

# TRAINING TO IMPROVE YOUR RUNNING ABILITY

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## INTRODUCTION

Successful performance in endurance running, such as in events ranging in distance from the mile through the marathon, is based on a number of variables. Three variables are of particular importance. First, maximal oxygen uptake ( $VO_2\text{max}$ ) represents the ability of your cardiovascular, respiratory and muscular system to process oxygen; the higher your  $VO_2\text{max}$ , the better, because you then have a greater potential to produce energy aerobically. Aerobic (with oxygen) energy production is more efficient than anaerobic (without oxygen) energy production. Second, your anaerobic threshold (AT) represents the percentage of your  $VO_2\text{max}$  at which lactate (lactic acid) begins to accumulate in your blood. This is the point at which you begin to rely increasingly on anaerobic energy production. Again, the higher your AT (80% vs. 50%), the better because you can produce more energy aerobically. Third, running economy represents your running efficiency, or the amount of oxygen needed to run at a set speed. One of the best measures of your running economy is your running speed at your AT. Again, the higher your running economy, the better.

These three factors are important because they represent the physiological and biomechanical factors underlying your running ability. However, other factors may also influence your running ability, such as your physique and body composition, social factors, psychological traits, thermoregulation, and nutrition.

How fast a runner can you be? The key determinant underlying your running potential is your genetic endowment. Sports scientists specializing in molecular genetics have identified various genes that regulate physiological and biomechanical factors important for successful running endurance. If you want to be an Olympic marathon runner, you would need to have had selected your parents well so as to provide you with those genetic characteristics important to distance running. Although genetic endowment with specific running endurance traits determines your maximal potential, appropriate physiological, psychological and biomechanical training is needed for you to achieve your maximal genetic potential and “to be all that you can be” as a distance runner.

## TRAINING TO RUN FASTER

Numerous training programs have been developed over the past century to help runners do a faster 5K, 10K or marathon. Although these training programs vary in their details, the major elements are generally similar and are designed to increase  $VO_2\text{max}$ , AT and running economy. Basically, to run faster races you need to train faster. Do 2-3 high-intensity workouts weekly. Such workouts include track workouts (200- to 1000-meter intervals), hill repeats, tempo runs, or fartlek runs. Weekend races may also be used as speed workouts.

The training program described here is, in my opinion, one of the best. It is based on the work of Dr. Jack Daniels, a world-class athlete, exercise scientist, and running coach. He is one of the most respected distance running coaches in the world, having been cited by Runner's World as the *World's Greatest Coach*. For a more in depth understanding and personal application of Dr. Daniel's program, I strongly recommend that you purchase his book entitled Daniels' Running Formula (2<sup>nd</sup> edition) published by Human Kinetics. You may find it at local running stores, book Web sites such as [www.amazon.com](http://www.amazon.com), or the Human Kinetics Web site [www.hkusa.com](http://www.hkusa.com).

Dr. Daniels developed the concept of VDOT, a term which represents the velocity of running at  $VO_2\text{max}$  with due consideration of other variables affecting running performance, such as running economy. Numerically, VDOT represents your  $VO_2\text{max}$  given in milliliters of oxygen per kilogram body weight per minute. For distance runners, the higher the better. For example, a VDOT of 30 would enable a runner to do a 5K in about 30-31 minutes, whereas the 5K time for a runner with a VDOT of 75 would be about 14 minutes. You can have your  $VO_2\text{max}$  or VDOT determined with laboratory testing on a treadmill, but in his book Dr. Daniels has developed a method whereby you may obtain a very close estimate of your VDOT from recent race performances ranging from 1500 meters to a marathon. Race distances of 3K to 5K provide a good estimate. If you follow Dr. Daniels' recommendations, knowing your VDOT facilitates the design of your individual training program.

Dr. Daniels' training program for distance runners involves several different types of training designed to improve the variables important to developing endurance. Here are his major types of training and their purposes.

**Easy-long runs** Easy-long runs are designed to increase the aerobic capacity of your muscle cells to use oxygen more effectively and to become a better fat burner, thus sparing the use of your muscle carbohydrate, glycogen.

**Marathon-pace runs** Marathon-pace running is specific to those training for marathons, and is also designed to increase aerobic capacity and the mental set of running at marathon pace.

**Threshold-pace runs** Threshold-pace running, also known as tempo running, is designed to raise your lactate threshold, or your ability to run faster without producing excess lactate that may cause premature fatigue.

**Interval-pace runs** In Daniels' program, interval training is designed to increase your maximal oxygen uptake ( $VO_2\text{max}$ ), or your ability to consume and process oxygen.

**Repetition-pace runs** Repetition-pace running is designed to improve your speed and running economy so that you may become a more efficient runner.

## INDIVIDUALIZING YOUR TRAINING PROGRAM

As the 5K race distance provides a good estimate of your VDOT, your time for that distance can be used as the basis for your training program.

First, you need to calculate your average pace per mile from a recent flat, fast 5K race. For example, if your recent time was 24:48, your average mile pace would approximate 8:00 per mile. [A time of 24:48 = 24.8 minutes; 24.8 minutes divided by 3.1 miles (5K) = 8:00 minutes]. Calculate your average mile pace.

