



THE ROLE OF DIETING PRINCIPLES IN MAINTAINING A SUPERIOR FUNCTIONAL BALANCE HUMAN BODY OF PROFESSIONAL ATHLETE

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Abstract

It is the view of experts that, currently, exceptional performances in sports that have been achieved in the past years, had at their core, among others, the following factors: the progress obtained in the field of sports nutrition, of biological preparation and the fight against infectious diseases.

I have set as a goal of this paper to present the role of nutritional principles, as well as the importance of the balance between the necessary and the dietary intake, in order to better understand the role of dieting in maintaining the performance.

Keywords: *dieting principles, metabolism, protein, lipids, carbohydrate.*

JEL classification: I19, I21

Introduction

To achieve performance, athletes have to undergo a considerable effort during the training process, which oftentimes drives the body to its physiological limits. In order to cope with these requirements and preserve sporting longevity for as long as possible, one must not only have a thorough preparation, but respect a regime meant for sporting life - and nutrition plays a crucial role in that. Rational dieting, and this is no exaggeration, is one of the contributing factors to achieving sports performances, and overlooking it compromises the results many times.

The human body needs a constant intake of energy for it to function properly, intake which is obtained by means of dietary principles. Given that the human body is a homeothermic organism, that is an organism lacking in the capacity to store heat or the possibility to transform an exterior type of energy into heat, the only source of man's survival remains the energy obtained through the breaking down of the chemical bonds of food. (Mariana Graur, 2006, p. 21)

The energy balance in humans is regulated primarily by modulating energy intake.

Insufficient food intake causes weight loss, while excessive intake leads to increase in weight. Energy storage in the body is determined, however, by the existing balance between food intake and energy expenditure. An active person putting in important physical activity will consume a larger amount of energy than a

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sedentary person. The equation of energy balance can thus be expressed as: changes in the body's energy deposits = energy intake - energy consumption.

The only source of energy for the human body is represented by food. The three nutrients which act as sources of energy are sugars, fats and proteins. For it to be able to be utilized, the energy contained in these is transformed into adenosine triphosphate molecules by the body, a process that consumes oxygen and produces heat.

The energy value of food and the energetic needs of humans are usually expressed in kilocalories, calories or Joules. (Mariana Graur, 2006, p. 23)

Dietary principles are well-defined substances from a chemical standpoint, and they have a certain role in the body where nutrition is concerned. The principles indispensable to man are: proteins, fats, carbohydrates, minerals, vitamins and water.

These are divided into two groups depending on the role they fulfill in the body:

- energetic (caloric): carbohydrates and fats;
- protective (maintenance):
- plastic role (recovery), which includes parotids and some mineral salts (Ca, Cl, K, etc.);
- catalytic role (adjustment of some chemical reactions), which includes vitamins, some mineral salts (copper, cobalt, iodine, etc.) and water.

Knowing the biochemical phenomena taking place during physical effort is especially important for the process of scientific practicing of performance sports. Any sportive activity implies a level of effort, big or small, and that in turn implies an additional amount of energy consumption, as opposed to the one needed in the case of normal vital processes, the so-called basal metabolism.

Basal metabolism represents the minimal quantity of energy expressed in large calories, required by the body in its resting state in order to maintain vital functions (circulation, breathing, nervous activity, etc.). (*Nutritie- doping*, 2015)

The energy value of the basal metabolism in adults is between 1300-1600 kcal/day or, more accurately, 1kcal/ kg/ body/ hour, which means that that is the amount required to live (vital functions), supposing that no type of effort is submitted.

Table 1 Values of global energy metabolism compared to basal metabolism

Basal metabolism	40 kcal/h
Sedentary activities	50 kcal/h
Light physical activities	50- 90 kcal/h
Moderate physical activity	90- 140 kcal/h
Intense physical effort	peste 140 kcal/h

Metabolism means the exchange of substances occurring between the body and the



environment (i.e. the exchange between protoplasm and the substances from the external environment), as well as the entirety of physical and chemical changes taking place in each cell. (Vâjială, 2002, p. 29).

