

Arthur Lydiard's Athletic Training

by

Arthur Lydiard

A Guide to the Brooks / American Track & Field Lydiard Running Lecture Tour in 1999

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Arthur Lydiard -- A Brief Biography

Arthur Lydiard was born in Eden Park, New Zealand, in 1917. In school, he ran and boxed, but was most interested in rugby football. Because of the great Depression of the 1930's, Lydiard dropped out of school at 16 to work in a shoe factory.

Lydiard figured he was pretty fit until Jack Dolan, president of the Lynndale Athletic Club in Auckland, and an old man compared to Lydiard, took him on a five-mile training jog. Lydiard was completely exhausted and was forced to rethink his concept of fitness. He wondered what he would feel like at 47, if at 27 he was exhausted by a 5 mile run.

Lydiard began training according to the methods of the time, but this only confused him further. At the club library he found a book by F. Webster called "The Science of Athletics." But Lydiard soon decided that the schedules offered by Webster were being too easy on him, so he began experimenting to find out how fit he could get. Lydiard was not a particularly fast runner in his day, nor had he any formal education in his coaching or physiology. He had never been to college.

He began running seven days a week, up to 12 miles a day, which at the time was considered exceptional. In 1945, at age 28, he began racing again. But while he was fitter and faster, he had trouble winning because he had trouble hitting at the wrong times. Because his mileage was considerable higher than those who beat him, he became annoyed and experimented with the daily distances and efforts, with some days short and easy and others hard and long.

Others joined Arthur Lydiard in training and thrashed along with him, though Arthur Lydiard still used himself as the principal guinea pig. He tested himself in the extremes of best and endurance -- running up to 250 miles a week -- and discovered that when he balanced distance and speedwork, not only did his marathon times improve, but his track performances improved also. Where other coaches and runners had been incapable of unraveling the fundamentals of conditioning, to Arthur Lydiard, his training experiments spoke volumes. This was to become the keystone of the system he would later use to develop Halberg, Snell, and the rest.

After two years of training with Lydiard on his lonely runs, Lawrie King beat a provincial championship in a 2 mile race by 80 meters. King's win established Lydiard as a coach, a qualification he neither sought nor particularly wanted. King went on to be New Zealand cross country champion, six mile record holder, and 1954 Empire Games representative.

In 1951, Murray Halberg, then 17 years old, came on the scene. His coach, Bert Payne, consulted with Lydiard on Halberg's training. By 1953, Halberg, who was now with Lydiard entirely, was joined by Barry Magee. It was with these men that Lydiard first tried out his formula for building stamina and coordinating training with races.

Lydiard completed his recipe for running in the mid 1950's. By then he knew how and when to mix the ingredients -- the long marathon type mileages, the hill work, the leg-speed work, the sprint training, the sharpening and freshening -- and how to plan it so his runners would peak at the right time.

In 1955, Lydiard stopped racing in order to devote his time to business. Until 1957, he worked two jobs, one of which was delivering milk in the middle of the night. Then he quit that job to start with a

marathoner, Ray Puckett. Puckett won the national championship that year with Lydiard in second. Lydiard was 40 years old.

Peter Snell was the next of Arthur's runners to win worldwide acclaim when he outsprinted Roger Moens for the 800 meter Olympic Gold in 1960. In the 5000 meter final, Murray Halberg broke away half a mile from the tape for the gold. Barry McGee captured the marathon bronze medal behind Africans, Bikila and Rhadi.

By 1960 and the final proof in Rome, Lydiard was the man who knew all the answers, he knew his methods worked, though he didn't "know the how." He had only the basic knowledge of human physiology. He just knew his system worked because he has spent more than ten years making it work. In the 1964 Olympics, Snell won gold in the 800 and the 1500 meters, and John Davies, also Lydiard trained captured the 1500 bronze medal.

The world wanted to know more about the methods by which this group of Auckland teammates trained. Fortunately, Lydiard was not at all closed mouthed. Indeed, he went to great length to publish and discuss his ideas.

the early to mid 1960's, Lydiard began working with coaches instead of athletes. In early 1966, Lydiard accepted an invitation arranged through Bud Winter (ex-San Jose State coach) to work in Mexico. Lydiard stayed about 8 months. Out of his efforts came Alfredo Penaloza (third at Boston in 1969), Pablo Garrido (2:12'52), and Juan Martinez (fourth in the '68 Mexico City Olympics 5000 & 10000).

Lydiard next accepted an invitation from the Finnish Track & Field Association. The Finns, with their misinterpreted concepts of the 1950's, had become interval junkies. Lydiard stayed in Finland for 19 months to mixed reviews. the Finnish were stubborn and reluctant to accept Lydiard's suggestions. However, Lydiard's lessons were not wasted on the coaches of Oekka Vasala and Lasse Viren. They listened carefully and blended Artur's words with those of Percy Cerruty, Nurmi, and Milhaly Igloi. The results of Lydiard's visit finally came into focus when Olavi Suomalainen won the 1972 Boston Marathon.

Then in Munich in 1972, Viren got up after falling in the 10000 to stun everyone with the Olympic Gold and a world record. Viren won again in the 5000 (with the final mile of 4:01, Pekoe Vasala took the gold in the 1500 Tapio Kantanen took the bronze in the steeple.

Until Lydiard arrived, it had been seven years since any Finnsh distance records had been broken. Four years after he left, the Finns again owned world records, Olympic gold medals, and several international championships.

Lydiard had made his methods available to anyone who wants to use them and the system has been applied to rugby, cycling, canoeing, squash, gridiron football. By discussing his concepts with physiology and sports medicine experts, he can now explain the scientific reasons for his successful methods. He inspires coaches and athletes to aspire to their potential.

Introduction to the Lydiard System

The Lydiard training system is based on a balanced combination of aerobic and anaerobic running. Aerobic running means running within your capacity to use oxygen. Everyone, according to his or her

physical condition, is able to use a limited amount of oxygen each minute. With the right kind of exercise, you can raise your limit.

The maximum limit is called the "Steady State", the level at which you are working to the limit of your ability to breathe in, transport, and use the oxygen. If you exceed this limit, the exercise becomes anaerobic. When this happens, your body's metabolism changes to supply the oxygen you need to supplement the amount of oxygen you are breathing in. This re-conversion process has limits, so the body is always limited in its anaerobic capacity. When you run anaerobically, you incur what is called "oxygen debt". Oxygen debt is accompanied by the build-up of lactic acid and other waste materials, which in turn leads to neuro-muscular breakdown, or simply, tired muscles that refuse to work. Oxygen debt has the unfortunate feature of doubling, squaring, and then cubing as you continue to run anaerobically.

In other words, the faster you run, the greater your need for oxygen to continue running becomes. Lydiard often uses figures shown in Morehouse and Miller's "Physiology of Exercise" as an example.

Yards per second	Liters per minute
5.56 to 6.45	5.08 to 8.75
(an increase of 0.89 yards)	(an increase in oxygen requirement of 3.67 liters)
9.10 to 9.23	28.46 to 33.96
(an increase of 0.13 yards)	(an increase in oxygen requirement of 5.50 liters)

According to Morehouse and Miller, aerobic exercise is 19 times more efficient than anaerobic exercise. The more intense the exercise becomes, the faster and less economically your body's fuel is used and the faster lactic acid accumulates.

The Lydiard training system contains elements to enhance all aspects of your running--conditioning, strength, and speed. The end result is the stamina. The ability to maintain speed over the whole distance.

Conditioning

The conditioning phase of Lydiard training stresses exercising aerobically to increase your Steady State as high as possible given your particular situation. For best results, you should exercise between 70 and 100 of your maximum aerobic effort. This, therefore, is not Long Slow Distance. This is running at a good effort and finishing each run feeling pleasantly tired. You will certainly benefit from running slower, but it will take much longer than if you ran at a good aerobic pace.

