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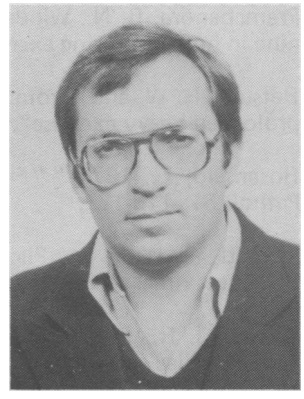

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ESTIMATION OF SWIMMERS' PHYSICAL CONDITION BY A SWIMMING RECOVERY TEST

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ABSTRACT

In this article, the authors propose an original analysis of the cardiac frequency after training. The study of rapid diminution (alactic oxygen debt) and of plateau (lactic debt in oxygen) make possible adjustment of the training.

The variations observed in young swimmers during their sporting season and note a tangible improvement of the two components for recovery.

INTRODUCTION

Numerous tests exist to estimate the quality of a swimmer's training during the sporting season but most of them are executed in laboratories under conditions far from those applied in competition (VO_2 max, STT, Flack, 1922) (Marconnet et al, 1978; Margaria et al, 1933).

This is why, starting from classical curves in cardio-vascular recoveries we worked out a new test which would enable the trainer to know about the degree of fitness of the athlete when the test is applied but moreover would guide him to the most suitable type of training needed (speed, interval-training).

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METHODS AND SUBJECTS

Equipment and method

This test requires a 26 metre long swimming pool and a stop-watch. It includes:

(i) 6 times 50 m freestyle in the swimming pool at 80% of the maximum individual speed with one minute thirty second rest between each race.
(ii) The evaluation of cardiac frequency (every minute) from the arrival up to the fifth minute.
(iii) Results are written out on a graph and afterwards interpreted thanks to a diagram.

Subjects

During this work we tested young swimmers in the MEAUX CLUB (county level) throughout a year, making three tests during the sporting season (Pilardeau et al, 1979; Valeri, 1978).

They are 21 trained swimmers (more than 2 years' competition) of both sexes (10 boys, 11 girls) aged 12.7 ± 3 years, doing crawl, breaststroke, backstroke (each test being done in the swimmer's speciality).

RESULTS

Cardiovascular recovery is schematised on a graph (Fig. 1) on which one notes down the value of points.

A* Point of intersection of the first part of recovery (first and second point) with the straight line representing the pulse at rest.

B* Pulse after five minutes (in beats/m).

Parameters taken into account to make the diagram.

The A and B points are put in a double entry diagram (figure no. 1) (Pilardeau et al, 1982; Pilardeau et al 1979).

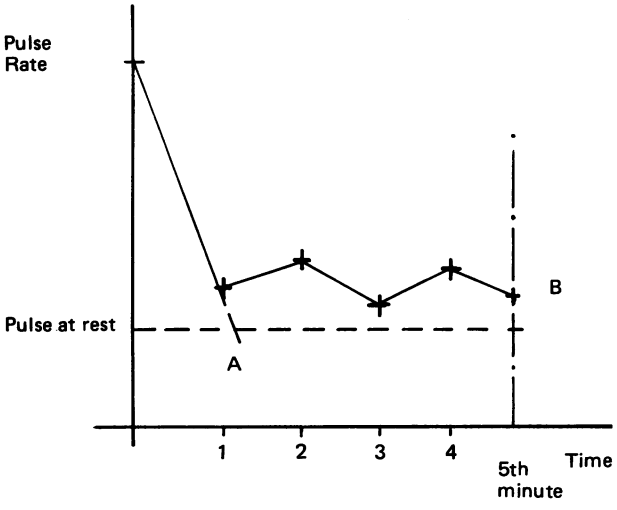

Figure 1

To make use of this diagram it is necessary to report A and B values:

A — Horizontal value
B — Vertical value

The score of a swimmer is read directly.

For example: A = 95 s and B = 90 beats/m. The score is averaged and it indicates this swimmer should practice "interval training".

The reading of this diagram indicates very quickly:

(i) The physical fitness of the athlete
(ii) The type of training to advise

Sector A: No problem
Sector B: Speed training
Sector C: Interval training
Sector D: Speed and interval training

The evolution of physical fitness during the season. For example in this study: ① in December, ② in February and ③ in May.

DISCUSSION

The interest of this test is its repetition possibility (Degre and Denolin, 1965; Pilardeau, 1982; Pilardeau et al, 1982) and the easiness with which it can be applied under effort conditions.

