SPORTS NUTRITION: THE INVISIBLE TRAINING

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Sports Nutrition is the branch of Nutrition focused on people who practice physical activity as amateurs, as well as professional athletes. Sports Nutrition investigates the basic processes that are triggered in the body once food has been consumed and involve digestion, absorption of nutrients, transport by blood or lymph, utilisation in each tissue (tissue metabolism) and elimination of waste products mainly through urine and faeces.

Nutrition, in general, is a very applied science and its mastery requires combining concepts from different scientific disciplines, such as: Biochemistry and Metabolism, Molecular Biology, Cellular Biology, Physiology, Pathology, Epidemiology, Psychology, Food Technology, Chemistry, Physics, Social Sciences (History, Geography, Gastronomy...) and Legislation among others.

Sports Nutrition also has its own particular characteristics, which depend mainly on the sporting discipline being worked on, which means that the Nutrition applied is different. In other words, the nutrition to be followed by a footballer is not the same as that applied to a mountaineer. Furthermore, each discipline determines a series of parameters that the Sports Nutritionist must be aware of:

a) Type of training.

The nutritionist must know the workload, intensity, frequency and predominant muscle groups. To do this, he/she must speak the same language as the coaches and physical trainers. The nutritionist may have diets designed for specific training as well as for general training. For example, when a judoka practises continuous running in pre-season, he/she is doing general training, as running exercise is practised in other sports disciplines, for example by marathon runners.

When the judoka performs tackling and throwing exercises on an opponent during the season, he is performing specific training, as the techniques he performs are particular to judo and are not performed in other sports disciplines. Caloric expenditures during general training are usually well studied, while those for specific training require particular approaches.

b) Skills and actions developed during sport practice.

There is a wide variety of sporting disciplines that use different metabolic and tissue systems during their execution. Thus, for example, in one stage of a cycling race, aerobic energy metabolism (high use of lipids) with a predominant work of the cardiovascular system. An 800m runner will depend on his glycogen metabolism, while a 100m runner will depend on his creatine reserves. In both cases, his lower body muscular system will be decisive.

In addition, during the course of the competition, energy needs may change. For example, a cyclist, who depends on his lipid metabolism during the stage, will depend exclusively on his carbohydrate metabolism at the time of the final sprint. Therefore, knowledge of the metabolic bases of exercise is essential for the correct work of the sports nutritionist.

c) Competition rules and system..

It is essential that the Sports Nutritionist knows the rules of the sport in which he/she is working. For example, during a football match in normal weather conditions, he/she can only recover and hydrate the players during the half-time break in the middle of the game. However, during a basketball game, players may play and rest several times during the game, so you can apply rehydration protocols at any time, as long as the player is resting and the game is not stopped.

Taking into account these considerations, the Sports Nutritionist must know and verify all the relevant factors that will condition nutrition during training and competition. The aim is to be able to design the most appropriate and personalised diets, bearing in mind the recovery diet or during periods of rest and inactivity.

Post-exercise recovery is as important as performance during competition. Proper recovery allows you to replenish reserves and repair damaged structures in a more efficient way, which will allow you to perform at your best. Diet during periods of inactivity is equally key. There is often a tendency to eat the same amounts as during periods of activity. This results in an increase in kcal but a decrease in expenditure. The result is weight gain, which will force the athlete to readjust his or her weight when the season starts, and delay his or her preparation.

Another key mission of the sports nutritionist is to control supplementation. Athletes are the biggest consumers of ergogenic supplements, but not all of them work in the same way or even at all. The Sports Nutritionist must know which supplements have proven scientific evidence, know the dosage to take, the most appropriate time of the season and the sport discipline in which the supplement works. Finally, the Sports Nutritionist must know how to design diets for various contingencies that may occur during the season. The occurrence of injuries is the most common contingency. In these cases, the athlete must reduce his or her intake, since he or she is not carrying out any intense activity, in order not to gain weight. At the same time, he/she should take supplements that have scientific evidence for the recovery of the injury. Other less common contingencies occur during sporting performance in certain environments. Thus, during a Himalayan expedition, the mountaineer should limit the weight of his backpack, which in addition to food, should include warm clothing, climbing equipment and first aid material. Choosing the most appropriate food in these extreme situations is a contingency that the nutrition professional must know how to deal with.

