

# MENUS FOR ATHLETES

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## Abstract

*Nutrition for athletes and making of menus for athletes plays a major role in professional sports and lives of recreational and amateur athletes. Implementation of a sports menu is often the predominant and determining nuance in the process of athletic preparation and athletic fitness, which results in creation of a big difference between top athletes and those who are not top athletes. Nutrition itself is the nuance in a large number of cases, because, as much as it is important to exercise it is also important how we nourish ourselves.*

**Key words:** *athletes, carbohydrates, proteins, fats, glycemic index, body weight, calories.*

## INTRODUCTION

Contemporary sports are characterized by an increase in game intensity, universalization of the player and technical-tactical rationality, which results in a higher level of conditional ability of athletes. For that reason in contemporary sports, it is necessary to take care of the quality of work in addition to scope and intensity. The issue of discovering efficient means and methods of training is still active. Analysis of the effect of differently dimensionalized workout is one of the main issues of the work technology.

Impact of a program also depends on the degree of unit complexity, their mutual correlation, volume of transformation procedure, energetic and informational focus of the program and conditions in which the procedure is being performed. A very significant factor in all of the above-mentioned is the nutrition of an athlete. Some would dare to say that the nutrition is 70% of an athlete's success. This paper will address the issue of nutrition, making of sports menus, glycemic index of food.

### CARBOHYDRATES AND SPORTS

The basic question concerning the use of carbohydrates is: how much and when to use them? Simple and complex sugars, that is -fast burning and slow burning - is that all we need to know? Not at all! The issue is far more complex. What will happen when you input some of the sugar? Depending on the glycemic index, it will cause different secretion of the hormone insulin. The aim in some situations is to provoke insulin secretion as little as possible. Why? Because intensive secretion of that precious hormone causes rapid energy burn and fast draining of reserves, as well as other changes of metabolism. A match burns with normal intensity outdoors, but if it is placed in an oxygen atmosphere it will burn out momentarily; if you place it in a space with some oxygen it will burn with slow flame, but for a long time. If you wish to "burn" for a long time, you

need to "burn out" slower! Thus, glucose with glycemic index 100 "burns" very fast and naturally lasts briefly, seriously provoking pancreas to intensively secrete insulin.

### *Prejudices about Carbohydrates*

Mistakes can be made in an athlete's nutrition, but when the mistake is related to carbohydrates, and then there is a price to pay. In case of excessive intake of carbohydrates the athletes can easily increase their body weight – fat, but in many sports such as football, tennis, volleyball, sprint jumping, ect. Is absolutely unacceptable. One should make a habit of abundant carbohydrate nutrition during the day. And now we have come to the greatest prejudice of numerous athletes: carbohydrates make you gain fat! Actually, prejudices against carbohydrates as "the guilty" did not refer to the athletes at all, but to the group of people (10-25% of the population) who were insulin insensitive. What does that mean? In order to maintain a normal level in the blood (5 – 20 mIU/ml), the insulin needs increased secretion, which means that the surplus of degraded carbohydrates turns into fat tissue. People like the above-mentioned really do gain weight. At the same time, it is a nice piece of evidence on why there should not be excessive insulin secretion and the importance of glycemic index of food. Glycogen is the "fuel" for high intensity training. During the season with high intensity training, the glycogen level is very difficult to maintain unless there are large quantities of carbohydrates. Many even forget that the training demands more carbohydrates than the competition!

### *What are Sucrose, Fructose, Glucose and Glucose Polymers?*

These are three standard sugars mostly used in industrialized products such as refreshment drinks, which often leads to confusion especially among young athletes. It is not the same which one you use if you are a top athlete. That means, read the

labels before you drink it and when evaluating, the only criterion of quality is the glycemic index. The best is to make combination of sucrose, fructose and glucose. According to numerous researches their combination is the best, it is easily and rapidly absorbed and it is not too sweet. There is also the synergism factor when the sugars are combined. I.e. if sucrose and fructose are blended in 50:50 ratio, a higher value is gained than their highest individual sweetness value, that is, you get 128. Juice producers always combine sugars. Glucose polymers (polysaccharides) have the lowest glycemic index and provoke insulin the least. That is why spaghetti should be consummated prior to a competition, as well as various pasta.

