

THE SCIENCE OF INTERVAL TRAINING

For the longest time it was widely accepted that the way to burn fat and calories was to grind through long, steady workouts at a slow pace. While slow, steady workouts may have their place in a workout routine, there is another type of training that offers increased benefits: Interval Training.

Speed Play

The concept of interval training is said to have originated in Sweden, where it known as Fartlek training. Fartlek literally means “speed play.” This training method involves alternating high intensity activity with periods of active recovery. It is the physiological response to this alternating intensity that produces the increased in fitness and calorie burning benefits.

Interval training utilizes the body’s two energy-producing systems: the aerobic system and the anaerobic system. The body constantly makes use of both systems. During rest or lighter activity the aerobic system is predominant. The anaerobic system becomes more predominant for higher intensity activity, and the higher the intensity, the greater the predominance of the anaerobic system. The effectiveness of interval training lies in the proportion of anaerobic system use to aerobic system use. Interval training typically pushes the body toward greater use of the anaerobic energy system.

Energy Production

Put simply, in the case of both the aerobic and anaerobic systems, energy is produced by the breakdown of adenosine triphosphate (ATP) into adenosine diphosphate (ADP) and phosphate (P).



The reaction releases the energy that is stored in a molecular bond. This provides the energy that makes the body go. The difference between the aerobic and anaerobic systems lies in whether or not oxygen (O₂) is present.

Aerobic Energy System

The aerobic energy system is the body’s preferred energy system during lower intensity activity. It is capable of producing a great deal of energy but it does so at a slower rate. This is the energy system your body is predominantly using during a long run, walk or bike ride and also during most of the activities of daily living. This system produces energy from the breakdown of ATP in the presence of oxygen. The term aerobic literally means “with oxygen.”

Anaerobic System

The difference with the anaerobic system lies in the body’s ability to cope with increased demand. In essence, as the intensity of an activity increases beyond a certain point, an oxygen deficit is created. The body reaches a point where it cannot meet the increased demand for oxygen. As this oxygen deficit increases, so does the predominance of the anaerobic energy system over the aerobic in energy production.

The anaerobic system is used for short bursts of higher intensity activity such as sprinting, jumping or lifting heavy objects and it is not capable of providing enough energy for longer duration activities. Anaerobic literally means “without oxygen” and the name is used because energy is produced from ATP in the absence of oxygen.

Hydrogen

In the case of both systems, hydrogen is produced as a waste product. With the aerobic system the hydrogen combines with the oxygen that is present to produce water. With the anaerobic system, because oxygen is not present in sufficient quantities, the waste hydrogen combines with a different molecule called





pyruvic acid to produce lactic acid. Lactic acid is responsible for that achy, burning sensation in the muscles during and after intense activity. Once lactic acid builds up to a certain level, muscle function is impeded until some recovery occurs. It is also during this recovery that the body makes up the oxygen debt created during the intense activity.

Why Interval Training?

One of the main reasons interval training works so well is that the more effort put out during the workout the more energy expended getting the body back to its normal state after the workout. Research has demonstrated that an elevated calorie burning benefit continues longer after an interval workout than it does for a steady effort workout. The body requires extra calories as it works to repair muscles, replace energy stores, and reduce the heart rate to its normal state. Depending on the intensity and duration of the effort involved, this can take anywhere from several minutes to many hours. Other benefits include:

- **Increased activity of enzymes involved in fat burning:** These enzymes trigger energy stored as fat to be released more readily. Research has shown that there are more free fatty acids in the blood after a session of interval training, which is an indication of more fat being used for energy production.
- **Adaptation to lactic acid:** Because high intensity intervals produce lactic acid the body begins to adapt to its presence, creating a tolerance to some degree. The body also becomes more efficient at getting rid of it. The body becomes able to go hard for longer and the ability to recover from an intense effort improves.
- **Adaptation and overload:** Interval-training workouts, by their nature, vary the stress on the body. Interval training takes advantage of the principles of adaptation and overload. Exercise is most effective and gets the greatest results when the body is forced to adapt to increased stress. That is to say, the more challenging an exercise feels the harder the body must work to adapt.

Contrast this with a consistently steady workout like working at a constant speed on an elliptical machine or a treadmill and where the same workout is performed on a regular basis. Eventually the body adapts to the stress of the workout and the fitness benefits begin to wane. This is why many people experience great benefits when they start a new workout routine but eventually hit a plateau when they continue with only that routine. Once the body has adapted to the exercise the fitness gains cease. Fitness is maintained, but not gained.

Group Ride

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