



## RECOVERY OF THE FIGHTER'S BODY AFTER EFFORT

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In order to be able to accomplish a mission, the fighter must have impeccable physical training that allows him to act in different conditions from those of daily life. For this, the fighter must constantly raise the level of physical effort capacity, through training sessions carried out systematically, continuously, consciously and scientifically. After the physical effort made in training process and missions, the fighter needs a period of recovery of the body to prepare for future physical efforts at optimal parameters and create the conditions for increasing the capacity for effort. So, it can be said without mistake that recovery is a part of the training process, with a role in creating the conditions for accumulation. Recovery must be natural, but there are often cases where physical effort leads to depletion of the energy substrate used and there is no time available to restore it naturally; then there is guided recovery that does nothing but complete the natural recovery. It is important that the fighter's lifestyle be adequate for the activity and effort.

**Keywords:** physical effort; fighter; rehabilitation; guided recovery; natural recovery.

Participation in an armed conflict on the battlefield or in a mission on the theaters of operations are typical of military activity. This determines the content of training process of the military, of the fighter. In the activity of training, especially for solving conflicts or missions, the military needs strength and energy, skills to maintain vigor and physical and mental freshness, great ability to recovery the body after great and prolonged efforts in difficult conditions, tenacity and strength to overcome difficulties and endure deprivation to meet the multiple requirements of the battlefield.

The recovery of the fighter's body is one of the most important biological processes and should be treated as a component of training process. The efforts made in the training process and in fulfilling a mission require an immediate recovery of physical and mental capacities, of psychophysical endurance, so that the fighters might be able in a short time to act again at full capacity. Recovering the body after the effort made in the training process is a sine qua non condition to progress, to make great efforts in terms of duration and intensity, which determine the increase of effort capacity. Thus, the body works to maintain its biochemical functions and processes in a state of dynamic equilibrium, translated into a continuous constancy of physiological functions

– homeostasis<sup>1</sup> –, recovery being a response to previous effort, becoming a means of sustaining the effort that to be filed.

Recovery differs from rehabilitation: recovery is addressed to a healthy organism that has made a significant physical effort (fatigue arising from physical effort), while rehabilitation is located in the area of sports pathology and is addressed to a sick organism (injuries occurred following a physical effort). On the other hand, recovery is of two types, natural and guided (when natural recovery is no longer possible).

Recent studies suggest that local metabolic fatigue is due to the following factors<sup>2</sup>:

- muscle phosphocreatine depletion – in effort up to 2';
- accumulation of lactic acid in the muscles – in efforts between 35'' and 4'30'';
- decrease in muscle glycogen and accumulation of ammonia – in the efforts made for 10 to 90';
- depletion of muscle glycogen and accumulation of lipid peroxides – in the effort between 70 and 360';
- decrease in circulating glucose;
- depletion of essential amino acids in the blood and penetration of tryptophan into the brain;
- neuropsychiatric discomfort factors.

The recovery of the body is an integral part of the daily training process. This requires adequate equipment and time allocated in the training process or after completing a mission because after the body has been required physical effort, energy reserves

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decrease dramatically. This condition is called *anabolic rest* and is actually a state of physiological fatigue, called by some authors *pessimum* which triggers the body's natural recovery processes. If the functional possibilities of the body are exceeded, we can no longer talk about a functional synergy, so we will face a pathological fatigue or a functional pathology<sup>3</sup>. The immediate effects are:

- at the level of the central nervous system – the appearance of cortical inhibition, following

refers to a single training session, a micro-cycle (training stage), a macrocycle (complete training program), or when performing a mission.

Natural recovery is defined by a certain stereotype<sup>4</sup>:

- the vegetative parameters (cardiovascular and respiratory system) return to normal in a few minutes;
- metabolic parameters (biochemical indices) return to normal in a few hours;

**Table no. 1**

**THE TIME REQUIRED TO RECOVER THE ENERGY SUBSTANCES USED IN THE EFFORT<sup>5</sup>**

The recovery process	Recovery time	
	Minimum	Maximum
Phosphagen recovery - ATP and CP	2 minutes	5 minutes
Repayment of alactacic oxygen debt	3 minutes	5 minutes
Muscle glycogen resynthesis	10 hours (after continuous effort) 5 hours (after effort at intervals)	46 hours 24 hours
Resynthesis of hepatic glycogen stores	Unknown	12-24 hours
Elimination of lactic acid from the blood and muscles	30 minutes (active recovery) 1 hour (passive recovery)	2 hours 1 hour
Repayment of lactic acid debt	30 minutes	1 hour
Restoration of oxygen reserves	10-15 seconds	1 minute

a physical effort (in which hyperexcitability predominates), which irradiates the entire cerebral cortex favoring anabolic processes, with a role in reconstruction;

- at the level of the vegetative nervous system and metabolism – the decrease of heart rate and respiratory rate, the increase of the alkalinity of the internal environment, the predominance of vagal and cholinergic effects favor the creation of conditions for the installation of anabolic processes to the detriment of catabolic ones;

- at the level of the muscular system – restoring the glycogen and myoglobin reserves, as well as increasing the protein synthesis by intensifying the enzymatic processes.

The central nervous system is responsible for the natural recovery of the body, this being the main form of recovery after an effort, whether it

- endocrine, hormonal, enzymatic parameters return to normal in a few days.