#### GLYCEMIC INDEX

Glycemic index as the measure of carbohydrate value (according to the impact on the level of blood glucose) was introduced in 1980. For a long time it has not been used or understood and today we cannot imagine the final evaluation of a meal quality for top athletes without it. With GI we can predict how the food will influence the level of blood glucose, which is decisive for sufficient energy in the key moment. The discovery of the role of glycemic index is a revolutionary novelty in evaluation of meals for top athletes. The standard used is glucose (glycemic index – GI =100) or white bread. Although every food has its own GI, scientists have divided them into three groups (Foster et al., 2002):

#### High GI foods

- White Bread
- Potatoes
- Breakfast cereals
- Rice
- Energy liquids with glucose

#### Moderate GI foods:

- Energy liquids with sucrose
- Cola beverages
- Fruity juices with maltose syrup base
- Tropical fruit

#### Low GI foods:

- Milk and dairy products
- Tare
- Lentil
- Oat
- Apples

With regard to top athletes on diets, the key is to eat less high glycemic and more of the low glycemic food. The question is how to “switch” to low glycemic food. Breakfast cereals should be replaced with full wheat grain, wheat crop and oat cereals. White bread should be replaced with darker one, if possible based on whole-wheat grain or rye and potatoes should be replaced with pasta made from pure semolina (wheat variety). Recommended are

low GI foods, such as those artificially sweetened with fructose, meat and meat products, milk and dairy products, fruit and fruit products without added sugar and vegetables and vegetable products. Glycemic index ranks foods and their final value according to their insulin actuation, i.e. how they influence the level of blood glucose. Glycemic index provides precious data on raising or lowering of blood glucose. What is the ultimate purpose? Control of the blood sugar status! It seems to be the most important thing for diabetics; however, it is of no less importance for top athletes either. Those who are able to successfully control the level of blood glucose avoid all of the inconvenient consequences caused by hyper and hypoglycemia, such as diuresis (loss of glucose, water, Na<sup>+</sup> and K<sup>+</sup> in urine, increased secretion of insulin, decreased secretion of insulin, increased secretion of glucagon, adrenaline and growth hormone, secretion of cortisol in severe cases occur confusion, weakness and sweating, muscle spasms, and brain damage and death as the most difficult cases. Many of the tests related to glycemic index are surprising, i.e. baked potatoes have GI higher than GI sucrose! An even bigger surprise is the very low GI in beans named Chana dai. A pleasant surprise is the low GI for pearled barley (36), which is by far the lowest among cereals. Completely unexpectedly, brown rice has a GI of 79 and wheat even higher than that. So far the scientists have determined the GI for 300 foods of carbohydrate type. (Foster et al., 2002).

#### MAKING A SPORTS MENU

Making healthy food menus, culinary and nutritionally tested is extremely important in relation to both top athletes and recreational athletes. It takes knowledge and experience. Making menus, which are practical and tested, both culinary and nutritionally, demands knowledge and skill. Athletes travel a lot changing vehicles such as busses and planes, places, cities and countries, which also entails change in routine nutritional habits. It is well known that constant energy supply, i.e. carbohydrates, is the key for successful training and even better results at competitions. There are two main options: either you will use a menu calculated by an expert manually or digitally or you will make a menu yourself using adequate software package, nutrition charts and good recipes.

When developing a menu for athletes one should differentiate the following:

- Provide various groceries
- Prepare meals in compliance with caloric and biological value and the athlete's taste
- With adequate culinary procedures prepare meals according to such suggestion

We cannot just pile up food that comes our way, a skill that includes rules is necessary – what goes with what and how, what is “tolerable” what is “intolerable”, especially with vegetarian menus. Preparing a meaningful menu is a skill just as the

creation of a beautiful flower bouquet or clothes accessorizing is a skill.

