and does NOT promote body fat loss. 1-3 mg/lb of body weight of caffeine one hour prior to exercise can improve overall endurance; however, side effects may include nausea, muscle tremor, palpitations and headache. Caffeine must NOT be combined with any other stimulant. This is not a supplement I recommend for children under age 18.

*He that takes medicine and neglects diet, wastes the skill of the physician.*

~Chinese Proverb

## **SECTION 7: HOW TO KEEP A DIET DIARY**

Please fill out each column for every food you eat. Include all fluids to make this as accurate as possible. **Track your fluid intake as well! Example:** (Get a postage scale to weigh your food)

<b>Time</b>	<b>Food</b>	<b>Total Calories</b>	<b>#gm Fat</b>	<b>#gm Carbs</b>	<b>#gm Protein</b>
<b>7am</b>	1 cup Cherrios	110	2	23	3
	½ cup whole milk	150	8	12	8
	1 Café Mocha	100	2.5	18	1
<b>Noon</b>	2 slices wheat bread	160	3	28	8
	1/4lb turkey	120	3	0	22
	1tbsp mayo(light)	50	5	1	0
	Vanilla Coke	250	0	70	0
<b>6pm</b>	Chicken-6oz Skinless	240	3	0	48
	Pasta 4oz	420	2	84	0
	Tomato sauce ¼ cup	25	.5	4	1
	Vanilla Coke	250	0	70	0

**TOTALS.....1875 calories 29gm fat 310gm carbs 91gm prot**

### **Calories from....**

Fat            29 grams x 9            = 261 calories  
                   261/1875 x 100       = 14% of the total calories are from fat

Carbs          310 grams x 4            = 1240 calories  
                   1240/1875 x 100       = 66% of the total calories are from fat

Protein        91 grams x 4             = 364 calories  
                   364/1875 x 100       = 19% of the total calories are from fat

### **Formulas:**

# grams of Fat x 9=            Total Calories From Fat

# grams of Carbs x 4=        Total Calories From Carbohydrates

# grams of Protein x 4=       Total Calories From Protein



## **SECTION 8: SUMMARY**

### **Daily Nutrition Needs**

An athlete's diet should be 50-60% non-processed carbohydrates and 15-20% (lean) protein, 20-30% (healthy) fat.

**Carbohydrates:** 2.7 to 4.5 g/pound

#### **Protein:**

**Endurance athletes:** .55 to .65 g/pound

**Strength-training athletes:** .7 to .8 g/pound

**Fats:** Not less than 15 percent of total calories. 20 to 25 percent calories from fat is okay.

### **Immediate Pre and Post Nutrition Needs**

Carbs: 0.04 grams per pound

Protein: 0.02 grams per pound

Fat: None

### **During Exercise Nutrition Needs**

30 to 60g of carbs (from glucose drinks, gels or bars) per hour.

Fructose doesn't work as well.

### **Post Exercise Nutrition Needs**

7 grams of carbs (glucose is best) per pound. Repeat every 2 hours for 4 to 6 hours post-exercise. If you don't eat in the first two hours, the rate of glycogen synthesis will be lower. Fast resynthesis is most important if you intend to do more exercise in the same day or next days. Adding protein might be good "for muscle protein repair and to promote a more anabolic hormonal profile."

### **Hydration Requirements**

**Before:** 14 to 22 oz of water or sports drink two hours before.

**During:** 6 to 12 oz of water/sports drink every 15-20 minutes. Start drinking within 30 minutes.

**After:** 16 to 24 oz water/sports drink for every pound of body weight lost.

### **General Dietary Guidelines**

- Variety is crucial—the more the variety, the better  
The more fruits and vegetables each day, the better

Steven Horwitz, DC, CCSP, CSCS, CKTP, HKC, USAW

[www.DCSportsInjury.com](http://www.DCSportsInjury.com)

[painfree123@gmail.com](mailto:painfree123@gmail.com)

