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Case Report

Case Report 1: Interval Exercise at High Intensity

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Athlete's Data

24-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).

Table 1	
Height	163 cm
Weight	57 Kg
Body surface Area	1,609 m^2
$\dot{V}O_2$max	2591 ml/min; ml/Kg/min
$\dot{V}_E$max	101 L
Max HR; Max Pulse O_2	179 lat/min; 15,1 ml/heartbeat
CRmax	1,30
Velocidad máxima	14,1 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 V̇O2 and V̇CO2 in the 8 repetitions.

Initial speed 13.1 km/h;

Speed adjustment from the 4th to the 5th repetition = 12.3 km/h).

New speed adjustment in the last three sets = 11.6 km/h.

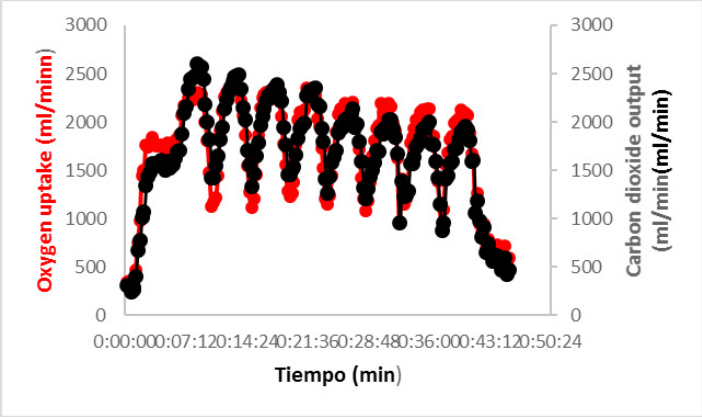

Figure 1: Evolution of oxygen uptake and carbon dioxide output during intermittent exercise. Note how, despite decreasing intensity, $\dot{V}O_2$ decreases, suggesting a lack of cardio-respiratory and/or muscular metabolism adaptation.

(Figure 2) shows the evolution of the respiratory quotient and running speed. Note how in the first 5 series the respiratory quotient, although decreasing (from 1.27 to 1.12), is greater than 1, From the 6th series onwards this ergo-spirometric parameter almost reaches unity.

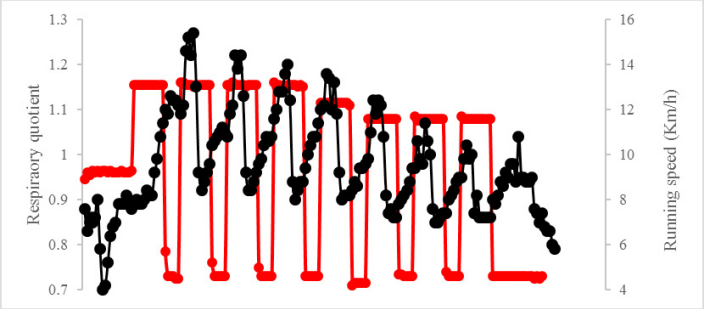

Figure 2: Evolution of respiratory quotient and running speed during intermittent exercise.

For each rest interval, regression lines were calculated for the decrease in averaged $\dot{V}O_2$ in the last minute of each repetition and the minimum of the rest interval, before starting the next repetition. (Figure 3) shows an example of the calculation of the regression line for the second repetition.

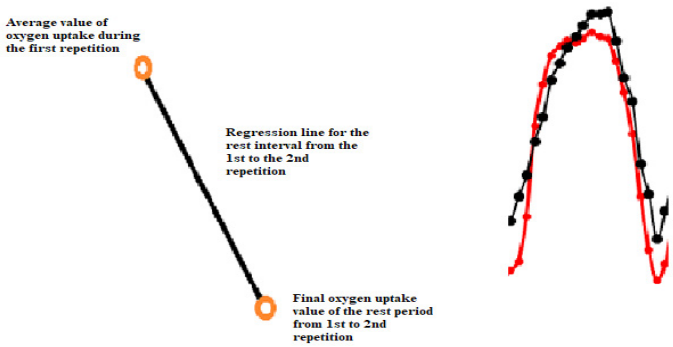

Figure 3: Example of calculation of the regression line in the second repetition. On the left, the drawing of the shape line and on the right the values of V̇O2 (in red) and V̇CO2 (in black) at the end of the repetition and during recovery.

(Table 2) shows the regression equations for each of the intervals between repetitions. Note how the slope decreases as the repetitions progress.

Intervalos de paso de serie	Ecuación de regresión
1ª a 2ª serie	**y = 1222,8x - 94,8**
2ª a 3ª serie	**y = 1170,2x - 51,2**
3ª a 4ª serie	**y = 1058,4x + 165,6**
4ª a 5ª serie	**y = 1029,8x + 117,2**
5ª a 6ª serie	**y = 1065,8x + 17,2**
6ª a 7ª serie	**y = 973,4x + 175,6**
7ª a 8ª serie	**y = 926,6x + 229,4**

Table 2:

The average V̇O2 value for all the changes from rest to each of the 7 runs was 2208 ml/min, i.e. 85.2 % of the peak V̇O2.

Based on the data provided, please answer the following question: Can you justify by ergo-spirometric parameters why it has been necessary to decrease the running speed?

Answer to the question raised

Can you justify by ergo-spirometric parameters why it has been necessary to decrease the running speed?

Failure to maintain the programmed running speed = 13.1 km/h.

1) Incorrect determination of VT_2 values.

2) Correct determination of VT2 values.

1. Interval exercise → continuous ...dency to ↓V̇O2.

   Cardiac

   Inability to maintain reponse Respiratory

   Metabolic

2. Respiratory quotient during first ...ts > 1.

   Possible state of lactic acidosis,

   Need to slow speed

3. The ↓speed during the 4th set is insufficient because the respiratory quotient remains high→ acidosis.
4. The respiratory quotient of the last three sets close to 1.

Demonstration that the initial and subsequent velocity adjustment was inadequate.

5. ↓ slope of recovery time/$\dot{V}O_2$ functions.

Central Nervous System does not adjust cardiac and respiratory variables to metabolic needs.

In short, the woman cannot maintain the programmed speed because indirectly (through the respiratory quotient) she is in a state of lactic acidosis that is incompatible with this type of intervallic training. Thus, it was necessary to decrease the speed twice in order to adjust the metabolic activity to be as aerobic as possible. In addition, the fact of not being able to maintain a constant slope