### *Menu Making*

In 5 meals a day, which is an average for a top athlete, one must "arrange" a breakfast. Based on recommendations, from the rich data base you should "invite": juices, corn flakes, skimmed milk, toast, soft boiled eggs and observe their caloric value, total fat, total proteins and their correlation. When you think that the meal is completed "print" it and that is 1/5 of the total daily work. The remaining meals are about to follow so be prepared to spend a few more hours at the computer, until you complete a daily menu. When developing a lunch menu the procedure is the same but the resources from the data base are different. Now you "invite" soups, stakes (meat), potatoes, rice, salad and ice cream (fruit cake), until you complete a meal and conclude it with a cup of coffee. There is evidence suggesting that caffeine acts as a central nervous system stimulant, primarily through competitive adenosine receptor blockade (Snyder et al., 1981). Caffeine is well known to enhance exercise performance (Graham et al., 1991, Ivy et al., 1979). Scientists from Department of Internal Medicine and the Howard Hughes Medical Institute (G.I.S.), Yale University School of Medicine, New Haven, Connecticut and Physiological Performance and Operational Medicine Department, Naval Research Center (K.E.S., W.K.P., H.W.G.), San Diego, California examined the effect of caffeine ingestion on muscle glycogen utilization during exercise. They studied 20 muscle glycogen-loaded subjects who were given placebo or caffeine (6 mg/kg) in a double blinded fashion 90 min before cycling for 2 h at 65% of their maximal oxygen consumption. They concluded that caffeine ingestion 90 min before prolonged exercise does not exert a muscle glycogen-sparing effect in athletes with high muscle glycogen content. However, these data suggest that caffeine lowers the threshold for exercise-induced  $\beta$ -endorphin and cortisol release, which may contribute to the reported benefits of caffeine on exercise endurance (Laurent et al., 2000). The same technique is used for snacks (banana, sandwich, juice) and dinner (pizza, chicken, salad, ice cream). If you are a good expert, you will create 7 different menus for the entire week. With careful measurement of all nutritive substances you can "adjust" the menu and if there is a lack somewhere it can be filled with food additives or supplements. The main rule in menu development is that it presents a permanent value for your athletic discipline (i.e. swimmers need complex carbohydrates, tennis players' choice is a banana because it contains simple sugars which restore energy fast and recover the lost potassium). When you "arrange" ten menus – you will simply exchange them. The advantage of individual "adventure" is that you get to choose your favorite food and avoid what you do not prefer. Nobody knows what you really like except yourself. An

important evaluation criterion along with macronutrients (proteins, fats, carbohydrates) is the total caloric value. However, those are basic things. They are followed by an analysis of the remaining 50-70 nutritive substances (vitamins, minerals, fatty acids and amino acids). ADA (*American and Canadian Dietetic Associations*) recommends that fat intake should be less than 30%, about 15% - 25 % of the total daily energy intake. The experts from the ADA ( American and Canadian Dietetic Associations) believe that vegetarian diet gets an average of about 12.5% energy of protein and strict vegan about 11% of the energy. Daily carbohydrate recommendations by European Food Safety Authority (EFSA) for athletes range from 6 to 10 g·kg<sup>-1</sup> body weight·d<sup>-1</sup> which will ensure the filling of spent reserves of muscle glycogen between exercises, and recommended ratio of daily calories for an athletes would be as follows:

1. For lower active athletes, and without high intensity training  
 Body weight x 28-30 kcal = ratio of daily kilo calories per day  
 For a person of body weight 80 kg an average of 2320 kcal.
2. For moderately active athletes (training 45-60 minutes per day):  
 Body weight x 32-40 kcal = ratio of daily kilo calories per day  
 For a person of body weight 60 kg an average of 2880 kcal.
3. For very active athletes ( training 60-120 minutes per day ):  
 Body weight x 45-50 kcal = ratio of daily kilo calories per day  
 For person of body weight 80 kg an average of 3680 kcal.
4. For very active athletes ( marathon training ):  
 Body weight x 50-60 kcal = ratio of daily kilo calories per day  
 For person of body weight 80 kg an average of 4400 kcal.