Thanks to works by Degre (1965), Morand (1978) and Troquet (1961) on the diminution of cardiac frequency after effort, it is now possible to analyse the curve obtained in two separate stages:

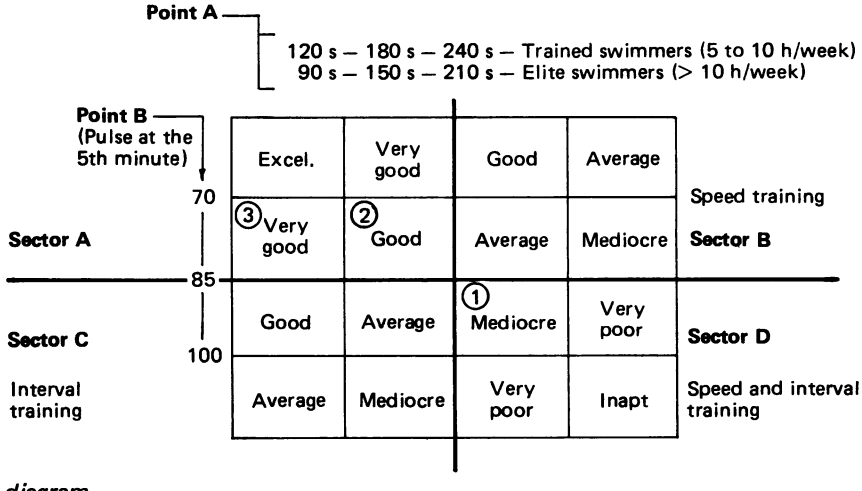

Fig. 2: Summary diagram.

(i) A phase of rapid diminution, obtained in putting in relation the first two points of the curve, corresponds to the recovery of the alactic oxygen debt.

(ii) A plateau, slightly slanting, represented by the pulse at the fifth minute and which corresponds to the recovery of the lactic oxygen debt.

Therefore it is possible to know the training component able to modify the cardiac recovery (Fig. 1).

(iii) Speed whether the first straight line isn't slanting enough.

(iv) Interval training if the plateau is too high.

Thus it is possible through this means to adjust training toward the most profitable type of exercises for the athlete.

In this study we can note that:

(i) An overall improvement in performance is achieved by the young swimmers due to their training (Table I) since in May 100% of athletes are in good, very good and excellent categories compared with only 45% in December and 86% in February.

TABLE I

Swimmers' physical conditions related to the sporting season.

	December %	February %	May %
Excellent	0	7	6
Very good	17	53	88
Good	28	26	6
Average	28	7	0
Mediocre	10	7	0
Very poor	17	0	0

Results are expressed in % related to the number of subjects tested.

TABLE II

Board no. 2: A and B variations according to the season significant differences exist for those 2 points ($a < 0.01$) between the months of December and May.

	December	February	May
A	155 s ± 60	95 s ± 30	72 s ± 12
B	93.4 beats/m ± 12	82.5 beats/m ± 19	73.5 beats/m ± 17

(ii) Both components of the test decrease (–52%) for the first curve and (–21%) for the plateau which seems to indicate the effects winter training have on recovery cardiac frequency.

From those facts it is now possible:

(iii) To follow an athlete during his successive training by checking the way his cardiac reactions are altered during exericise.

(iv) To test an individual on his cardio-vascular profile in order to place him in relation to the team.

Easily performed, this test can help the medical team to supervise training for it can easily be applied by trainers several times a year, allowing them to modify the stages of training with more accuracy.

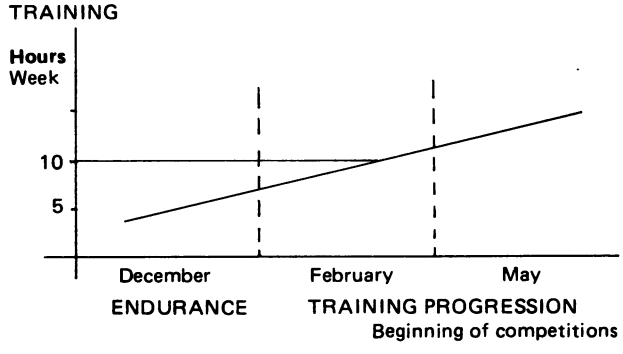

Fig. 3: Training of athletes in relation to the month.

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OBITUARY

Dr. Patricia Campbell Grant, MB, ChB

The tragic death of Dr. Patricia Grant at the age of 30 while competing in the Eglington Horse Trials on July 31st came as a great shock to her many friends and colleagues alike. She qualified at the University of Glasgow in 1977, and joined the British Association of Sport and Medicine the following year. Pressure of clinical work and the care and preparation of her horses for high level equestrian events took up most of her time so she was unable to devote as much of her efforts to the Association's Scottish activities as she would have liked.

A keen horsewoman and cross-country eventer, Dr. Grant, Patsy to her friends, was also deeply interested in many aspects of medicine which she pursued with a rare combination of ability and enthusiasm. She will be sorely missed by her colleagues in the Blood Transfusion Unit, the Glasgow Homeopathic Hospital and in Sports Medicine as well as by her wide circle of friends. It is a privilege to have known and worked with her.

Robin G. Gibson