Introduction to the Lydiard System

The meat and potatoes of the conditioning period is the long runs, three a week. Many parts of your physiology improve as a result of these longer runs. The under-developed parts of your circulatory system are enhanced; neglected capillary beds are expanded and new ones are created. This increases oxygen transportation and utilization, thereby improving your Steady State. Also through aerobics training, your heart, which is just another muscle, becomes bigger and is able to pump more blood with each contraction and to pump the blood faster. Your lungs become more efficient, with increased pulmonary capillary bed activity, which improves the tone of your blood, allowing you to get more oxygen

out of each breath. Blood circulation through out your body becomes better, waste products are eliminated more easily.

Anaerobic Training

Once you have developed cardiac efficiency through aerobic exercise, it is time to develop your ability to exercise anaerobically., to increase your ability to withstand oxygen debt. The absolute limit of oxygen debt that a person who has exercised consistently for a long time can incur 15 to 18 liters. If you have a Steady State of 3 liters a minute and you run at a pace that requires 4 liters of oxygen a minute, you will be able to last for about 15 minutes--one liter of debt per minute. If you increase your pace and now require 5 liters of oxygen per minute, your debt increases to two liters a minute, and you will be empty in about 7.5 minutes. It's common sense, the slower you run, the farther you can run; the effort and speed are determined by your aerobic capacity. When your Maximum Steady State is low, you can be running anaerobically at a relatively slow speed. As your fitness improves, the speed that was anaerobic before is now high aerobic. Therefore, you want to get your Steady State, your best aerobic pace, at a high level before tackling anaerobic training.

With anaerobic training, your objective is to create a big oxygen debt and lower your blood pH level so that your metabolism is stimulated to build buffers against fatigue. This is done with interval or repetition training. Once you have built those buffers, your anaerobic training is complete: to continue this type of training is to invite injury.

Similar to the three long runs in aerobic conditioning, you should run hard (anaerobically) three times a week during the anaerobic phase. Be sure to allow yourself to recover between hard workouts, at least a day in between. The idea is to stress your system, recover completely, then stress it again. It is not all that important what the distances or speeds are, just run repetitions and intervals until you are tired and have had enough for the day. No coach can tell exactly how many repetitions you can do, or what your recovery intervals should be, on a particular day. So trust your instincts and use any schedule as a guide only.

It is not necessary to run your anaerobic work on a track. In fact, you may enjoy it more if you do your workouts in an area more comfortable to you; a forest trail or grassy field. Just pick a tree or a marker to run to and jog back after each run. Do this until you have done enough, making yourself tired with speed. The one important thing to keep in mind is to make your distance at least 200 meters or more; it takes a distance of this much to lower your blood pH level generally.

Anaerobic training is essential if you want to race well. Bear in mind, however, that if you overdo anaerobic work, you will sacrifice the very thing you have worked so hard to achieve, your good condition, which determines your performance level.

Introduction to the Lydiard System

Sharpening.

You have built your aerobic capacity and developed your anaerobic capacity. Now you need to keep your ability to tolerate oxygen debt high without dragging your condition down. This is where the sharpening. Doing short sharp sprints of 50-100 meters with 50 to 100 meters floats in between allows you to tire your muscles without lowering your blood pH. Doing sharpening once a week is most

effective for the maintaining of your maximum anaerobic development. In conjunction with races or time trials during the week, you can continue to improve your race times for quite a while.

**Next section;
Marathon
Conditioning**

Marathon Conditioning

It is necessary to understand that, while the object of training is to develop your anaerobic capacity to exercise, this can only be done in relation to your oxygen uptake level and capacity to exercise aerobically. In other words, it is necessary to run as many miles or kilometers as you possibly can at economic or aerobic speeds to lift your oxygen uptake to your highest possible level as the foundation upon which to base your anaerobic or speed training.

To gain the best results for the time spent in training, it is important to run at your best aerobic speed: i.e. at speeds at a level just under your steady state or Maximum Oxygen Uptake. This is theory and can be applied in practice.

Even very slow running will effectively increase general cardiac efficiency and therefore raise the oxygen uptake. However, by running at speeds much below the maximum oxygen uptake level, it is going to take much longer periods of time to gain the same results than if the rates of speed were at faster aerobic levels. In other words: one can run too fast or too slow and it is important to control the running efforts as well as possible if the optimum results are to be achieved in the time spent exercising.

To train at speeds above the oxygen uptake is anaerobic exercising with the net results the development of lactic acid that causes a lowering of the blood pH with the ultimate results of neuromuscular breakdown in the working muscles. This means that the volume of exercising will be limited according to the oxygen debts being incurred. Seeing that, in this marathon conditioning phase, it is important to do a large volume of training and it has to be economic, or aerobic. The net results of the aerobic exercise is carbon-dioxide we breathe out; and water and salt we perspire. We are really endeavoring to lift the pressure by the heart upon the cardiac systems generally, to an economical level to bring about the development of the under-developed parts--the smaller arteries, arterioles, capillary beds and veins.

To carry out this 'near best aerobic' training practically, it is necessary to time your runs over measured courses, and to progressively increase the running efforts as fitness improves.

It can take many years to gradually and continually develop general cardiac efficiency. This is the reason why marathon runners are usually better performers at ages nearer forty rather than in their earlier years; that is if they continue with systematic long aerobic training.

I always tell runners that, "miles make the champions", and that initially this grind of running all the mileage possible between the competitive seasons is of prime importance. The more miles that you are able to run aerobically in training, then the greater endurance you will be able to develop. So there is really

no limit to the mileage that a coach should place upon his athletes, provided that the supplementary miles run above the required faster aerobic running are as easy effort at the lower aerobic speeds. In other

words; it is wise to run once a day at faster aerobic speeds and supplementary to this running, to jog as many miles as you find time and energy for; even if it is only for fifteen minutes jaunt.

The fast aerobic running should be approached this way: Decide how much time you have daily for your training and balance your conditioning schedule upon this. Measure out several different courses over different terrain that allow for reasonable traction. One course for each week day, if possible. This for psychological reasons It does help to overcome the boredom that can be experienced at times during training.

Start training by first running against time rather than timing miles run. Get yourself running fit so that you are capable of running long distances continuously. Do this by running on out and back courses. By running out, say 10 minutes and turning around and running back in nearly the same time. If it takes longer to return, then you should realize that you went too fast on the outward journey and so are forced to slow down upon the return journey. You will soon learn about your present capabilities and fitness and so adjust your running efforts accordingly. Progressively, the running time daily should be increased so that as your oxygen uptake improves you will find the training progressively easier, and your possibilities of increasing the running time greater.

A schedule such as this should be the ultimate aim for a person, less for younger athletes, prior to starting

a schedule designed to have you running against the watch for mileage; Monday; 1 hour, Tuesday; 1.5 hours, Wednesday; 1 hour, Thursday; 1.5 hours to 2 hours, Friday; 1 hour, Saturday; 2 hours or more, Sunday; 1 to 1.5 hours. This running should be done very easily and the miles covered of no real account. The "time" spent training is the important part.

Do not go straight into such a schedule, but work up to it according to your fitness and ability to train. Once you are sure you can run for two hours without any problems, then start to the watch per mile as follows: Run over your measured courses for one week, without any influencing factors such as a watch, per mile pace, or another runner. Try to run evenly in effort and as strongly as your condition allows.

Start your watch at the start of the runs, so as to be able to take the overall time of each run at the conclusion; this giving an estimate of your capability and condition at this stage of your training.