### *Importance of Breakfast*

Many young people who are not involved in sports activities underestimate the importance of a morning meal, and a majority of athletes simply does not have the time for that. Although none of the above-mentioned is good, it is even worse when it involves top athletes. Along with macronutrients (proteins, fats, carbohydrates) an important criterion for quality evaluation is the total caloric value of a morning meal/breakfast. Namely, it is well known that constant energy supply (carbohydrates) is the key for a successful training and even better competition. Although your morning coffee will make you fresher, it will not influence the level of blood glucose, which is low after you get out of bed. If you do not eat anything lowering of blood glucose will continue and probably cause hypoglycemia and drowsiness around noon. If you have some more coffee on an

empty stomach (which many do), it results in increased diuresis and loss of valuable fluids.

What happens in your body that you do not have a clue about? The body is fighting itself – looking for energy supply. You have failed with the “supply”, so you will bear the consequences. The body is simply “crying” for a bite and you think it is a good thing for weight loss. You could do that in the evening, but in the morning – not at all! If you do not have time for breakfast, before an early training you should take supplements that will provide energy and will not burden the digestion. Preparations with 20% proteins, 80% carbohydrates and desired flavor (prepared with water or milk) and multivitamins and multimineral are recommended. Just not to forget one important fact that the supplements should not be a substitute to a regular breakfast.

### TAKE CARE OF YOUR BODY WEIGHT

According to HZJZ (Croatian Institute for Public Health) amount of energy necessary to achieve and maintain desired body weight depends on: age, gender, physical activity and even climate. (Energy demands vary. The usual method for evaluation of nutritional condition of adults is the calculation of the body mass index (BMI). BMI is defined as the body weight (in kg) divided by the square of height (in m).

Formula:

$$\text{BMI} = \frac{\text{Weight in kg}}{\text{Height in m}^2}$$

WHO (World Health Organization) criteria for evaluation of nutritional condition according to BMI for adults (except pregnant women):

- Below 18,5 = malnutrition
- 18,5-24,9 = desirable weight
- 25,0-29,9 = increased weight
- 30,0-34,9 = level I obesity
- 35,0-39,9 = level II obesity
- Over 40 = level III obesity

However, WHO (World Health Organisation) athletes with large proportion of muscle unnecessarily puts at the level of obesity in the above classification. This could be noted as a disadvantage of this classification.

### Recommended Food

#### **Protein sources:**

Recommended:

Fat-free red meat (veal, baby-beef, non-fat beef), white poultry meat – skinned (chicken, turkey), fish, low-fat cheese, egg white, protein shakes, soy.

Not recommended:

Red meat (fat), variety meats/giblets, smoked and cured meat products

#### **Carbohydrate sources:**

Recommended:

Vegetables (especially leaf vegetables), fruit, cereals (barley, oat and flax)

Not recommended:

White flour products (white bread, bagels, snacks), white sugar

#### **Fat sources:**

Recommended:

Olive oil, olives, almonds, peanuts, hazelnuts

Not recommended:

Snacks such as chips etc., margarine, butter, oil fried food, fried food, and industrial cakes.

### NUTRITION AFTER WORKOUT

Whether the aim of the workout is increase of the muscle mass or reduction of subcutaneous fat tissue it is equally important to take care of the workout and the meal after the workout.

It is not a mistake to say that most athletes and fitness recreational athletes go for a drink after a great workout, feeling good about losing a few kilos, not knowing that it was primarily water, and after 2-3 hours they come home and eat. Sounds familiar, right?