Your average pace per mile in a 5K race:\_\_\_\_\_

Now calculate your average 400 meter (quarter-mile) pace based on your mile pace. There are approximately four 400-meter segments in a mile. The average 400-meter pace for our 8:00 runner is 2:00, as 8:00 divided by 4 = 2:00. Calculate your average 400-meter pace.

Your average pace per 400 meters in a 5K race:\_\_\_\_\_

**Easy running** Your easy-long pace should be about 1:30 to 2:00 slower than your average per mile pace for the 5K. Thus, our 8:00 runner would do easy runs at about 9:30 to 10:00 per mile. One of your easy runs of the week should be somewhat longer than the others. Do 4-5 days per week, which may include a rest day. Intersperse an easy running day between more intense running (threshold; interval; repetition) days.

Your average easy-long run pace per mile : \_\_\_\_\_

**Marathon running** This pace is for marathoners only. Simply calculate the average per mile time that you would like to achieve for your next marathon and train at that pace. For example, if our runner wants to run a 4:00 marathon, the pace should be about 9:10 per mile for a long run. Do once every week or two.

Your average marathon run pace per mile:\_\_\_\_\_

**Threshold running** Threshold, or *tempo*, runs should consist of 15 to 20 continuous minutes at a pace about 25 to 30 seconds slower than your average per mile pace for the 5K. Our 8:00 runner would do the tempo pace at about 8:25 to 8:30 per mile. You may do a short recovery if you do two tempo runs. You may also do *cruise intervals*, running distances of about one mile at tempo pace with a short one minute recovery between miles. Build up to 6 to 8 cruise intervals. Do once a week.

Your average threshold run pace per mile in a 5K race:\_\_\_\_\_

**Interval running** Interval running should be about 3 to 4 seconds faster than your average 400-meter pace in a 5K. Our 2:00 runner would average 1:56 to 1:57 doing 400-meter intervals. Intervals should be done for 400, 800 or 1000 meters with a similar pace per 400 meters. Work up to 10-16 x 400 meters, 5-8 x 800 meters, and 4-6 x 1000 meters. Jog about half the distance for your recovery, e. g., jog 200 meters between 400-meter intervals. You may alternate interval and repetition running from week to week.

Your average interval run pace per 400 meters:\_\_\_\_\_

**Repetition running** Repetition running pace should be about 9 to 10 seconds faster than your average 400-meter pace in a 5K. Our 2:00 runner would average 1:50 to 1:51 doing 400-meter repetitions. Repetitions should be done for 200 or 400 meters. Work up to 10-16 x 200 meters and 5-8 x 400 meters. Have a full recovery between repetitions. You may alternate interval and repetition running from week to week.

Your average repetition run pace per 400 meters: \_\_\_\_\_

If you previously have not done speed running, start by doing fewer repetitions. Try to stay close to your pace times as each type of training has its purpose. Do NOT run faster than necessary. However, keep in mind that you may individualize your training program and run slightly faster if experience indicates you do not become unduly fatigued. Run a 5K race periodically to adjust your training pace, doing faster workouts as you get faster in racing.

### **REST AND CROSS TRAINING**

In order to train properly, rest is an important variable. Try to rest at least one day a week. You may cross-train on your rest day, using a non-impact exercise equipment such as stationary cycles, elliptical trainers, stair climbing machines, or water-running devices to do one of your weekly high-intensity exercise bouts. Cross training provides you with the opportunity to not only maintain or improve your fitness level, but it can also help prevent running-related injuries. Biking and water running are two excellent cross training exercises that can serve as an adjunct to your running. In biking, either outside or on a trainer, do some high-intensity intervals in a gear that enables you to stand up and drive your legs comparable to running. Repetitive one-minute or two-minute intervals will stress both your cardiovascular and muscular system in a fashion somewhat comparable to interval running, but without the impact. Water running with a flotation device, again using one-minute or two-minute high-intensity intervals, mimics running, but again you experience no impact.

Cross training can enable you to reduce your training mileage, which is one of the key factors involved in running-related injuries. However, to help retain your competitive running ability, it is important to maintain your high-intensity interval running workouts. Focus on quality running, not quantity.

### **SAMPLE TRAINING SCHEDULE**

Here is a basic example of two weeks of training. It may be modified in a variety of ways. For example, when training for a marathon and total mileage is important, an easy running day may replace the off or cross train day.

	<b>Week 1</b>	<b>Week 2</b>
Monday	Off or Cross Train	Off or Cross Train
Tuesday	Interval running	Repetition running
Wednesday	Easy running	Easy running

Thursday	Threshold running	Interval running
Friday	Off or Cross Train	Off or Cross Train
Saturday	Easy running	Easy running
Sunday	Marathon running	Race (Threshold or faster)

Your training program should be based on your running goals. Dr. Daniels provides individualized training programs for all race distances from the 5K to the marathon, many of them incorporating training throughout the year and how to prepare for your personal best (PB) race attempt. His text will not only help you better understand why and how to train different ways, but also help you individualize your training program for your specific goals.