The totality of chemical transformations, starting from the absorption of nutrients and ending with the removal of the final products is defined as the intermediary metabolism. It manifests itself through two opposing processes, found in dynamic equilibrium: anabolism, consisting of the synthesis of complex organic substances characteristic of the body, and catabolism, meaning the degradation of organic substances and the releasing of energy. Metabolic processes are conducted simultaneously, are enzymatically catalyzed, reversible and interconnected.

Energy metabolism covers all the energy changes that accompany the intermediary metabolism. The body receives through food both the material needed for growth and the recovery of cells (in other words for the developing of their own substances- the trophic or plastic role of food), as well as the energy necessary to these syntheses and the conducting of biological processes (energetic role).

In order to not produce disturbances by excess or insufficiency, the nutritional factors must be brought in certain proportions. Rational dieting is the one that fully satisfies all the quantitative and qualitative needs of the body, taking into account its physiological particularities, the effort submitted and the environmental conditions in which it is carried out. Rational nutrition contains all the trophic, energetic and catalytic substances needed.

For an athlete's food ration to be correctly constructed, it must meet several requirements, including:

- covering minimal energy expenses (basal metabolism) necessary to sustain life;
- covering the energy needs for the additional activities that maintain basal metabolism (certain physical or intellectual activities, professional or school-related ones, etc.);
- covering the energy requirements imposed by the consumption during training and competitions;
- covering energy expenses caused by recovery processes;
- covering other unforeseen energy expenses (environmental conditions, disease, stress, etc.).

The food ration of an athlete differs: the ration of support (from training); the competition ration; the waiting ration; the ration of recovery. (Dragan, I., 2002) In order to achieve a food ration that is superior from a quality point of view, it is necessary that the principles of food be arranged in a certain order and in certain proportions.

The average values of the main nutrients where an athlete's ration is concerned - of



course, with variations for each individual and type of sport- are: protein, 15-20% (2-2,5g/kg); carbohydrate, 55-65 % (9-10g/kg) and 20-25% lipids (1.5-2 g/kg) plus at least 2 liters of liquids/ 24 hours.

Table 2 The average daily demand of organic substances and their report in the food ration

Substance	Carbohydrate	Lipids	Protein
% of food ration	55 - 70%	25 - 30%	12- 1 %
Necessary /kg/ Corp	4,5 -10	1,5 - 2	1, 2 - 2,5
Required total	380- 400 g /24h	30- 110 g /24 h	100 g /24h
Calories /gram	4,1 kcal /g	9,3 kcal /g	4,2 kcal /g

Protein

The word „protein“ comes from the greek „*proteinus*“, which means „first“. Protein is part of every cell and plays the role of element of anatomic construction, as well as substance with catalytic and functional role.

Of the 20 amino acids that make up the structure of protein substances, 8 are considered essential, because they cannot be synthesized by the human body and must be brought every day through food. These are valine, lysine, leucine, isoleucine, methionine, tryptophan, threonine and phenylalanine. The rest of them were deemed non-essential, seeing as they can be synthesized by the body from other substances.

For the synthesis of protein for the body, essential and non-essential amino acids are needed in certain proportions.

The daily allowance of protein is at around 12-15% of the nutritional ratio value (15-20% in some sports), which represents:

- for sportsmen involved in intense efforts, there are recommended 1,5-1,8 grams per kilogram of bodyweight/day
- for strength sports, 2-4 grams per kilogram of bodyweight/day.

Animal origin protides represent 60% in the total quantity of protides, and the vegetal ones about 40%. Among animal source foods, which contain a large amount of protides, we mention: meat and meat products, fish, eggs, milk and cheeses.

The necessary in terms of animal proteins is delivered by:

- 250-300 grams/day of meat servings, one of which is to be liver, 2-3 servings of fish, and 4-5 eggs per week.
- daily: 250 ml of milk or 120 ml of concentrated milk/ 30g powdered-milk, 2 little yogurts, 50 grams of cottage cheese, 30 grams of pressed cheese.



