



Anaerobic Conditioning

Your anaerobic conditioning is your ability to perform at a rate faster than can be met by the incoming oxygen. If you are in good condition and are exercising or playing below a certain level of intensity, your energy requirements can be met by your aerobic system. When you pick up the pace to defeat your opponent and your body cannot meet the immediate demands for more energy with the available oxygen, your body must get its energy from the anaerobic systems. At this point, you are in “oxygen debt” which will be “paid back” later.

A Little Physiology:

In order for movement to occur, your muscles require energy. This energy takes the form of chemical bonds in a molecule called Adenosine Triphosphate or ATP. Your body has three different ways it can generate ATP. The aerobic system produces ATP by burning sugars in the presence of oxygen (aerobically). This is the most efficient way to produce ATP and the method preferred by the body. It can be continued almost indefinitely. The lactic acid system provides ATP when you burn sugars without oxygen present (anaerobically). This method is used when you are exercising at a rate faster than your body can bring in and use oxygen. The lactic acid system produces less ATP than the aerobic system and causes the production of large amounts of lactic acid. Consequently, it can only be sustained for a few minutes. The phosphocreatin system also produces ATP in absence of oxygen. It acts as an ATP “reservoir” for the muscles. It is the primary source of ATP in all out effort of less than a few seconds.

If all this seems a little confusing, just remember the following:

- ⇒ Your body uses three different energy systems to replenish ATP.
- ⇒ There is overlap among the three systems.
- ⇒ Training your anaerobic system allows you to perform with greater effort for short duration.
- ⇒ Training your aerobic system allows you to perform tasks of long duration. It also allows you to recover more quickly for anaerobic exercise.
- ⇒ The energy systems must be trained near their maximum for best results.

Physiological Adaptations:

As your conditioning level improves, you will find that you will have to work harder and faster to make progress. You may initially be able to run six 400 meter sprints in 85 to 88 seconds each. Several weeks later, you may be able to run them in 81 to 84 seconds each. In addition, your recovery time will shorten as your ability to clear lactic acid improves. At the beginning of your anaerobic training program, you may need only two minutes of rest. This is progressive and productive training. Other physiological adaptations include increases in strength and resting levels of ATP, phosphocreatine, free creatine and glycogen. Improvements also occur in anaerobic enzyme function, capacity for high levels of lactic acid and pain tolerance, as well.

Interval Training:

The demands of anaerobic conditioning are best met by interval training. Because of the “high intensity” nature of the exercise, it can only be continued for short periods of time that must be followed by intervals of rest. Interval training is systematic manipulation of the work/rest intervals to ensure overload and progression. By writing programs using “sets” and “repetitions” of sprints we can change the workload, work rate or rest periods to achieve the desired results.

The rest interval is sometimes designated as a ratio of work time to rest time, because the longer the sprint, the longer it takes to recover. This ratio is typically 1:4 to 1:1. An athlete using a 1:2 ratio could do the following: run 400 yards in 80 seconds, rest 2:40, run 400 yards in 83 seconds, rest 2:46 seconds...etc. Alternatively, run 200 yards in 37 seconds and rest 74 seconds. As conditioning levels improve, rest periods can decrease. The ratio of work to rest is determined by the conditioning of the athlete and the distance ran. The longer the distance ran, the less intense the running will have to be to recover to a specific heart rate. As conditioning improves, the time to recover will decrease. We will use 70% of your maximum heart rate (MHR) or 140 beats per minute (BPM) as your recovery heart rate.

When training large groups of people, it is convenient to keep the rest period the same and try to increase the speed at which the interval sprints are ran. An athlete training with 300 yard sprints could use 90 seconds as the constant rest between each sprint. The time of each sprint should be recorded and the average for that day should be compared to previous workouts. The first week of training may find you running 6 X 300 in an average time of 49.3 seconds. The next week you may have improved to 7 X 300 with an average time of 48.5 seconds.

It is best to walk around while resting between sprints that emphasize the lactic acid system, as this helps facilitate recovery. When training the ATP-PC system, it is best to just rest during the rest intervals.

Specificity of Conditioning:

The best way to condition for your sport is to play your sport. The closer your conditioning comes to simulating the demands of the game, the greater the conditioning carryover to your sport will be. Therefore, runners must run, swimmers must swim and rowers must row. Baseball players should perform drills that simulate the game, etc. However, just as I would not recommend that a football player play football year round to stay in shape, I would not recommend that an athlete run sprints year round either. For this reason, parts of the year are designated as a time to train the “aerobic base”. This training cycle, allows the athlete to get or stay in shape without placing the physical and emotional stress of sprint conditioning on the athlete year round. Furthermore, the three energy systems overlap considerably and compliment each other. Improving one energy system will never hurt the other and will probably help. As the season comes closer and closer, the conditioning drills will become more specific in nature.