

The Effect of Exercise on Heart Rate

Introduction

The heart rate of a human varies from 150 beats per minute in young children, to about 60 in the aged. However, I am going to investigate whether doing exercise may alter the rate substantially.

Prediction

From my scientific knowledge I predict that the rate of respiration will increase as a result of exercise. I think that there will be a gradual increase to begin with, but as the body has to work harder I believe that the heart will then increase at a faster rate. When the exercise is complete I think that the heart rate will gradually decrease back to the resting pulse rate.

I have made these predictions because I believe that the supply of Oxygen to the muscles will decrease which will push the heart rate up. I also think that a lot of energy will be used up as the exercise takes place, thus resulting in a further increase. If the body is unable to continue aerobic respiration anaerobic respiration will take place. This results in lactic acid being formed. Finally, the CO₂ levels would also rise which would also contribute to the heart rate rising.

Method

I am going to carry out step-up exercise on a 3cm stair on my eleven-year-old sister. The heart rate will be taken by feeling the pulse in the neck.

Here is the procedure of the experiment:

- The resting pulse will be taken and recorded.
- Five-minute exercise begins with a break of 30 seconds every half-minute of exercise in order to calculate the current heart rate.
- When exercise is complete, I will be recording the current heart rate every minute until it returns to it's normal heart rate.

Results Table

Time (min)	Heart Rate (per minute)			
	1	2	3	Average
0	64	64	64	64
1	68	68	70	69

2	100	94	92	95
3	116	120	122	119
4	140	142	140	141
5	140	148	146	145
6	116	120	122	119
7	76	102	84	87
8	68	84	66	73
9	64	74	64	67
10	64	64	64	64

Analysis

The graph shows that the heart rate didn't increase a huge amount for the first minute but then increased very steeply for most of the rest of the exercise. However, during the final minute the heart rate doesn't increase much at all. This happened because the supply of Oxygen to the muscles decreased, a lot of energy will be used up as the exercise took place, the body was unable to continue aerobic respiration and anaerobic respiration took place. This resulted in lactic acid being formed. Finally, the CO₂ levels also rose which also contributed to the heart rate rising.

When the exercise was complete, the graph tells us that during the next two minutes the heart rate falls very dramatically however it doesn't return immediately to the resting pulse rate. This is because during the exercise anaerobic respiration begins to take place therefore the body has to pay back that oxygen back when it is resting. Therefore, when the exercise is complete the body's heart rate does not immediately return to the normal resting pulse rate. This is because of the pay back the body has to complete first. After two minutes after the exercise is complete the decrease rate then begins to gradually fall as the pay back becomes complete.

Evaluation

Although I believe that my experiment produced fairly valid results, I am not sure that my experiment was particularly accurate. For instance, I cannot be sure that the step-up exercise was done at the same rate throughout the experiment. Also, I am not sure that the 30-second intervals were kept exactly to

this timing.

If I were doing this experiment again I would have to look closely at the method of exercise I used. I think that exercising on a piece of equipment like a running machine would produce more accurate results because I would be able to guarantee that the exercise remained constant throughout this experiment.

Finally, an actual 'pulse-meter' might have helped the experiment to be more accurate. This is simply strapped round the chest of the exercise and it measures your current heart rate. I believe that this would produce a more accurate heart rate and destroyed any necessity to have the 30-second breaks during the exercise.