Carbohydrates

Carbohydrates are substances consisting of one or more molecules. On the basis of the number of forming units, there can be defined: monosaccharides, oligosaccharides and polysaccharides.

In the human body, carbohydrates are a major energy source. Furthermore, these are the most important resources of energy in our body. When the body faces a carbohydrate deficit, it resorts to the resources of protein, breaking down the muscle tissues that use the most energy. For a sportsman, $\frac{3}{4}$ of the recommended amount of carbs will be monosaccharides and disaccharides (glucose, fructose).

The daily carbs intake for a sportsman is about 55-70% of the food allowance.

When it comes to sportsmen, the need for carbohydrates is on average between 4,5 and 10 grams per kilogram of body weight/day (600-800 grams).

Carbohydrates are found in cereals (wheat, corn, cornflakes, oat etc.), pasta, rice, dried fruits (plum, apricot, fig, currant, date etc.), pulses (beans, soy, lentil, peas etc.), bread, potatoes, fruits, greens, sugar, honey, candies, syrups, sweetnesses, jam, Turkish delight.

The standard ratio for carbohydrates includes (consists in): flour 300-350 grams; potatoes 400 grams triweekly, rice- twice a week; flour/cereals: 30 grams at breakfast/brunch; sugar: 50 grams, jam (marmalade) 50 grams.

Pre, intra and post-workout supplements based on carbs are necessary.

Lipids

Lipids are a heterogenous group of substances soluble in organic solvents, but insoluble in water. These fatty organic substances are found in both saturated, insaturated, hydrogenated and essential fatty acids. Lipids (known in the form of fat) provide the highest amount of energy than the other main nutritive substances. Fats are important for the body, but are also dangerous if not consumed properly.

We increase the level of cholesterol and adipose tissue by consuming hydrogenated and saturated fats.

Of the total amount of lipids, the ones that are animal origin represent 70% (butter, whipped cream, sour cream, cream cheese, milk, yolk, fat, bacon, fatty meat, brain, caviar, liver, fish oil) and the ones that are vegetal origin 30% (olives, peanuts, nuts, almonds, sunflower seeds, pumpkin, soy, corn).

The need of lipids is provided by 30g butter/day; 35g vegetable fat (oil, margarine). It is not necessary an additional quantitative lipid; the quality can be supplemented with omega 3, fatty acids, medium chain triglycerides, essential phospholipids.



Another thing worth mentioning is that the food rich in acid radicals are the proteins, while the food rich in alkaline radicals are the ones from the dairy products and derivatives, fruits and vegetables.

Water is one of the most important constituents of the human body and without it, life wouldn't be possible. Water represents the environment in which all the metabolic processes of the body are being carried out. It dissolves the nutrients that the organism receives through food, intervenes in the process of maintaining constant the body temperature and it's the solvent in which are being dissolved the organic and inorganic substances.

About 60% of the body weight of the male and 50% of the female, is represented by water. As a body is younger, the percentage of its water is higher. The human brain consists of 95% water, blood is 82% water and the lungs 90%. Of the daily requirement of 40 g water / kg, 35g are being represented by the exogenous water and 5 g of the endogenous one. The exogenous water infiltrates itself in the form of solid and liquid food while the endogenous one represents the water resulted from the mitochondrial respiratory chain. The constant maintenance of the water balance requires that the volume of the water ingested and excreted by the kidneys, lungs, skin and faeces to be equal. This volume is approximately 2500 cm³/day. At a loss of 15% of water in the body, brain activity ceases. The water intake required to maintain the fluid balance is being initiated by the appearance of thirst.

The mineral salts have a great importance in an electrolytic, dissociated form. The distribution of the electrolytes differs from one compartment to another of the body. Mineral ions have a special physiological importance in maintaining the acid-base balance in the muscle contraction, the stimulation and inhibition of enzyme activity in excitability etc.

The essential difference between the mineral metabolism and the organic substances is that the minerals are not produced in the body. They are ingested, perform their physiological role and are eliminated through the kidneys, skin and faeces.