#### **PWM – Post Workout Meal – Nutritive Meal Immediately After Training/Workout**

It is not only important to eat well in order to gain muscle mass, it is also important to know what, how and when. We can say that this is the most important meal during the day. After a heavy workout the muscles are overtired, glycogen level has drastically dropped and catabolism or muscle degradation begins. The only way to prevent that negative process and to start the anabolic process (muscle building) is to input necessary nutritive elements into the body. Replacement of lost glycogen is most distinct after a workout. That is also the time of drastic increase and acceleration of protein synthesis process or process of renewal and building of new muscle fibers. Isn't it reasonable to supply the organism with necessary elements at that moment? Input of carbohydrates immediately after the workout raises the level of insulin, one of the main hormones responsible for the growth of muscle mass along with growth hormone and testosterone. Those who wish to lift muscle mass need to take carbohydrates immediately after the workout. By doing so, you increase the level of all hormones and prevent unnecessary degradation of muscles bringing them into the state of positive nitrogen balance. Time after the workout is ideal for absorption of creatin and amino acids: efficiency is greater than any other time of the day. Let us see what a quality PWM should contain. The first ingredient is water; our muscles are 80% water. During the workout we lose large amounts of water through perspiration, organism is protecting the body from overheating. Water and workout – important! By not taking any water we can lose up to 20% of strength and energy needed for the

workout. When perspiring we lose large amounts of water which thickens our blood and increases the blood pressure because the heart needs to increase the pumping pressure in order to work the thickened blood through all vessels especially small capillaries and also to get oxygen to the smallest muscle fibers. It takes 4 ml of water per gram of carbohydrates in order for the organism to replace and store glucose (glycogen). The second important ingredients are the carbohydrates. I have previously mentioned why it is necessary to consummate them after a workout, but let us see which ones and how much. Maltodextrin and dextrose are the best for this meal and they are usually contained in mixtures of protein meals for mass enlargement. Their absorption is fastest, which means that they replace lost glycogen supplies faster. Depending on the speed of our metabolism and the intensity of the workout, we should take 1 –1,5 grams of carbohydrates per kg of body weight (i.e. if you weigh 80kg, you take max 80-120 grams of carbohydrates). If you prefer fruit, have some fruit with higher GI (i.e. bananas or grapefruit). Protein-protein-protein. Nothing without proteins. Proteins are building blocks for the muscle wall. Immediately after the workout, the organism is able to use and build in up to 50% more proteins than with any other meal. Protein synthesis is highest then and hungry muscles absorb the proteins and amino acids like sponges. There are several types of proteins (whey, soy, milk, eggs,

meat etc.), and it is good to know which one is the best at that moment. Among all proteins the best one in general is whey or milk whey protein, which is ionized and micro filtered and thus most adequate for a fast entry through cell walls of the muscle. How much do we need; that depends on the metabolism, body weight, but mostly it is around 40-70 grams. Final ingredients, no less important, are the vitamins, minerals and microelements.

### CONCLUSION

For success and advancement in sports it is necessary to know the space we work in. Nutrition and sports have gained a lot of attention in the past 20 years and have been attributed one of the leading roles in the athletic pyramid of success. Books were published and researches performed -all leading to nutrition and menu making as a very important factor in athletic success. Sports nutrition is primarily the food with composition that provides an effective support during training and also insures optimal recovery. Programmed basic nutrition and food supplements make a sports menu. Training/workout without adequate nutrition means nothing, just as nutrition means nothing without adequate workout. Their combination creates a compact unit, which may have different names, but each of those names aspires to one thing – success.

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## SPORTSKI JELOVNICI

Stručni rad

### **Sažetak**

*Prehrana sportista i izrada jelovnika za sportiste već odavno igra veliku ulogu u profesionalnom sportu, ali i u životima rekreativaca i amatera. Primjena sportskih jelovnika često čini prevagu i odlučujuću nijansu u samom procesu sportskih priprema i forme sportista, što na kraju rezultira stvaranjem velike razlike između vrhunskog sportiste i onih koji to nisu. Upravo prehrana čini tu nijansu u velikom broju slučajeva, jer koliko je važno kako treniramo, toliko je važno i čime se hranimo.*

**Ključne riječi:** *sportisti, ugljikohidrati, proteini, masti, glikemički indeks, tjelesna težina, kalorije.*

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