The time taken from the first week's training should give you a fair indication of your capacity to train and a basis on which to train further.

The following week, you should use these times for control and run the same course at the comparable times by checking each mile time as you pass your mile markers. For example, if you took one hour to run a ten mile course the trial week, then the next week you should set out to run six minute per mile, allowing for hills and hollows. After a week or so, you will find that the previous times used for control are becoming too slow for you as your oxygen uptake improves. So it will be necessary to increase the average speed for distance by lowering the average mile time down to 5:55 per mile or thereabouts, In this way, it is possible to keep running at your best aerobic effort rather than too fast or too slow and so to gain the best results for the time spent in training.

I discovered years ago, through trial and error methods, that the best results in this respect were gained by running about 100 miles weekly at near my best aerobic efforts and that supplementary to this, by running at an easier effort as many miles as I possibly could. I also found that by alternating the length of the runs by running 10 miles one day and 20 the next, rather than by running 15 miles a day, I gained better results.

This was due to the gaining of better muscular capillarization though the longer continued training (efforts of two or more hours), this in turn allowed for better utilization of oxygen.

The total weekly mileage that you manage to do Will be governed by your climatic conditions and available time for training. However, it is important to realize this point; that it is not the distance that will stop you in training as much as the speeds. If you keep the running efforts to a level within your capabilities, then you will quickly be able to manage a large mileage. It is better to run a long way slowly rather than to curtail the mileage possible by running to fast.

When I say that your aim should be to run a weekly schedule such as the following, I mean it only as a guide and that you should adjust it to suit your own daily program, fitness and age.

Monday	10 miles (15km) at 1/2 effort over undulating course
Tuesday	15 miles (25km) at 1/4 effort over reasonably flat
Wednesday	12 miles (20km) at 1/2 effort over hilly course
Thursday	18 miles (30km) at 1/4 effort over reasonably flat
Friday	10 miles (15km) at 3/4 effort over flat course
Saturday	22 miles (35km) at 1/4 effort over reasonably flat
Sunday	15 miles (25km) at 1/4 effort over any type terrain

It is just a matter of running what you feel capable of; the more the better.

It is also wise to jog easily every morning for at least minutes or longer. The longer the better.

Running action should be relaxed with the arms following through with a low and loose action; the thumbs brushing the side seams of the training shorts. The hips should be held comfortably forward; and the head should be carried so that you are looking forward about thirty yards or more. Try to bring the knees up to a comfortable height, rather than to develop a shuffling action.

Hill Resistance Training **(Introduction of Anaerobic running and Leg-Speed Training)**

Hill Circuit Training

When the marathon conditioning period of training is completed, or no further time can be spared, it is necessary to develop speed and start to develop the anaerobic capacity to exercise.

It is necessary to bring resistance to the leg muscles to develop the muscle fibers; in particular, the white (fast twitch) muscle fibers that are mainly responsible for giving better speed.

I have found that a form of isotonic exercise will develop white muscle fibers better than isometric exercise and that quite quickly the speed can be developed. By springing up-hill, with a series of short and sharp resistance, you can use your body's weight as resistance for your leg muscles. The up-hill springing will also stretch the muscles and tendons to the extreme experienced during competitions and other training and assist in added flexibility and speed. It will also help to eliminate the possibility of pulled muscles and strained tendons later.

Ankle flexibility is of great concern to the runner: and with strong and flexible ankles, the runner is able to increase stride length.

A good running technique is also important: and by learning to run with the hips comfortably forward, the runner is able to bring the knees up higher. This in turn allows the feet to follow through higher, in so shortening the lever and allowing for a faster leg action.

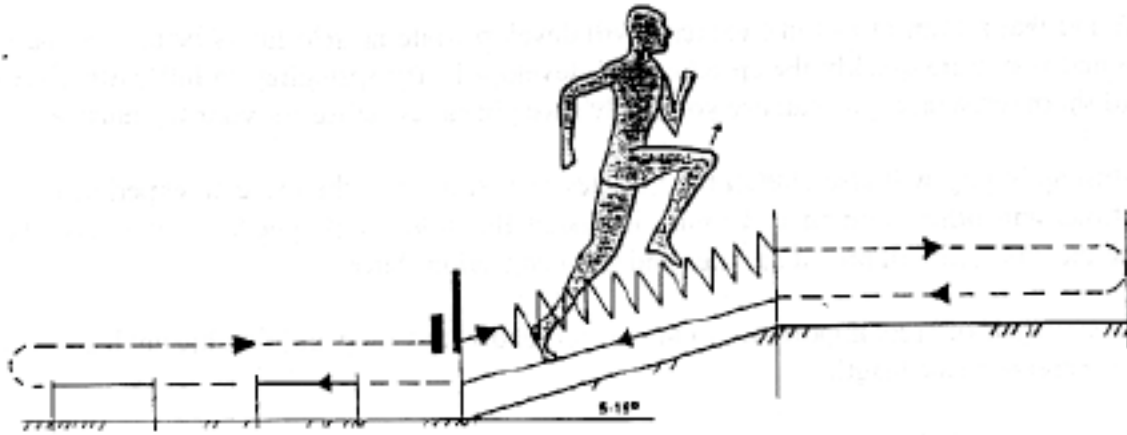
So it is important to develop leg power, flexibility, and a good economical running style. With good speed development, the runner can run at relatively the same speed more economically. This is of great importance to the marathon runner as well as the track runner.

By using hill training, it is possible to develop all these abilities during the same training sessions so saving valuable time

The training that I suggest in the following paragraph is not easy to do and can be quite testing. A runner needs to be well conditioned to be able to do a 1 hr workout properly, A runner should also understand what he is trying to achieve by using the exercise, so as to apply it according to his/her fitness and capacity to train with respect to development and age.

Find a hill with a raise of near one in three, or a little steeper: on grass, forest trail, or the road that will give good traction so that it is possible to spring up-hill without slipping. It should be about 200 to 300 meters long or longer, with a flattish area at the base of approximately 200 to 400 meters where you can sprint, and an area at the top where it is possible to jog.

If a circuit can be found with a steeper hill and a similar flattish area at the top as mentioned, that would bring you into a more gradual down-hill, leading to the flat at the bottom: it is better for the down-hill running and seems less tiresome psychologically. Approach the training this way: Warm-up for at least 15 minutes. This being sufficient; discard unnecessary clothes at the base of the hill so as to allow the maximum freedom of movement. Then start springing up the hill with a bouncing action and slower forward progression. It is necessary to use the body's weight for resistance; and the slower the forward momentum is, the more resistance will be felt. The Center of Gravity must be lifted up and down to gain resistance, not just lifting the knees. Keep the upper body relaxed with the arms loose at the sides. Hold the head up; and do not look down at the ground which tends to throw the hips back. Keep your knees coming up high with the hips held comfortably forward. Do all that you can or feel capable of doing. Should the exercise be too tiring to go all the way up the hill, then jog some yards before doing more. Use it according to your needs and ability.



At the hill top, jog easily for near three minutes before running down-hill with a fast relaxed striding action, this will develop the fine leg-speed and also stretch leg muscles for better stride length. Should the hill that you have selected be too steep for this exercise, then it is better to take it easily as you run down.

The down-hill section should be such that it allows the runner to stride down fast without fear of losing control and falling.

At the base of the hill, some windsprints (sprint repetitions) should be done to gradually accustom your body to exercise anaerobically, varying the distances from 50 to 400 Meters with each circuit, If the circuit is short, do the windsprints only every 15 minutes. It is not advisable to suddenly go into a great volume of intense anaerobic training as very many people do. So it is logical that this anaerobic training should initially be not too intense, and in a reasonable volume. By only doing windsprints on the short stretch at the bottom of the hill, and by only doing them every 15 minutes, it is not possible to do too much. Use whatever distance you like, but for best results, you try to use 50, 100, 200, and 400 windsprints.