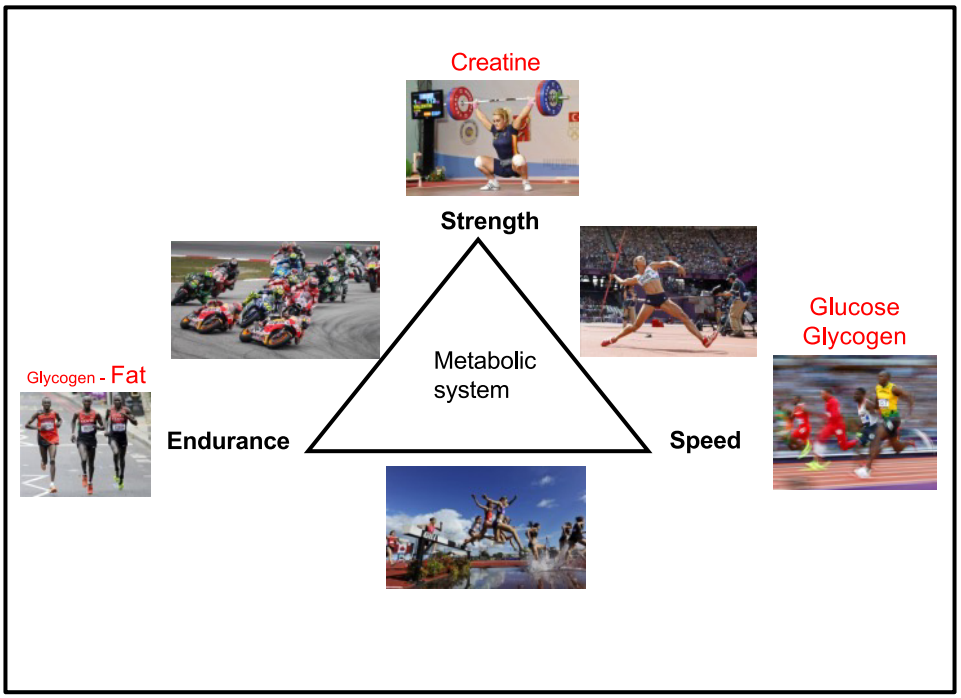
Taking all of the above into account, sports diets can be classified into regular diet (diet consumed during the training period), pre-competition diet (diet for the day or days prior to the competition), competition diet (diet to be consumed on the day of the event), post-competition diet (also known as recovery diet), maintenance diet (diet for periods of inactivity) and contingency diet (diet for special situations, such as the aforementioned injuries).

In addition, anaerobic power and explosive strength sports are generally characterised by protein-rich diets, which are up to twice the recommended intakes for the normal population. The increase in protein is made at the expense of reducing the fats in the diet, in which the correct presence of unsaturated (essential) fats must be monitored. Protein adjustment should be made according to the body's production of growth hormone and nitrogen balance.

Aerobic and combined endurance sports give preference to carbohydrate intake. In these cases proteins may be slightly increased and fats slightly reduced, with special attention being paid to maintaining optimal levels of glycogen stores. In this regard, it is particularly important to take into account the glycaemic load of foods or supplements that provide carbohydrates, so that a low-medium glycaemic load is the most advisable during exercise. This would include cereal bars and isotonic drinks. The idea is not to provoke an insulin spike that could trigger a sudden hypoglycaemia ("panic"), as well as to hydrate, as is the case with isotonic drinks. Carbohydrates will allow optimal use of fats by the athlete during the course of the event.

Finally, after exercise (recovery diet), special attention should be paid to damage to muscle mass during very prolonged efforts that favour protein catabolism and exercise-induced anaemia, with women being a population at risk. It is also important to replenish glycogen stores by eating foods with a high glycaemic load. The maintenance diet should be applied during rest periods and can be a balanced or slightly carbohydrate-rich diet, but always appropriate to the expenditure of the athlete. The contingency diet takes into account particular situations of specific sports and cases of injury.

To summarise, the Sports Nutritionist must work as a team with the coach, physical trainer, doctor and technical team with the idea of adapting the diet to each particular moment of the season and to each athlete, taking into account their level of performance, their position on the field (in the case of team sports), their capacity for recovery and the risk of injury. In addition to the diet, the Sports Nutritionist must control supplementation for the same purpose.



Illustrative diagram of the different metabolic systems used in different sports disciplines. *The 3 basic sports specialities are considered, such as strength (e.g. weightlifting), speed (e.g. 400 m sprint) or endurance (e.g. marathon). However, most sporting disciplines cannot be classified into a specific speciality, as several facets are combined during their execution. Thus, there are disciplines where strength-resistance actions predominate, i.e. a prolonged or repetitive strength action is performed over time (e.g. motorcycling). Other disciplines combine strength-speed actions, i.e. a strength action is performed after a speed run (e.g. javelin throwing). Finally, other disciplines combine endurance with speed or explosive moments during the execution of the race (example: 3000 m steeplechase). The sports nutritionist must know all these details and many more for the proper design of sports diets.*