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Case Report

Case Report 2: Interval Exercise at High Intensity

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Athlete's Data

23-year-old woman participating in a research project looking at iron metabolism in three groups; pill, regular menses and menopause. After a medical examination and a maximal test, she performed intermittent exercise on the treadmill. The maximal parameters as well as the characteristics of the intermittent exercise are shown in (Table 1).

Height	155 cm
Weight	55 Kg
Body surface Area	1,53 m^2
$FEV_{1,0}$	2,76 L
FVC	3,18 L
$\dot{V}O_2max$	2772 ml/min; 49,6 ml/Kg/min
$\dot{V}_{Emax}$; VT_{max}; BR_{max}	115 L; 1,7 L; 65 resp/min
Max HR; Max Pulse O_2	180 lat/min; 15,4 ml/heartbeat
RQ_{max}	1,16
maximum running speed on the treadmill	16,9 Km/h
Ventilatory threshold 1 (VT_1)	82 % del $\dot{V}O_2max$ 75 L/min 161 latidos/min 13,2 Km/h
Ventilatory threshold 2 (VT_2)	97,1 % del $\dot{V}O_2max$ 102 L/min 175 latidos/min 16,1 Km/h
Interval exercise	**8 x 3 min 85 % of $\dot{V}O_2$ max** **1,5 min rest between repetitions**

Table 1

Objective

To analyze the physiological response to an intermittent exercise at a high intensity.

Interval exercise data and questions to be asked.

(Figure 1) shows the $\dot{V}O_2$ and $\dot{V}CO_2$ for the 8 repetitions performed at 85 % of $\dot{V}O_2max$. The average $\dot{V}O_2$ values corresponding to the changes from the final rest period to the last minute of each of the sets are shown in (Table 1). The average $\dot{V}O_2$ of the changes from rest to each of the 7 sets was 2505 ml/min, i.e. at 90.4 % of the $\dot{V}O_2$ max (< than % of VT_2).

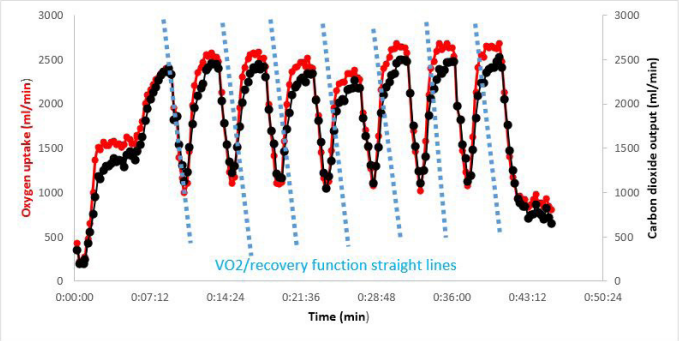

Figure 1: *V ̇O*_2/time function during the 8 repetitions. Note the rapid increase in V ̇*O*_2 during exercise and the decrease in this variable during recovery periods. The straight lines of the V ̇*O*_2/ recovery functions are parallel, suggesting no loss of recovery capacity.

Slopes of the Straight Lines	
1^a-2^a	1355,8
2^a-3^a	1448,4
3^a-4^a	1459
4^a-5^a	1414,2
5^a-6^a	1260,4
6^a-7^a	1618,4
7^a-8^a	1556,2
Mean	1444,62857
Standard Deviation	110,597103

Table 2

For each rest interval, regression lines were calculated. The values of the slopes are shown in (Table 2).

Speed in each of the 8 runs = 14.4 km/h: 85.2% of the maximum speed in the maximal stress test and 89.4% of the speed at VT_2.

On the basis of the data provided, answer the following question:

1. Is it possible to justify by ergo-spirometric parameters the fact of finishing the intervallic exercise?
2. Compare this woman's response with that of case report 1.

Answer to the questions raised

Woman in good cardio-respiratory and metabolic conditions, because:

- She has maintained a high speed during intermittent exercise.

  85% of maximum speed and 89.4% of speed at VT_2.

- In all the repetitions, RQ < 1. Although she has produced considerable lactic acid, as it is at all times above (10 % of the $\dot{V}O_2$ corresponding to VT_1 and 82 % of the $\dot{V}O_2$max), she has probably maintained a relatively stable concentration and acid-base state.

- Very relevant, the slopes of the recovery straight lines change very little in the repetitions (1444 ± 110 ml/min).

2A) Compare this woman's response with that of case report 1

At the same relative intensity in the two women, the woman in case 1 cannot maintain running speed due to the following considerations:

1. The woman in case 1 is not able to maintain a stable $\dot{V}O_2$, while the woman in case 2 maintains this parameter stable.

2. The woman in case 1 reaches a CR > 1 in the first three series and then equal to 1, while the woman in case 2' respiratory quotient has always been below the unit.

3. In each interval, the slopes of the recovery time/$\dot{V}O_2$ functions in the case of the woman in case 1 are decreasing, while in the woman in case 2 the slopes are relatively constant.

All of the above indicates that the physical condition of the woman in case 2 is significantly better than that of case 1. In other words, the cardio-respiratory and metabolic functions show a better response to the intervallic exercise performed.

Practical Application:

The differences in the slopes of the straight lines could be checked by means of the heart rate:

Case 1: The recovery time/heart rate functions would also be decreasing slopes.

Case 2: The recovery time/heart rate functions would remain stable, as would the slopes of the recovery time/$\dot{V}O_2$ functions.

In summary, high intensity intervallic training can only be applied to people in good physical condition. HIIT needs to be demystified as a method of improving fitness for anyone.