Go through the circuit again, etc, until you have been out for an hour, or according to ability to exercise this way. Then cool down for at least 15 minutes.

This training should be done three days weekly with the alternate days for leg-speed running, three a week:, and one day a long run of 1.5 to 2 hours should be completed at an easy effort.

Leg-Speed

Find an area that is nearly flat but with a gradual decline and about 120 to 150 meters long. Warm-up for at least 15 minutes and then, run over the course ten times as follows, with a three minute interval. Do not rush through this training and realize that it is important to have a full three minute interval.

Each time during the run, think of moving the legs as fast as possible and do not be conscious of stride length. Keep as relaxed as possible in the upper body. The same action can be obtained by going down stairs one at a time as fast as possible. You will find that the legs do not seem to move fast enough.

So run with a normal stride, thinking of only one thing: **MOVING THE LEGS FAST**. This way, it is possible to overcome viscosity in the leg muscles and develop fine speed.

After the tenth repetition, cool down for at least 15 minutes.

It is wise to train twice a day, everyday, even while doing this training and track training and racing, even if it is only for 15 minutes each morning.

During this period of training, your legs will get tired. However, if this exercise is maintained for at least two weeks, it becomes progressively easier and gives fine results.

The best results come from four to six weeks of this training.

A schedule during this period could look like this:

Monday, Wednesday and Friday - Hill training

Tuesday, Thursday and Saturday - Leg-speed

Sunday - Long run

Track Training

A period of about 10 weeks is usually sufficient to carry out the necessary track training leading up to the first important competition. If these 10 weeks are divided into three sections as described below, it is possible to develop the necessary abilities and gain fine coordination, with the optimum performance coming upon the desired date.

Anaerobic / Speed Development

The first four weeks should be used for the further development of the anaerobic capacity to exercise and speed. When developing the capacity to exercise anaerobically, it is important to realize what you are trying to do and what physiological development you are trying to achieve. It is possible to develop an ability to incur about 15-liter oxygen debt and this is done by exercising anaerobically. Developing big oxygen debts in training stimulates the body's metabolism to create buffers against fatigue. If this is understood, it will be realized that it does not really matter what form of running it takes, as long as you are making yourself tired with the volume of anaerobic exercise: and finish the training session knowing that you could not do much more nor any better. Therefore, it doesn't matter whether you use repetitions or interval training, over different distances with different intervals, you don't even need to time them: as long as you come off the track or from your training quite fatigued. However, as a practical guide, it is advisable to get fast running into a total of about 3 miles, or 5000 meters, or thereabouts; i.e. 12 X 400 meters, 6 X 600 meters, 5 X 1000 meters or 3 X 1 mile, etc.: with a recovery jog of a equal distance in

between. If one athlete takes longer intervals or more volume of fast repetitions than another to gain the same reaction physiologically, then he will just need to train for a longer time.

So in many ways, it is important to evaluate your training every day, so as to understand the effects of each day's training; and not to follow some or any schedule blindly.

I advise athletes to run their hard anaerobic training during this period of four weeks by doing it for three days weekly on alternate days. Never do hard anaerobic training on consecutive days. as it is wise to allow your blood pH to return to normal after the exhausting workouts.

The younger the athletes, the less anaerobic training should be used in the schedule; and the ratio of anaerobic to aerobic training only increases as the athletes get older and fitter.

It is only necessary to do four weeks of this training for three days weekly to gain the desired results, to develop near to the possibility to incur 15-liter oxygen debt. If you continue with this type of training in great volume and intensity for much longer, you will start to adversely affect your body's metabolism and pull the condition down through the effects of lower blood pH.

On alternate days, it is wise to concentrate upon developing your speed to near its maximum by carrying out sprint training workouts of suppling and loosening exercises, sprint starts and sprint races, and leg speed running.

A typical workout could be: Warm-up by running easily for about 15 minutes, doing exercises for 10 to 15 minutes, running easily for 5 more minutes. Follow by runs over 70 to 100 meters, concentrating upon the following elements; with a jog between each run of 3 minutes:

- (A) The runs to develop stride length by exaggerating the length of the strides and pushing off hard with the back leg.
- (B) another by running tall, bring your knees high and getting up high on your toes.
- (C) and another by moving the legs as fast as possible to develop a quick leg turn-over.

Then the last set of runs covering all of these things. These runs can be done two or three times with each exercise. Also some sprint starts can be used and a sprint race or two competed in for training. Any form of American sprint training is usually good as long as it covers these points that I have made.

All middle distance and distance runners should race in sprints and train to develop their leg speed as this increases their economy of action and reserves energy for the latter stage of competition.

When doing sprint training, be sure that you do not try to rush through it like when doing repetition training; give yourself sufficient recovery after each run.

On the seventh day, it is best to go for a long easy run, the distance or time of running being in keeping with your age and development. In the case of a mature and fit person, it could be for 2 hours or more, at an easy effort.

Co-ordination and Sharpening

After these first four weeks of track training, another four and a half weeks period should start with the aim to coordinate all the training that you've so far done. Now that speed, stamina, and the anaerobic capacity to exercise are more or less developed, it is necessary to have you running smoothly through-out your competitions without apparent weak spots showing in your running. Even though you may have fine stamina and speed, it does not necessarily mean that you can race well and to your best potential. If you give your body certain exercises to do often enough, then your body will adjust and manage them efficiently. The same can be said about running over distances, If you have the basic condition and run over certain distances often in a controlled way, you start to improve in performances. So at this stage of training, there are these aspects to consider:

It is necessary to do some anaerobic training, only at this time you need to drop the volume and increase the intensity. In other words, if you run, say 400 meters twenty times, it takes a long time and you get very tired with the training. Whereas, if you run five laps around the track by sprinting fifty meters in every 100 meters, floating the other 50 meters, in all twenty sprints; you will also be very tired, though in this case it will only take about 7-8 minutes to complete the exercise, if you are a mature person. This is called sharpening, or putting the edge on the knife of anaerobic capacity training; and this way we can get into racing shape without seeming to pull the good condition down. At this stage it is usually best to use this training once every week, say, upon Monday.

On Tuesday, a time trial could be run over or near to the distance being trained for. When training for the 5000 meters and 10000 meters, it usually pays to use 5000 meters for your time trials with the occasional 10000 meters. When training for the 800 meters and 1500 meters (1 mile), it often pays to use under distance time trials; such as 600 meters for 800 meters, and 1200 meters for the 1500 or mile. This is because the speed involved causes larger oxygen debts and recovery sometimes takes longer. From the time trials, you can observe weaknesses in your running. You can also have someone record your lap times during the run and you can see where you may have slowed down. It is then necessary to use the appropriate exercises to strengthen the weaknesses that are apparent. This is where the training is mainly coordinated. For instance; if you could run the early part of a time trial easily and were tired near the latter stages, it would be advisable to run in over-distance races or time trials the following week. On the other hand, if you found the pace a little difficult throughout the run even though you were running strongly near the end and not overly tired, then it would be wise for you to run under distance races or trials during the next few days.

All athletes are different in their reactions, so you would have to be a little experimental in the later stages of training to determine exactly how to co-ordinate the training. But the trials (and development races) will give you the necessary information very well.

On Wednesday, sprint training should be done and a club (team) level sprint race or two competed in. This means the long distance runners too. A middle distance race could be used as well.

On Thursday, you could do any training that you consider necessary from the information found out from the time trials; however, it is also wise to work at pace judgment, two to four times at the speed that you intend to race at. You can also do more sharpeners if you think that you require this training.