## **SOME OTHER IMPORTANT CONSIDERATIONS**

### **Racing and Personal Bests (PB)**

Race often. Racing may be a good high-intensity workout, and it also is an excellent test to evaluate your training progress and modify your pacing for your training workouts. For example, as your race times improve, you need to adjust increase the intensity, or speed, of your workouts.

However, select key races during the year for your PB attempts. Taper for such races by reducing your weekly mileage for 2-3 weeks, and resting a day or two before the attempt. Autumn is an excellent time to attempt to run your PB because your body has made several beneficial physiological adjustments (such as an expanded blood volume) to running in the summer heat and humidity that carry over for several weeks into the cooler weather. Proper training is the key to running a PB, be it a mile run or a marathon. However, proper rest is also an important consideration. Runners rest for a variety of reasons, particularly to prevent injury and overtraining, but runners should also rest somewhat prior to attempting a PB, a process referred to as tapering. Research indicates that tapering may enhance performance, possibly because a gradual decrease in training may enable a more complete recovery of running muscles that may have suffered microscopic damage from increased daily mileage.

Each individual should experiment with various tapering techniques and through personal experience find the one that works for them for each racing distance. If you are attempting a marathon PB, one tapering model recommends that you decrease your weekly mileage, but not intensity, over a 5-week period. As an example, five weeks prior to the race (week 5) should be your peak mileage week. Let us assume our runner has run 80 miles this week, which represents 100% at week 5; week 4 would be 64 miles (80%), week 3 would be 48 miles (60%), week 2 would be 40 miles (50%), and the week of the race would be 32 miles (40%). For a runner with a peak week of 60 miles, the corresponding weeks would be 48, 36, 30 and 24 miles. Gradual tapering is also important for shorter races, but the taper period is not as lengthy.

Although there is some science to tapering, it is also an art that has to be individualized through personal experience. Given the need to train intensely, tapering for a PR is usually done only several times a year.

## **Losing Fat and Gaining Speed**

Want to run faster? Lose some fat. Excess fat mass is dead weight to runners. From your high school physics class, you may recall Newton's second law of motion which stated that acceleration is directly proportional to force and inversely proportional to mass. In other words, if your muscles can develop a certain amount of force, the acceleration of your body will be greater if your body mass is lower.

If you lose excess fat mass, but maintain your oxygen uptake, you have more oxygen per unit body mass. Based on oxygen consumption dynamics, sport scientists have calculated the energy savings associated with fat loss. Basically, you gain 1% in running speed for every 1% reduction in body fat. To put this in perspective, if you currently run a 10 K at a pace of eight minutes (8:00) per mile, losing 5% of your excess body fat will improve your time to 7:36 per mile ( $8:00 \times 0.95 = 7:36$ ). Consequently, you will run the 10K about 2.5 minutes faster, and your marathon about 11 minutes faster.

Not every runner has excess fat to lose, but if you do, it is a proven way to get faster. On the other hand, excess body weight loss in someone who is already very lean may be counterproductive, and running performance may actually get worse, not better. If you have trouble losing excess fat, see a sports-oriented health professional, such as a dietitian.

## **Nutrition**

An important element of training is to provide your body with the optimal fuel. Carbohydrate is the major fuel for high-intensity aerobic and anaerobic training, so your daily diet should provide ample amounts of carbohydrates that also rich in other nutrients, particularly vitamins and minerals that help regulate energy metabolism. About 60-70 percent of your daily calories should be derived from carbohydrates, particularly nutrient-dense whole grains (bread, cereal, pasta, rice), legumes (beans, peas, lentils), fruits and vegetables.

In general, the diet that is optimal for health is also optimal for running performance. Other than healthy carbohydrates, your diet should be low in fat and moderate in protein. Plant protein should be the major source of your dietary protein intake, and may be complimented with animal protein (meat, milk, eggs) that is low in fat such as fish, turkey breast, skim milk, and egg whites.

Combined with proper exercise, a balanced diet with a modest reduction in calories may be useful in helping you lose excess body fat. As noted above, this may be a very effective technique to enhance running performance.

## **Racing Flats**

Use racing flats. If you have good running biomechanics you may be able to use racing flats, even in marathon distance races. Experiment with a pair in training, then in a 5K race, and then in progressively longer races. As compared to heavy training shoes, racing flats may save you 20-30 seconds in a 10K and several minutes in a marathon.

## CONCLUDING COMMENTS

Individuals want to run faster for a variety of reasons. Some want to win races outright, others may want to win or place in their age group, while still others may simply want to set an individual PB. Whatever the reason, proper training and other considerations can help you maximize your genetic potential for distance running in attempts to achieve your running performance, or racing, goals. Racing goals provide a stimulus for you to continue to train more diligently throughout the years. You will eventually reach the time in life when you will no longer be setting PBs, but optimal training will help you slow down the rate at which you slow down in running. You will also continue to reap the many health benefits of intense exercise training, such as reduced incidence of heart disease, stroke, and certain forms of cancer, as well as the social benefits of racing, particularly the camaraderie of fellow runners and the formation of lifelong friendships.

Good luck and hope to see you on the road.

Mel Williams