- Do not skip meals
- Eat 4-5 meals a day
- Eat breakfast everyday
- Eat most of your vegetables and fruit in raw form
- Try and eat all the colors in the crayon box (fruits & vegetables)
- Sufficient protein should be present in all meals (especially breakfast) to prevent extreme insulin fluctuations due to rapid digestion of carbohydrates
- Highly processed foods (such as sugars, oils, and flour) should be avoided in excess. They are not recognized by the body and make them difficult to process.
- Design your diet so that you receive a complete mix of all the nutrients everyday to promote recovery and restoration and to enhance your immune system function.
- Post workout nutrition can drastically reduce the time needed to recover.
- The body is much more efficient in restoring carbohydrates 15 minutes after a strenuous workout. Carbohydrates are the primary fuel during exercise – needs to be restored by the body.
- Post workout drink: 1 gram of protein for every 3 grams of carbohydrate. (.3gm of protein/lb. of lean body weight)
- Drink approximately 64 oz. (8 glasses) of water daily. Bring a water bottle with you everywhere (especially practice).
- Healthy food preparation: baked, braised, roasted, sautéed, boiled, simmered, poached, steamed, stewed
- Unhealthy food preparation: Fried!
- Very basic supplements, such as a high quality protein, are OK, within reason, but the food first approach is always the best with folks of all ages.

*The doctor of the future will give no medication, but will interest his patients in the care of the human frame, diet and in the cause and prevention of disease. ~Thomas Edison*

## APPENDIX A: SAMPLE DAILY DIET

Breakfast	Lunch	Dinner	Snacks
*whole grain waffles w/syrup *handful of walnuts *Lowfat milk	*bean burrito *baked chips and salsa *100% fruit juice	*Spaghetti with tomato sauce & sliced vegetables *Spinach salad * Lowfat Milk	*Whole grain bagel with peanut butter *Grapes *Yogurt
*Granola cereal with banana *whole wheat toast *Orange juice	*Grilled chicken sandwich *Baked potato with veggies *Fruit Cup	*Vegetarian Pizza *Tossed Green Salad w/whole grain roll *Apple Crisp	*Raisins *Sliced turkey on whole grain crackers *Gatorade
*Oatmeal and Sliced Fruit *Lowfat Milk *Canadian Bacon	*Turkey Sub on whole grain bread *Baked chips *Apple	*Chili with beans and rice *100% fruit juice *Mixed berries	*Popcorn *Peanuts *Iced Tea
*Whole grain English muffin with peanut butter *Juice or Water *Banana	*Rice with vegetables and black beans *Garden Veggie Salad with grilled chicken *Fruit Cup	*Grilled Fish filet *Large green salad with vinaigrette *Steamed veggies	*Cottage Cheese *Fruit Smoothie *Lowfat Frozen Yogurt

### Eating on the go/good fast food choices:

**Subway**- load on the veggies, especially spinach...Avoid The meatball and pastrami.

**Buger King & McDonald's**- Broiled chicken sandwich no mayo, salad w/low fat dressing...NO FRIES!

**Pizza**- Cheese with extra sauce, veggie, ham/pineapple. Avoid white sauce and fatty meat.

**Taco Bell/Mexican**- Bean Burrito, chicken taco/burrito...ask for boiled beans if possible.

\*Avoid soda, sugary drinks, and milkshakes...H2O and skim milk when possible.

*When you see the golden arches, you are probably on your way to the pearly gates. ~William Castelli, M.D.*

# APPENDIX B: WEIGHT GAIN & WEIGHT LOSS BASICS

## Weight Loss Basics

To lose 1 to 2 pounds a week you must subtract 500 to 1000 calories per day to equal 3,500 calories per week.

- **Weight train.** The more lean muscle mass you have, the more calories you burn.
- **Eat regularly and often.** Try to eat every 2 to 3 hours. 3 meals a day with a snack in between.
- **Drink plenty of water.** At least 8 glasses per day. Your body is made up primarily of water, plus it helps to "flush" your system.
  - Most drinks such as beer, soda, punch, etc are full of sugar and excess calories. Instead try to have water or low fat milk with meals. Decrease calories from beverages by diluting juices, choosing diet soda or ice tea, and using smaller glasses.
- **Portions control.** Bigger is not better when it comes to food. A portion should be about the size of your fist.
- **Eat a variety of food.** If you eat the same food everyday, you will get the same nutrients everyday.
- **Prevent hunger!** It is better to eat bad than not at all. If you wait until you are hungry more than likely you are going to over-eat. Protein rich meals will satisfy your hunger longer and help maintain lean body weight.
  - Put snacks into a bowl instead of sitting down with the whole bag.
- **Carbs are not bad.** Extra calories are bad.
- **Increase your fruit and vegetable intake.** These make for great low calorie snacks and desserts and are full of needed vitamins and minerals.
- **Reward yourself.** If you try to stick to a strict diet, more than likely it won't last very long. Try to eat as healthy as possible during the week, and allow yourself to indulge a little on the weekend.
- **Limit excess calories.** Reduce fried foods and sugars from your diet.
- When eating fast food, choose regular instead of super-size meals.