On Friday, leg speed can be done over 120 meters, say four to six times after warming up and exercising.

Saturday can be open competition day with you looking for the best competition available. The races during this period are considered development races; since you are training hard and are tired to a degree, it is not possible to give your best effort. These races should be over- and under- distances, according to your needs and considering your time trial reactions.

On Sunday, the usual long run should be taken at a leisurely pace.

Freshening Up

During the last one-and-a-half weeks, you should try to freshen up by lightening your training so as to build up your reserves mentally and physically for the coming important competition. Some call this "Super Compensation" and other words. This is important and the time for this freshening up should be decided by the individual through trial and error methods as individuals differ in this respect, though usually 10 days is about right on the average. You should train every day, but easily. The fast training should be small in volume and the longer runs should be at very low efforts.

When the main competitions are reached, it is important to realize that you have trained for the race.

You

should not continue to train hard as many athletes make the mistake of doing. It is necessary to keep fresh and sharp. You cannot be fresh and sharp if you are doing hard repetition training, etc. Therefore, a typical

training week during competition season would go something like this; Saturday - race, Sunday - long easy run, Monday - a few sharpeners, Tuesday - sprint training or leg speed, Wednesday - race at a club, Thursday - jog, Friday - leg speed, etc. Reserve your energies for your races.

Just train enough to keep your condition to a good level. Your races will indicate your general condition, they are all you need in hard work.

Every morning except upon days for your long run, you should go for your morning easy runs, as this helps keep your blood pH level high and makes your recovery better. It also continues to further develop general cardiac efficiency.

Without being too specific, this is basically the way to approach training for the middle and longer distances. As long as the exercises used daily are evaluated and you decide that the training to be used is what is required, then you are sure to start to gain a fine balance in your schedule and get the results you desire. You can train hard and not succeed unless the training is approached in an intelligent way.

How to Set Out a Training Schedule

1. Count back from the first important race date. How many weeks?
2. Allow ten days to freshen up.
3. Allow six weeks (including freshening up) for co-ordination training.

Sharpeners, trials, development races (under and over-distances). Pace judgment training. Fast relaxed striding. If needed, 300 and 500 meters. Fast anaerobic.

4. Allow four weeks for anaerobic development

Anaerobic training two or three days weekly. One day long aerobic run. Other days sprint training of sorts and easy running.

5. Allow four weeks for hill resistance training.

Hill training two or three days weekly. One day long aerobic run. Some wind sprints every 15 minutes during hill training. Other days leg speed and fast relaxed runs over meters.

6. Conditioning training is time left.

A) Conditioning starts with only aerobic mileage (flats and hills).

B) Then include a day easy fartlek and strong runs over about 5K and 10K.

The 10K only once every two weeks and the 5K three times every two weeks.

7. Continuation of racing

Non-race week / Race week schedule

These schedules allow a runner to compete often and to keep improving, as long as the races are not run every week. It is usually best to race every three weeks.

Training Considerations
(by John Davies - Olympic medalist)

1. You need to be at a peak for the day. It is not necessarily the best athlete who wins, it is the best prepared

2. Choose the event that best suits you internationally. Basic speed is the governing factor.

3. The aim is to develop sufficient endurance to maintain the necessary speed over the race distance to be successful.

4. In middle distance and distance events, a high aerobic threshold is necessary.

5. Stamina can be continually developed.

6. Aerobic development is a limited factor.

7. Once anaerobic training is started, it must be continued, otherwise development is lost.

8. Once conditioning is finished, the performance level is determined.

9. Conditioning requires many kilometers in training. It can only be accomplished aerobically

10. It is a mistake to use anaerobic training during the conditioning phase.

11. Anaerobic development only takes 10 to 12 weeks to achieve maximum levels.
12. Anaerobic training should be done in relation to reactions, not by using hypothetical figures such as number of repetitions, etc. The athlete should decide how many reps is enough.
13. Evaluate every day's training and train by daily reactions, using the schedule for guidance.
14. Balance in training must be maintained between aerobic / anaerobic and speed development.
15. It is a fallacy that anaerobic training develops speed. It in fact counteracts speed.
16. Training can be done too fast or too slow, too much or too little, at right or wrong times.
17. Understand the how and what of training as well as why each day's training is important physiologically and mechanically.
18. Co-ordination of training is important.
19. all middle distance and distance athletes require;
 - (a) A high aerobic threshold,
 - (b) Anaerobic development,
 - (c) Speed, and
 - (d) Co-ordination. One development follows another. Training needs to be systematic.
20. No one can determine exactly what an athlete should do in anaerobic training. The athlete should determine that in each session and not train to hypothetical figures.
21. Anaerobic development requires volume training, i.e. longer repetitions, not short sharp ones or short intervals. After three weeks of heavy overload anaerobic training, the athlete needs to decide whether to back off during the fourth week and start the shorter sharper workouts. This is to maintain the anaerobic development achieved but not sacrifice good condition at the same time.

The Actual Schedule

Please note that it is wise to run supplementary miles at an easy pace, as many as you can, in addition to the schedules presented here. This will help you maintain good general condition and allow you to recover from training sessions more easily. Even 15 minutes is of value.

Training should be done over all types of surfaces and trial runs over courses similar to that to be raced over. Training should also be applied in volume according to age and condition.

Regular running on hills will help you in developing and maintaining your speed. Try to fit in some hill springing, uphill running or bounding with a driving action, and some steep hill or step running whenever you can, but don't overdo it.

The schedules are only for guidance. They give a balanced method of training for a specific event, but think of them as a flexible guideline, allowing for age and general conditioning. Study your reactions to the training from day to day and if you feel stale or suffer from any soreness, allow time for recovery.

Never do speed training when your muscles are sore or you are feeling tired. Just jog easily, regardless of what is on the schedule for that days training. You can never harm yourself by jogging and it will usually help to overcome the soreness or tiredness. Fast training can lead to injury and will certainly only make you more tired.

Don't race your training, except when full efforts are called for on the schedule Run strongly and easily in effort, always keeping something in reserve. As you feel improvement, gradually increase your training tempo, but never use that reserve.

When runners are well conditioned, it is not too difficult to maintain top form for months, providing simple precautions are taken, not to try train hard and race at the same time and allowances are always made for recovery from races. To keep FRESH and SHARP is the secret.

The instruction "for as long as possible" on the schedules refers to the period between the finish of one season and the start of the next one. (e.g., between cross-country and track seasons, etc).

1. Conditioning (As long as possible) 2 week cycles.

Monday: Aerobic running 3/4 to 1 hour.
Tuesday: Aerobic running 1 to 1.5 hours.
Wednesday: Run hilly course 1/2 to 1 hour.
Thursday: Aerobic running 1 to 1.5 hours.
Friday: Jog 1/2 to 1 hour.
Saturday: Run hilly course 1/2 to 1 hour.
Sunday: Aerobic running 1.5 to 2 hours.

Monday: Run hilly course 1/2 to 1 hour.
Tuesday: Aerobic running 1 to 1.5 hours.
Wednesday: Time trial 3000 or 5000 meters.
Thursday: Aerobic running 1 to 1.5 hours.
Friday: Jog 1/2 to 1 hour.
Saturday: Relaxed striding of 4 to 8 times 200 meters.
Sunday: Aerobic running 2 hours or more.

11. Hill Resistance Training (4 weeks)

Monday: Leg-speed 100 meters 6 to 10 times.
Tuesday: Hill exercise 1/2 to 1 hour.
Wednesday: Fast relaxed running 100 meters 6 to 10 times.
Thursday: A Hill exercise (or jog) 1/2 to 1 hour.

