Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 117 (2014) 232 – 237

Procedia Social and Behavioral Sciences

ICSPEK 2013

Endurance Training in Performance Swimming

Luciela Vasile [a]*

[a] National University of Physical Education and Sport, 140 Constantin Noica Street, sector 6, Bucharest, 060057, Romania

Abstract

In order for the balance between lactic acid production and removal ratios to be maintained during long-distance races in performance swimming, endurance training sessions should be designed by taking due account of rest intervals. In this paper, we emphasize the importance of the aerobic metabolism in swimming races - swimming being based to a large extent on endurance. Moreover, our aim is to define some methodological aspects based on which we can build sets of exercises for developing endurance, by reconsidering rest breaks.

Keywords: swimming, endurance training, rest intervals;

1. Introduction

One of the coaches' permanent concerns is the efficient combination of different training methods and the selection of appropriate means capable of ensuring the athletes' constant progress. The first step to be made in order to successfully solve this task is to determine accurately the particularities of the sport being dealt with. In the case of swimming, the most important element to be considered is the athletes' endurance capacity. Thus, their training needs to include almost all the training methods, because they require a good level of endurance, whether they swim short or long distances. Endurance is an essential prerequisite for performance in swimming. In this case, endurance is mainly an effect of heart hypertrophy. The effect of myocardial enlargement or "athlete's heart" is the pumping of a large amount of nutritive blood to the arteries. Aerobic endurance depends on the heart tone, which determines a higher blood pressure, by allowing the supply capillaries to open at the level of active muscles. This intense capillarization is the result of a long training process based mainly, in our view, on the way rest breaks are used between repetitions.

* Corresponding author. tel.: 0040722235376
E-mail address: lucielav05@yahoo.com

doi:10.1016/j.sbspro.2014.02.206

Endurance is also developed through the adaptation to ampler and quicker gas exchanges at the level of the lungs, which becomes possible by an increase in the number of functional pulmonary alveoli and by the intensification of pulmonary hematosis. Its manifestation continues after the effort, even after anaerobic effort, being expressed by the rapid regaining of the body values at rest (Dudley et al., 1982).

The endurance effort is mainly sustained by the slow-twitch (ST) fibres (Kindermann, Simon, Keul, 1979). They possess more myoglobin with the heme group attached to them, which allows oxygen storage, and they also have an increased oxidative potential, being recruited, during endurance efforts, in a higher proportion than the rapid-twitch (RT) fibres (FT), with a significant glycolytic potential.

The improvement of endurance is particularly correlated with an increase in the number of mitochondria and with the higher oxidative capacity of the muscles, and not only with the VO_2max value (Counsilman, 1997). Thus the muscular system also becomes important, as endurance is influenced not only by the oxygen that arrives in the muscular areas with increased metabolic necessities, but also by muscular adaptation, through morpho-functional specialization, to intense and prolonged effort.

Contextually, we consider that, by developing aerobic capacity through the adjustment of rest intervals, swimmers have the possibility to perform mechanical work over a longer period of time, thus delaying the depletion of the energy supplies available in the muscle cells. In these conditions, the body will gradually diminish the effects of the residual substances accumulated as a result of tissue metabolism, even during effort, generally through the buffer systems and the mechanisms for the removal of effort-induced catabolites (Costill, 1978).

2. Endurance training types

In order to develop endurance capacity, we propose three types of specific training, with an emphasis on the methodical aspects related to the determination of rest breaks, which are so necessary for the construction of each metabolic picture.

2.1. Basic endurance training (En-1)

Basic endurance develops through the *distance swimming method* that consists in covering longer distances than the competition distance, at a slower pace than that used in a competition. During the standard training sessions, athletes perform submaximal but also fast swimming.

Table 1. Specific drills for En-1

Distances	Number of repetitions	Effects	Breaks
200 m	4 - 6 x 200 m children – level III	anaerobic;	30 minutes – level III
	6 - 8 x 200 m juniors – level II	moderate and high aerobic	/
	8 x 200 m (maximum 12 x) seniors – level I		20 seconds – level II
			/
			10 seconds – level I
400 m	2 - 3 x 400 m – level III	moderate and high aerobic	30 seconds – level III
	4 - 6 x 400 m – level II		/
	6 x 400 m (maximum 10 x) – level I		25 seconds – level II
			/
			20 seconds – level I