## Weight Gain Basics

To gain 1 to 2 pounds per week, you must add 500 to 1000 calories per day to equal 3,500 extra calories a week. Simply put: you must take in more calories than you burn off!

- Eat 4 to 5 meals plus 2 to 3 snacks a day.
- Start a meal with food, not liquids, so have the sandwich first, then the shake.
- Replace low-or no-calorie beverages with juice, lemonade, milk, and sports drinks instead of water.
- Try to eat one-quarter more at every meal and snack.
- Keep snack food around to nibble on.
- Add higher calorie foods to every meal: granola instead of sugared cereal.
- Add nuts to cereal or snacks.
- Eat bagels instead of bread.
- Add more protein, but only four ounces more a day, through food, **not supplements**. Choose cheese, low-fat lunchmeats, an extra piece of chicken, milk and yogurt.

## APPENDIX C: A WORD ABOUT ORGANIC FOOD

(from <http://www.heall.com/body/askthedoctor/nutrition/organicfoods.html>)

Ounce for ounce, organic fruits and vegetables are twice as rich in certain nutrients compared to non-organic produce, according to a recent study reported in the *Journal of Applied Nutrition*.

Here are some thought-provoking figures about our food supply:

- More than 20,000 pesticides are registered for use in the United States. About 75% of the chemicals, some 2.2 billion pounds annually, are used on more than 900,000 US farms at an annual cost of about \$8.3 billion, according to the Pesticide Action Network. Pesticide sales have increased more than 2,700% since 1962 and US users now account for one-third of the world pesticide market.
- NBC News recently reported that 9000 people die each year in the US due to food related illness. Our exposure to man-made chemicals in the food we eat is suspected of being a major factor in today's increased risk to cancer.
- The Environmental Working Group found that "more than half of the total dietary risk from pesticides...was concentrated in just 12 crops.
- Groundwater contamination caused by pesticides has spread pollutants to the world's rivers, lakes and oceans, killing fish, wildlife, and aquatic plants.
- Greenpeace states that "numerous studies show that many pesticides cause health problems ranging from such long-term chronic effects as cancer, genetic damage, birth defects, harm to the immune system, kidneys and liver, to short-term acute effects such as nerve damage, dizziness, nausea and fatigue."

- Some experts believe certain agricultural chemicals, such as toluene, can be toxic to fetuses.
- Sixty percent of all herbicides, 90% of all fungicides and 30% of all insecticides are considered carcinogenic by the Environmental Protection Agency (EPA).
- A 1987 National Academy of Sciences (NAS) report estimated that 20,000 cases of cancer a year can be linked to US pesticide use.
- Health experts long have warned of the dangers of high-fat foods that can lead to heart disease or cancer. New studies show that each fatty bite may also carry a dose of highly toxic chemicals.

Twelve highly contaminated foods according to some sources: Strawberries, Green and Red Bell Peppers, Spinach, Cherries (US), Peaches, Cantaloupe (Mexico), Celery, Apples, Apricots, Green beans, Grapes (Chilean), Cucumbers.