Friday: Leg-speed 100 meters 6 to 10 times.
Saturday: Hill exercise 1/2 to 1 hour.
Sunday: Aerobic running 1 to 2 hours.

111. Anaerobic Training (4 weeks)

Monday: Sprint training.
Tuesday: Repetitions.
Wednesday: Easy fartlek 1/2 to 1 hour (jogging and striding or sprint training).
Thursday: Repetitions.
Friday: Relaxed striding (fast and easy).
Saturday: Repetitions.
Sunday: Aerobic running 1 to 2 hours.

1V. Co-ordination Training (4 weeks).

Monday: Wind-sprints (total of 2000 to 4000 meters) either 50 meters every 100 meters or 100 meters every 200 meters; 10 to 20 times.
Tuesday: For Middle Distance; Fast relaxed striding or Sprint training.
For Distance; Time trial 3000 or 5000 meters.
For Either; Easy fartlek or Aerobic running up to an hour.
Wednesday: Development races or Time trial ; a sprint and middle distance.
Thursday: Fast relaxed striding or Pace judgement or Easy Fartlek or Fast runs in repetition over 300 meters by 3 or 500 meters by 2.
Friday: Jog 1/2 hour.
Saturday: Development races; over or under race distance.
Sunday: Aerobic running 1 hours to 1 1/2 hours.

V. Last Two Weeks of Freshening up!

Monday: Wind-sprints 50 meters by 12 to 20 times.
Tuesday: Easy fartlek or Aerobic running, 1 hour.
Wednesday: Time trial over race distance (fast)..
Thursday: Fast relaxed striding 100 meters by 6.
Friday: Jog 1/2 hour.
Saturday: Race or time trial 1/2 the race distance.
Sunday: Aerobic running 1 hours to 1 1/2 hours.

Monday: Wind-sprints 50 meters by 10 to 16 times.
Tuesday: Time trial, 400. 600 or 1500 meters.
Wednesday: Fast relaxed striding 100 meters by 6.
Thursday: Jog 3/4 hour.
Friday: Jog 1/2 hour.
Saturday: The First Important Race.
Sunday: Jog 1 hours to 1 1/2 hours or more.

V1. Continuation of Racing

Monday: Easy fartlek 3/4 to 1 hour.

Tuesday: Relaxed striding 200 meters by 6.
Wednesday: Race or time trial.
Thursday: Easy fartlek 1 hour or Jog 3/4 hour.
Friday: Jog 1/2 hour.
Saturday: Race or time trial.
Sunday: Jog 1 1/2 hours.

Race Week / Non-Race Week Schedule

Following schedules allow a runner to compete often and to keep improving, as long as races are not run every week. It is usually best to race every three weeks. Two schedules are shown here, one for road racers and one for cross country racers, but basically the idea is the same.

Cross country (Non-race week)

Monday: Repetitions 1500 meters by 3 or 800 meters by 6.
Tuesday: Aerobic running 1 hours to 1 1/2 hours.
Wednesday: Time trial 3000 or 5000 meters.
Thursday: Aerobic running 1 hours to 1 1/2 hours.
Friday: Fast relaxed striding 100 meters by 10.
Saturday: Time trial 3000 or 5000 meters.
Sunday: Aerobic running 1 hours to 1 1/2 hours.

Cross country (Race week)

Monday: Wind-sprints 100 meters by 6 to 10 times.
Tuesday: Easy fartlek 1/2 to 1 hour.
Wednesday: Time trial 1500 to 2000 meters.
Thursday: Fast relaxed striding 100 meters by 6.
Friday: Jog 1/2 hour.
Saturday: Race.
Sunday: Aerobic running 1 1/2 hours or more.

Road (Non-race week)

Monday: Repetitions 1 mile by 3 or 880 yards by 6.
Tuesday: Aerobic running 1 1/2 hours.
Wednesday: Time trial 3 miles.
Thursday: Aerobic running 1 1/2 hours.
Friday: Fast relaxed striding 100 meters by 6 to 10 times.
Saturday: Time trial 3 miles.
Sunday: Aerobic running 1 1/2 hours or more.

Road (Race week)

Monday: Wind-sprints 100 meters by 16 to 10 times.

Tuesday: Easy fartlek 1/2 to 1 hour.

Wednesday: Time trial 1 mile.

Thursday: Fast relaxed striding 100 meters by 4 to 6 times.

Friday: Jog 1/2 hour.

Saturday: Race.

Sunday: Aerobic running 1 1/2 hours or more.

For Joggers

Why Jog?

Jogging, or easy aerobic running, has been evaluated in Sports Medicine Institutes throughout the world, and found to be the best way to exercise - - next to cross country skiing - - to develop general cardiac efficiency.

By developing the under-developed blood vascular or circulatory system to gather in and transport more oxygen to the various parts of the body, jogging eases pressure on the heart.

During strenuous exercise, the heart can pump about 34 liters of blood per minute. When running easily, heart is still pumping several liters of blood per minute and this is sufficient to develop the under-developed circulatory system--the smaller arteries, arterioles, capillary beds and veins. This means that the build up of blood in the aorta is lessened and the blood can circulate back to the heart more quickly, so easing pressure on the heart.

A greater flow of blood is pumped to the lungs as the arteries in the respiratory system develop larger , and this in turn improves the possibility of the gathering in more oxygen per minute than . Everyone breathes in a lot of oxygen, but much of this is breathed out because it is not able to be absorbed.

It is also agreed that better blood tone usually results through exercise, increasing the quality and quantity of red blood cells.

Through the increased oxygen intake per minute and improved circulation, the heart's workload eases. This is the first stage in trying to improve a person's cardiac efficiency and in eliminating the possibility of failure.

Starting Out

As general efficiency is acquired, it is possible to progressively increase the workload safely, running at faster speeds and for longer distances.

But it is wise to run easily for several months until some reasonable development has resulted.

Everyone has a certain ability to absorb, transport, and utilize oxygen and when the exercise calls for the individual's maximum use, it is termed the Steady State. This ability can be improved with regular aerobic exercise -- aerobic meaning "with oxygen". When the exercise requires more oxygen than the person can take in, it becomes an anaerobic exercise, the metabolism has to compensate, resulting in the formation of lactic acid in the blood stream and eventually causing the person to stop exercising through the neuro-muscular breakdown.

To develop general cardiac efficiency, it is necessary to use the powerful leg and thigh muscles that do not tire quickly and keep the blood pressure, generated by the heart, up to high aerobic levels for periods of 15 minutes or more. This should be undertaken daily or every other day at least. The more time spent running aerobically, the better the beneficial reactions.

By running regularly, efficiency is improved and previously low anaerobic exercise becomes high aerobic exercise. This means that for relative workloads the heart can perform its tasks more easily.

The novice jogger therefore should exercise well within his or her fitness level and capacity to exercise - not trying to strive too hard for at least six or more weeks. Then the benefits of the regular exercise become evident and result in a higher oxygen uptake, making it possible to run at, and maintain, a faster pace for longer periods of time.

Building Up

Running continuously for longish periods of time helps to develop the under-developed capillary beds and also to develop new ones. This results in more efficient utilization of oxygen and blood sugar and the elimination of waste products. Greater muscular endurance comes in turn.

If a runner is accustomed to running for, say, 15 minutes daily, the best approach for developing stamina is to increase the time running every third day to about 30 minutes. On the days in between, revert to the 15 minutes for two days until the improvement in stamina is apparent. This approach to training should be continued progressively until it is possible to run for an hour or longer.

That is, an increase of the usual daily run, with the weekly schedule including two or three longer runs. Say, 30 minutes for two days, then a longer run of 45 minutes to an hour on the third day. This way endurance improves quickly.