However, there are certain features of the body's recovery as a result of physical effort (in training process or in the mission):

- energy sources used – carbohydrates from muscle glycogen stores, fat from body fat deposits and even proteins, when physical effort causes severe energy depletion:

- type of muscle fiber used – type I, slow-twitch, tonic, oxidative, red and type II, fast-twitch, phasic, glycolytic, white;

- the psyche – a positive, optimistic thinking can influence the recovery, in the sense of reducing the time in which it can be achieved;

- age – the older the age, the more difficult it is to recover and the longer period it requires;

- experience - a more experienced fighter has a faster recovery;

• weather – physical effort performed in extreme temperature conditions requires a longer recovery period.

Guided recovery (a complex process – methodical, pedagogical, medical, biological) completes the natural recovery, if the energy substrate that needs to be restored cannot be achieved until the next effort should be made (long and/or intense efforts performed at short intervals). The means

The application of means of recovery of the body after the effort (natural and/or guided) must take into account the specificities of the effort made, the type of mission performed, the individual characteristics of the fighter, the environment in which combat actions take place, but it must not be forgotten that their effectiveness is determined primarily by the accessibility of these means.

Table no. 2

**MEANS OF RECOVERY OF THE BODY AFTER PERFORMING A PHYSICAL EFFORT**

The biological substrate required in the effort	Neuropsychiatric	Neuromuscular	Endocrinometabolic	Cardiovascular and respiratory
Belonging to the field of recovery	Balneophysiokinetotherapy, nutrition, pharmacology, psychotherapy, rest			
Specific actions	Psychotherapy (demonstration, desensitization, relaxation, activation, conversations, relaxation techniques, concentration, self-suggestion, suggestion, psychosomatic training), acupuncture, acupressure, massage, medication			
	Active and passive rest, warm hydrotherapy		-	Active and passive rest, warm hydrotherapy
	Oxygenation	-	Oxygenation	
	-	Hydroelectrolytic rebalancing		
	Negative aeration	-	Negative aeration	-
	-	Sauna, diet	-	Sauna, diet
	-	-	Neuromuscular relaxation	-
Types of effort	Anaerobic effort			-
	-	Aerobic effort (without endocrine recovery)		
	Mixed effort (without endocrine recovery)			

used in guided recovery can address the biological, functional substrate that was required in the effort (cardiovascular and respiratory, muscular, endocrine, hormonal, enzymatic, nervous) or belonging to a certain field (balneophysiokinetotherapy, nutrition, pharmacology, psychotherapy, rest).

In the following table I tried to include a large part of the means of recovery of the body after performing a physical effort depending on their addressability, as well as the correlation of the means of recovery with the nature of the physical effort:

In conclusion, the most important role in the recovery of the body after effort is the natural recovery, but when it cannot ensure the recovery in a short time so that the fighter might carry out a new mission entrusted to him, the means of guided recovery can also be used.

In other words, the fighter cannot benefit from all the means of recovery of the body because it is not possible for them to be applied in units (acupuncture, acupressure, oxygenation, negative aeration, sauna, etc.), but this does not mean that it cannot achieve an optimal recovery. The important role belongs to the fighter, because the recovery is largely conditioned by each fighter's observance of specific norms as he/she must adopt an optimal lifestyle, which is close to that of a performance athlete – rest, diet, elimination of risk factors (alcohol, tobacco, etc.). In order to support the fighter in achieving these goals, there must be a concentrated effort of all those responsible, at the level of each structure – specialist in military physical training, doctor, psychologist.



**NOTES:**

1 Ion Andrei, Viorel Ceascai, *Efortul fizic pe înțelesul tuturor*, "Carol I" National Defence University Publishing House, Bucharest, 2007, p. 7.

2 Alexe Nicu, *Teoria și metodică antrenamentului sportiv modern*, România de Mâine Foundation Publishing House, București, 2002, p. 207.

3 Alexe Nicu, *Antrenamentul sportiv modern*, Editis Publishing House, Bucharest, 1993, p. 473.

4 Adrian Dragnea, *Antrenament sportiv – Teorie și metodologie*–, vol. 1, National Academy of Physical Education and Sports Publishing House, Bucharest, 1993, p. 213.

5 Cornelia Bota, *Ergofiziologie*, Editura Globus, Bucharest, 2000, p. 262.

Andrei Ion, Ceascai Viorel, *Efortul fizic pe înțelesul tuturor*; "Carol I" National Defence University Publishing House, Bucharest, 2017.

Bota Cornelia, *Ergofiziologie*, Globus Publishing House, Bucharest, 2000.

Dragnea Adrian, *Antrenament sportiv – Teorie și metodologie*, vol. 1, National Academy of Physical Education and Sports Publishing House, Bucharest, 1993.

Ionescu A., Anton B., *Dirijarea medicală a efortului*, National Center for Training and Professional Development for Coaches, National School for Coaches, Bucharest, 2004.

Nicu Alexe, *Antrenamentul sportiv modern*, Editis Publishing House, Bucharest, 1993.

Nicu Alexe, *Teoria și metodică antrenamentului sportiv modern*, România de Mâine Foundation Publishing House, Bucharest, 2002.

**REFERENCES**

\*\*\* *Teoria și metodică antrenamentului sportiv modern*, România de Mâine Foundation Publishing House, Bucharest, 2002.