Table 2 The main mineral ions

Elements	Total/ 70 kg	Functions and location in the body	Required /day
Na	56-57 g	<ul style="list-style-type: none"> it is essential in the natural growth process; it maintains the extracellular fluid volume(outside the cells), supports the body's acid-base balance; contributes to the well functioning of the nervous system and muscles; involved in the production of the amino acids and catecholamines , as also in the solubilization of the calcium and others minerals in the blood. The absence sodium in the body causes: thirst, dehydration syndrome with dryness of mucous membranes and skin, fatigue and muscle cramps. 	0,7-4 g



Elements	Total/ 70 kg	Functions and location in the body	Required /day
K	120-160	<ul style="list-style-type: none"> stimulates the release of sodium from the the body and increases urine (kidney removal of liquids), along with it balances the water balance in the body; normalizes the heartbeat and the neuromuscular excitability, preventing arrhythmias; it is involved in the protein metabolism and in the proper functioning of the enzyme systems; the potassium blood intracellular penetration is favored by the presence of magnesium. The absence of potassium in the body cause: mental or physical stress. 	2- 3,5 g
Ca	900-1200g	<ul style="list-style-type: none"> A mineral present in the largest amount in the human body (120g); along with phosphorus contributes to maintain the health of bones and teeth; plays an essential role in maintaining the fluid balance in controlling the transmission of nerve impulses and muscle contraction, together with magnesium are reducing the neuromuscular excitability; part in coagulation; facilitates the absorption of vitamin B12. 	1,5-1,8g
P	600-800 g	<ul style="list-style-type: none"> it's being concentrated in the most part in bones and teeth, with a role in the growth and multiplication of the cells, being constituent of the nucleic acids, provides and stores the energy (constituent ATP = adenosine triphosphate) by metabolizing lipids and polysaccharides Ca ++ and vitamin D. There are absolutely necessary in the metabolization of phosphorus; a ratio of 2: 1 for Ca and P is optimum in the body, these two minerals are involved in almost all the physiological, chemical, metabolic diseases. 	1,5 –2g
Fe	4-5 g	<ul style="list-style-type: none"> essential for the formation of hemoglobin (oxygen transport to the cells of the body); constituent of myoglobin (oxygen uptake in the muscles as an emergency storage) and mitochondria, having a role in the intracellular energy production; it is necessary for the enzyme optimal functioning and in the metabolim of vitamin B. To reach the body, copper, cobalt and Vitamin C are necessary in absorbing the iron, only 8% of the ingested quantity of iron is present in the blood. The deficiency of iron in the alimentation (vegetarian) can lead to iron deficiency anemia and so on: paleness, tiredness, weakness, palpitations, nervousness, anergy, decreased immunity. Sources: red meat, giblets, shellfish and raw shellfish, oysters, egg yolk, nuts, asparagus, beans, fruit. 	10-15 mg



Elements	Total/ 70 kg	Functions and location in the body	Required /day
Cl	125	<ul style="list-style-type: none"> Participant to maintain the body's electrolyte balance; maintains the colloid osmotic pressure and participates in the formation of hydrochloric acid in the stomach, facilitating digestion. 	3, 5 g
I	20- 30 mg	<ul style="list-style-type: none"> almost two thirds of existing iodine in the body is stuck in the thyroid, where participates in the formation of thyroid hormones. These hormones have a major role in the body's growth and development from childhood to adulthood, intervening in almost all the processes of the carbohydrate, lipid and protidic metabolism (thermogenesis, nervous system, cardiovascular, etc.). Iodine deficiency leads to thyroid goitre and hypothyroidism: weight gain, mental retardation (bradipsihie). 	0,15 mg

Conclusions

The diet of athletes must be made according to the period of preparation in which the athlete lays in namely: ration of support (in training), ration of the competition and recovery.

Respecting the requirements life and diet all during training and especially during the contest represents a basic factor that determines the training of the body at a higher level and the achievement of superior performances, growing.

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