When a runner can run freely for up to an hour or more, he or she should be able to run in Fun Runs and other competitions of an aerobic nature without fear of developing a problem.

If racing is contemplated, anaerobic training is necessary to develop the ability to exercise to the anaerobic maximum and to withstand oxygen debt.

The principle is to run fast so as to incur oxygen debt. Oxygen debts not only double but they square and cube as the effort increases and can be tolerated to about a 15 liter debt. If a runner has a Steady State of liters per minute and is required to exercise with a resulting workload of 4 liters per minute, he or she can only continue for about 15 minutes. If the workload is increased to 5 liters per minute, the runner can only continue for about 7 1/2 minutes or so.

It can be explained this way; If an individual sprinted as fast as possible, the distance covered before having to stop would not be very far. However, if the speed was slowed down, the distance covered before having to stop would be further. In other words, the slower the pace, the further it is possible to go. The anaerobic exercise is governed by the limited anaerobic capacity development. It is not possible to develop it to an unlimited capacity.

Technique

A good running technique can help in gaining better results and can also help to eliminate some injuries.

The runner should be upright when running with the hips directly under the torso. The upper body should be relaxed with the arms coming through loosely and low and upwards so that the thumbs are just inside the shoulders. The upright body carriage helps to lift the knees higher so increasing stride length and stride speed relative to the speed he or she is attempting, and the relaxed style saves energy and helps the runner to maintain balance and avoid sway from side to side. By keeping up tall, it is possible to gain a drive off the back leg and run lightly. A runner should not hit the ground hard with the feet as happens when someone sits back and keeps the knees bent.

Striding out over about 100 meters or more and then jogging about 300 meters before repeating can help if the observations are kept in mind. Gradually speed improves to coordinate with the endurance training.

Running over hilly terrain, when the runner is fit enough, will strengthen the legs and add power and flexibility, particularly in the ankles. If this is fitted into the running schedule on a regular basis, the runner will show a marked improvement.

Golden Rules

If you have any doubts about your health, it is wise to consult your doctor before starting to jog and also have regular checks to monitor the bodies reactions.

Running on firm surfaces, such as roads, gives the best traction and means the leg muscles do not tire as quickly as they would on rough or soft surfaces. when training on firm surfaces, it pays to have good rubber soles and heels on running shoes to alleviate the effects of jarring. Dry grassy areas are usually best for beginners to minimize the jarring as the slower you run, the harder you land on the ground.

Never try to run too fast during the initial training, for it is better to run a little too slowly rather than too fast. Always try to finish in the "pleasantly tired state", knowing that you can do better.

You can never run too slowly to help bring about some cardiac development. but you can run too fast, causing distress, sore muscles and slowing your recovery. Inevitably this then effects your following days

training.

A sensible and balanced diet should be maintained. It pays to read all you can about the functions of vitamins, enzymes, and minerals. It is futile training hard if your diet is not wholesome and balanced.

Continued jogging over months can help lose weight, providing you run enough and at the same time watch your calorie intake. After about half an hour of running at a good speed, your fat metabolism starts to provide most of your energy.

The Golden Rules are:

- Whenever in doubt about yourself, see your doctor.
- Be regular with your exercising as a little often is better than a lot occasionally.
- Jogging is an aerobic exercise, so it can be done at any time of the day or night, but preferably not straight after meals.
- Try to give your digestive system two or three hours to digest food before you exercise.
- Be careful of your running shoes and do not let them wear unevenly as this can lead to leg injuries.

Running a Marathon

The point of marathon running is to develop fine general cardiac efficiency, which basically means the improved intake, transportation, and utilization of oxygen. With continued running, the intake and transportation improves quickly, but the improvement in usage by the muscles takes longer. The necessary development of muscular endurance can only be brought about with continuous exercise of the muscle groups for long periods.

Muscle group exercise, particularly for periods of two hours or more, not only affects underdeveloped capillary beds but also develops new beds, giving an important increase in muscular endurance. So, to be successful in marathon racing or running, it is essential to go for long runs often. The more the better. The nucleus of the marathon training schedule is three long runs a week, interchanged with other runs that, while they can be shorter, are usually over hilly terrain. Because marathons are run most of the way at fast aerobic efforts, there is little need to do a lot of anaerobic training; this means that to develop the anaerobic capacity to race marathons, time trials over 5K to 10K are sufficient.

The use of fartlek or speed-play training is of value. Fartlek training is done by mixing all sorts of running over golf course-type terrain. Set yourself a time to train for and, once you are warmed up, stride out fast, sprint, sprint up hills, stride down hills, jog and generally run according to how you are feeling.

When you begin marathon training, it is better to train on a time basis rather than out to cover a given mileage. This allows you to feel your way and not bite off too much at the beginning. Always run to your individual fitness level and not at someone else's. That can involve you in anaerobic running. In conditioning training, you can never run too slow to improve the oxygen uptake; but you can run too fast and run yourself into trouble.

Getting used to running in the heat is important: if you are not prepared for it, you can suffer ill effects. Hot weather training develops the skin arterioles which allow more blood to be pumped to the skin surface for cooling. Sauna baths can help in this development.

Train well within your capabilities. Start your races at a steady effort and don't be trapped into going too fast at the beginning.

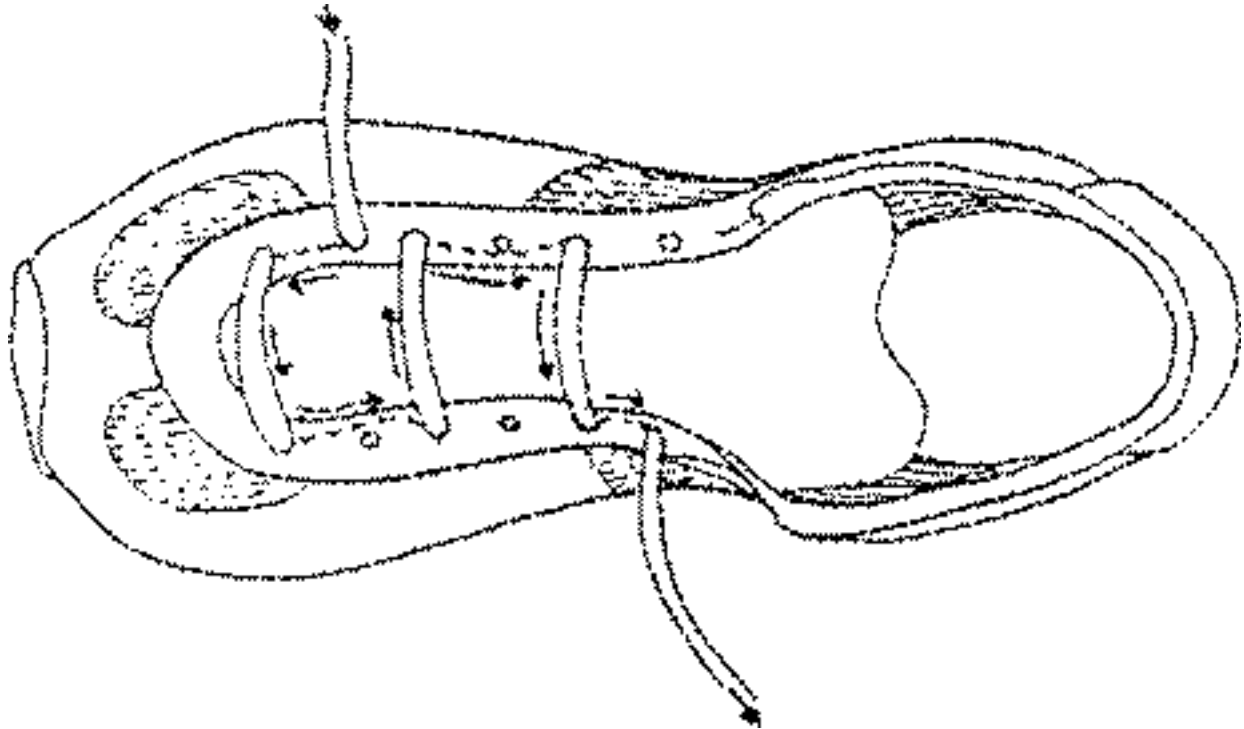
WHEN YOU RUN A MARATHON, BE SURE THAT YOU:

1. Keep to your normal balanced meals the days prior to the race. Protein, carbo-hydrate & fat are all necessary for a balanced metabolism in the marathon race.
2. Eat up to 8oz. of honey supplementary to your normal meals the two days prior to the race.
3. Finish eating about three hours before the start.
4. Eat a light breakfast preferably of cereals, honey and toast with tea or coffee.
5. Have good fitting clothes and shoes that will not chafe and are suitable for the conditions on the day.
6. Use lubricant (olive oil, lanolin) under arms and crotch.
7. When putting on your shoes, force your heels hard into the backs of the shoes before lacing firmly, but not too tight. To stop foot movement inside the shoes that leads to blistering.
8. Do not run much before the start. Save your energy.
9. Stretch and loosen a little.
10. Start well within your capabilities and warm up to the run as you go. Hold yourself in check. It will pay off later.
11. Do not exaggerate your knee lift. From the start, try to relax and not lift the knees higher than necessary to save the muscles lift the legs.
12. Ignore the other runners. Run at efforts that suit you.
13. Prepare electrolyte drinks for a hot day. Make the mixture weaker than directed. Add some honey.
14. Do not take salt tablets.
15. Drink water and electrolyte drinks throughout the race on a hot day. A glass just prior to the start can help.

16. Keep your body wet. Sponging is the best insurance against dehydration and high body temperatures.

17. Do not surge in the race and waste energy.

18. Do not use anti-perspirants.



How to Lace Your Shoes

Lacing is more important than most runners realize. Your shoes should be laced so that when they are tightened, they don't pull down on the sinews and metatarsals on the top of your foot, as shown below. Any other lacing tends to create pressure points across the top of the foot, which can become uncomfortable, even painful, when your foot swells. A simple matter like improper lacing can prevent the foot from functioning freely and, because it may be straining against restrictive points, the foot can be damaged.

Nutrition and More

The time to experiment with your diet is not before an important race, but when the wrong reaction won't affect your training too severely.

Carbohydrate, protein, and fat are all necessary in the balanced diet. but for those runners who are

following the marathon conditioning program, you will find that you need a higher caloric intake. It is difficult to get the extra calories from bulky foods; they are harder to digest. It is recommended to use honey, especially prior to big races, to provide the calories / energy you need without causing intestinal distress.

You should evaluate what you are eating and what you need. It pays to study all you can of the latest information about vitamins and minerals. However, some people assimilate more minerals than others; each person is unique in his or her requirements.

Natural foods are the best source of nutrition because they contain not only the natural balance of vitamins and minerals, but also the enzymes needed to use them.

Always remember that, as long as you are training, your vitamin and mineral requirements are higher than normal, and deficiencies could cause a lot of break-down in your body. You must be sure to replace the amounts that you lose if you want to continue to train and compete effectively. You can get many of the minerals you need from electrolyte drinks, but be sure to check the label before you buy them. Some quick lessons of vitamins and minerals are as follows;

Calcium: Your body contains about 3 lbs of calcium - more than any other mineral. Most of it is in your teeth and bones, but the remaining ten percent is vital. Calcium allows your muscles to contract. You can unknot muscle cramps by taking extra calcium. Without the proper amount in your system, your body takes the necessary amount from your bones to make up the deficit. It (calcium) also helps eliminate lead from the system.

Magnesium: If you are experiencing sleepless or restless nights, perhaps you are deficient in magnesium. Magnesium is the natural tranquilizer and relaxes jumpy muscles and nerves and counteracts irritability. It also aids in the digestion of protein, fats and carbohydrates.

Potassium: When you sweat, you lose salt and potassium. It is not necessary to replace the salt, but it is very important to replace the potassium. Severe potassium deficiency symptoms are nausea, muscle weakness, cramps, irritability, and finally total collapse. Potassium helps against the effects of heat. Those who do not perspire much do not need so much potassium. Those who do and take salt need double doses. Food sources that contains potassium are bananas, oranges, tomatoes, cabbage, celery, carrots, grapefruit, apples, beans, and fish.

Iron: This is a vital oxygen carrying agent in the hemoglobin. it is also reported that iron can help against depression. Vitamin C will help in the body's absorption of iron. Daily dose of approximately 18 mgs. is recommended.

Chromium: It helps the body use insulin to help regulate blood sugar, which in turn helps prevent diabetes. It also culminates to help maintain muscles contractions and eliminate cramps.

Zinc: Almost nothing happens in the human body without zinc. It assists in the making of new cells and

speeds up healing of burns and all kinds of wounds. It also assists recovery from lactic acid build up.

Vitamin A: Assists against stress, shortcuts dangerous pollutants such as benzene and dieldrin. It also keeps skin smooth, vision sharp, immune system strong and anti stress mechanisms efficient

Vitamin B1: Helps the carbohydrate metabolism to turn carbs into glucose, which fuels the brain and the muscles. It is best taken in a B-Complex form, but 5 mgs. daily helps most athletes. Any athlete that carbo-loads before a race should take sufficient amounts, which will turn all the pasta into energy.

Vitamin B2: This vitamin helps the digestion of fats. Any whole grain will do, but wild rice is best.

Vitamin B3: At least 40 biomechanical reactions in the body rely on Niacin. Its most important function involves the red blood cells carrying oxygen to all body parts. Niacin keeps the blood cells charged and they keep the body charged with oxygen.

Vitamin B6: Important for the memory as it serves as the synthesis of serotonin, a chemical that regulates memory.

Vitamin B12: It assists the nervous system in relaying messages between the body and the brain. Liver is the best source, but any animal product will do.

Vitamin B15: It increases oxygen utilization by tissues, increases content of glycogen and creatine phosphate in muscles. It also intensifies the process of aerobic oxydation during muscular activity, helps in recovery of low PH of the blood and doubles the recovery of ADP to ATP

Vitamin C: It is an all purpose antidote. So powerful that it detoxifies heroin, nicotine, alcohol and cancer causing pollutants. It also beats the heat. Increasing Vitamin C intake a week before an event in hot weather will increase your competitive edge. It also assists the bodys ability to absorb iron which in turn helps oxygen carrying capacity. A thousand milligrams with a meal will boost iron absorbtion tenfold.

Vitamin D: It's main purpose is to allow the body to absorb calcium. Only vitamin naturally produced in the body.

Vitamin E: It improves glycogen storage, which is translated as more fuel for the endurance athletes. It also improves the tone and strength of the heart muscle and protects cells from oxydation.

Training Terms

Long Aerobic Running means to be training at a fairly strong aerobic effort, not just jogging. Finishing in a "pleasantly tired state".

Easy Fartlek Running means easy "speed play". Running over undulating areas if possible and mixing in some fast stride outs, hill sprints, downhill striding, or whatever you feel like doing without tiring yourself too much. Take easy jogging intervals whenever you feel like it.

Strong Fartlek Running is similar to easy fartlek, however you should push it and finish in a tired state.

Hill Springing is used to strengthen the legs generally and the ankles in particular. Find a gentle slope and, after warming up, use a bouncing action with a slow forward momentum, pushing hard off the toes again on alternating feet.