

"DEVELOPING PHYSICAL CAPACITIES"



EFFECTS OF ENDURANCE TRAINING

- ✓ It increases the size of the heart and thickens the heart walls, so it becomes more efficient.
- ✓ Blood volume, red cells and hemoglobin increase.
- ✓ Decreases blood pressure and heart rate, so the heart has to do less work.
- ✓ Arteries grow larger.
- ✓ Decreases body fat.
- ✓ Recovery after exercise is quicker.
- ✓ Lungs become more expandable increasing in volume, so we can put more air into our lungs on each inspiration.
- ✓ Reduces the risk of heart disease.



Types of endurance

In order to understand the types of endurance, it is necessary to know how the "energy" used by the muscles to move is obtained:

Training needs a great deal of muscular effort. This means that throughout exercise the muscles are continually contracting and relaxing. This muscular effort requires energy. Energy comes from a substance called ATP (adenosine-triphosphate); muscles need it to do the contractions and to exert force or to move. There are two ways of getting ATP: the anaerobic way and the aerobic way.

The Anaerobic way

It is used when the effort is very intense during a short time. The muscles do not have time enough to use O_2 for ATP production, which is why it is called "anaerobic". There are two paths of getting ATP without O_2 , the Alactic and the Lactic:

Anaerobic Alactic.

This is the first path the body follows to get the energy, and it uses the ATP stored in the muscles. There are no waste products, but it can be used only for a very short time (from 10" to 20") and in very intense activities (90-100 % of the maximum capacity).





Anaerobic Lactic.

This is the second path followed when the effort lasts longer than 20". It uses the carbohydrates on the muscles and on the blood flood to obtain ATP. The intensity is still high, and the muscles cannot use O_2 yet to get ATP. Using this path results in waste products like Lactic Acid. It is also used in very intense activities with a duration from 20" to 4-5'. It cannot take longer because of the increase of Lactic Acid in the muscles. The intensity of the effort is about 80-90% of the maximum.

The Aerobic way

It is the third path used to get the energy, when the efforts last much longer with a lower intensity. As it is low intensity, the body can use O_2 to get the ATP. ATP is obtained from the carbohydrates first and from the fat later, through chemical reactions where O_2 is involved; this is why it is called "aerobic". This aerobic path releases waste products that can be easily removed from the body (through sweat and respiration). An aerobic effort can last longer, from 3 minutes to hours, and with intensity not higher than 80 %.



Energy production system	Effort	Heart rate (bpm)	Effort duration
Anaerobic Alactic	Maximum	More than 180	10 to 15 seconds
Anaerobic Lactic	Submaximum	More than 170	20"to 5 minutes
Aerobic	Moderate	120 to 160	More than 5 minutes

These three energy production systems are related to the three types of endurance: anaerobic alactic; anaerobic lactic and aerobic.

HOW TO DEVELOP OUR ENDURANCE

There are several different types of endurance training - each with a different, specific outcome and suitable for different events and sports. The duration, frequency and intensity of sessions vary with each form of training leading to different physiological adaptations within the body. Exercising can be through running, swimming, biking, skating...

Continuous training. It consists of exercising at a constant rate, a long distance without stopping, starting from 15 or 20 min. The *intensity* has to be *low and without changes*, between **60 % and 80 %** of your maximum heart rate. There must not be slopes.

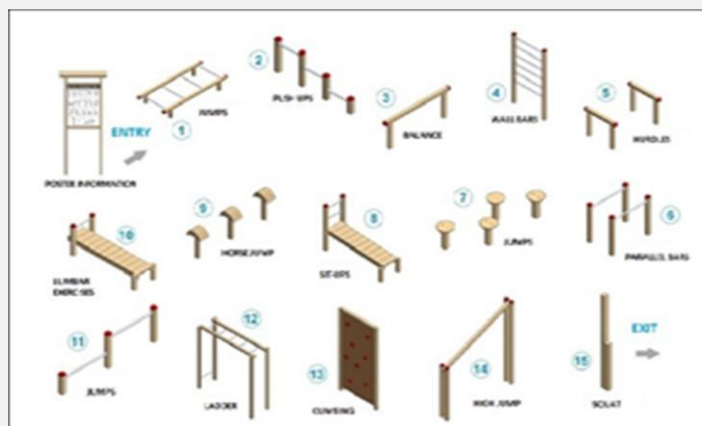


Fartlek. This word comes from the Swedish for 'Speed Play'. It consists of exercising for a medium or long distance (20' or 30') changing the speed for several periods and with *no rest*. This type of training stresses both the *aerobic and anaerobic energy pathways*. We can use slopes to increase or decrease the intensity of our race. Intensity varies from **60 to 80 %** of our maximum heart rate.

Total training: You can improve your aerobic endurance with this method but you can also improve other aspects of the general and physical fitness. It is a mixture of the other methods, you have run and pace changes, but you also can do strength, balance and stretching exercises and much more. Here you have an example:

10 minutes of continuous running + 3 X 30 metres sprint series with slow running recovery (30 metres) + 25 sit ups + 15 push ups + 1 minute of skipping + 3 minutes of stretching + 2 minutes running and repeat until you have done 40 or 50 minutes.

You can find in some parks a natural circuit with a lot of exercises you can do. There is a long distance to run (1000 m. or more) and an exercise every 100 m. (for example) with a "how to do it" explanation. In the next picture can you see some of the elements you could find in one of those circuits.

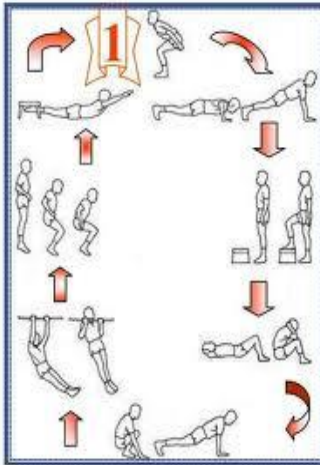


Interval training. It consists of exercising through relatively short distances followed by *resting periods*. This allows a higher intensity of workout.

The distances are from 100 m to 400 m; repetitions are between 10-30, and the resting periods should be done walking or with very easy running, until the heart rate reaches 120-140 bpm.

The intensity can be high, between *70-95 % of the maximum*.

We can use it for developing *aerobic or anaerobic endurance*, therefore distances, repetitions, speed and resting periods will vary.



Circuit training. This method is one of the most common forms of training. It is flexible and versatile. It consists of:

- A group of around **8-12 exercises**, completed one exercise after another. Both **aerobic and anaerobic activities** can be included.
- Each one of them is performed for a specified number of **repetitions** (10 or 30) or for a prescribed **time** (10" or 30"), before moving on to the next exercise.
- The exercises within each circuit are separated by brief-timed **rest intervals** (10" to 40").
- Each round of the circuit is separated by a longer rest period.
- The total **number of rounds** performed may vary between 2-6 depending on your training level (beginner, intermediate, or advanced) and your training objective.