

How To Find Anaerobic Threshold (AT)

Equipment Needed

A good heart rate (HR) monitor that has beat per minute (bpm) increments as well as an upper and lower alarm range. You will need the use of a treadmill or a track where you can ride a bicycle beside them or run with them.

Knowledge Needed

Since the female heart is smaller than the male heart and must pump more often (about 5 bpm) to create the same volume we will use the following formulas to approximate anaerobic threshold.

180 bpm - Age = Estimated AT in most males (+ 3-5 bpm for most active individuals)

185 bpm - Age = Estimated AT in most females (+ 3-5 bpm for most active individuals)

NOTE: I find that most high school male runners AT ranges from 168-176. Most high school female runners AT ranges from 171-179. Individual AT can be higher or lower.

Procedure

Each athlete must wear a heart rate monitor and start out slowly on a treadmill or on a track. Ride a bike beside the athlete when they attempt to find their AT in order to help them recognize where it occurs. The athlete then slowly but surely increases the pace so that his/her HR will begin to go higher. When the athlete gets to within 10 bpm of his/her estimated AT start listening to their breathing. Keep increasing the pace gradually and the moment they start breathing harder and/or their breathing changes have them look at the HR monitor as that is their anaerobic threshold. Generally AT occurs within ± 7 bpm of the estimated AT in most athletes.

Once you have their AT subtract 15 bpm from it to find the exact range to train to benefit the aerobic conditioning energy system. This is the HR range where 75% of all distance training needs to be done. Let's say your male athlete has an AT of 170 (which is close to where most high school boys will generally be) then their aerobic conditioning needs to be done in a range from 155-170 bpm. Extrapolating this knowledge of the HR @ AT further you can then see that anaerobic conditioning begins to happen at 184 bpm for this athlete. The range for anaerobic conditioning is 184-195. It will take about 8 minutes to get to this range once you have started the tempo run or other type of training for the anaerobic conditioning energy system.

Using this knowledge along with the use of a HR monitor you can avoid the pitfalls that lead to most injuries and burnout in a distance runner. When the athlete is training in the zone between aerobic conditioning and anaerobic conditioning, he/she is receiving no physiological benefit. This zone is considered to be the junk mileage range.

AT vs MaxVO₂ - I utilize AT in all my training schedules as a runner's AT generally only changes about one beat lower per year. MaxVO₂ can change weekly and therefore the need to test constantly for that type of training to be effective.

AT and Ability

A runner's AT has nothing to do with their ability. It is solely their way of telling you where most of their training needs to be done in order to be the most efficient and effective.

IMPORTANT NOTE: The athlete will begin to recognize where AT occurs (generally by his/her need to breath twice instead of once) and know without looking at their HR monitor if they are in the correct range. If the runner goes beyond AT, his/her breathing will return to normal as long as they remain above AT in that junk mileage zone. It is interesting to note that this increased breathing also occurs when they slow back down and cross back through AT.

It is our hope that you can use this knowledge to improve performance in all your runners.