Ten most important Organic Foods to Eat:

- **Baby Food** - According to the National Academy of Sciences, federal pesticide standards provide too little health protection.
- **Strawberries** - A 1993 study by the Environmental Working Group found that supermarket strawberries were the most heavily contaminated fruit or vegetable in the US.
- **Rice** - Water-soluble herbicides and insecticides have contaminated the groundwater near rice fields. Buy organic rice from Eagle Agricultural Products, Lundberg Family Farmers, or MacDougall's Wild Rice.
- **Oats** - In 1994, the FDA found illegal residues in a year's worth of Cheerios from GM. Organic growers provide oats, millet, quinoa, barley, couscous, amaranth, and spelt as healthy options.
- **Milk** - Dairy companies inject cows with recombinant bovine growth hormone. 79% of treated cows get clinical mastitis, a common udder infection. Treating them with antibiotics increases the change of residue in milk. Organic milk is widely available.
- **Bell Peppers** - The FDA found that in 1993, 38% of the peppers from Mexico, which provides 98% of the US, had two or more toxic pesticides.
- **Bananas** - Costa Rica uses 35% of the country's pesticide on banana crops.
- **Green Beans** - 60 pesticides are used on green beans. 10% of Mexican green beans are contaminated with illegal pesticides.
- **Peaches** - FDA cited peaches for above-average rates of illegal pesticide violations; 5% of the crop was contaminated.
- **Apples** - 36 different pesticides have been detected by the FDA. The fungicide captan and the insecticide chlorpyrifos were among the 48 pesticides most frequently found in FDA testing between 1984 and 1991. After the Alar scare in the 80's, growers are leading the integrated-pest management movement, which only resorts to chemicals when mandatory.

## **APPENDIX D: EASY TO MAKE HEALTHY SNACKS**

- **Fruit kabobs.** Buy some shish kabob skewers and create colorful strawberry, pineapple and mandarin orange kabobs kids can grab and go. Kids enjoy making them, too.
- **Frozen grapes.** They have the consistency of mini-popsicles, yet no added sugar and plenty of flavonoids. Just pop a bowlful of grapes in the freezer for a sweet treat anytime.
- **Ants on a log.** Part craft project, part after-school treat. Get your kids involved in making their own snacks. Take celery sticks, smear them with light cream cheese or natural peanut butter and sprinkle with a line of raisins.
- **Seasoned nuts.** Nuts, especially walnuts, which are rich in omega-3 fatty acids, are a perfect snack. Sprinkle with a bit of cinnamon sugar and bake 10 to 15 minutes.
- **Veggie chips and dip.** There is no excuse for not having fresh vegetables on hand. Buy prechopped, prewashed bagged veggies. "Then give your kids a little bit of whatever dip they want," says Jegtvig. "Kids need a little fat, and fat helps you absorb many of the nutrients in vegetables, so a little ranch dip or chip dip is fine."
- **Smoothies.** Mix half a banana, a fistful of grapes, some berries and some yogurt in a blender and make a smoothie. In the summertime, freeze the mixture to make a cool dish that's as sweet as ice cream but much more nutritious.
- **Rainbow melons.** Slice honeydew, cantaloupe and watermelon to make a candy-colored natural treat.
- **Carrots and hummus.** You can buy hummus in most grocery stores today, and baby carrots are sold practically everywhere. This spicy snack is rich in protein, so it's filling and helps stave off hunger.
- **Star fruit sandwiches.** Place banana slices between sliced star fruit for funky, filling sandwiches.
- **PB&J.** Don't shy from the classics. "Traditional kid favorites like peanut butter and jelly are still better choices than processed snacks," says Jegtvig. Just choose whole grain bread and go light on the sugary jelly.
- **Nuked sweet potatoes.** Thinly slice a sweet potato, spread it out on a plate, sprinkle with a little salt and pepper and microwave for three to five minutes. These "potato chips" are more filling than the fried, bagged kind, and they're chock-full of beta-carotene.
- **Berry blends.** "Anything with berries is great," says Jegtvig. Mix a bowlful of berries in season, including blueberries, blackberries, raspberries and strawberries.
- **Assorted seeds.** Seeds are a rich source of vitamin E and some, like pumpkin seeds, have omega-3 acids. Roast seeds for extra crunch.
- **Make a mix.** In a Tupperware container, mix whole grain cereal, such as multigrain Cheerios, dried fruit, seeds and nuts, for a trail mix that satisfies indoors, too.
- **Roll ups.** For a heartier snack, layer thinly sliced turkey breast, spinach leaves and a light spread on a whole-wheat tortilla. Roll up and slice into tasty disks. Roll ups also work with tuna salad, refried beans and spreads such as hummus.