

# **MY FITNESS JOURNEY**

**John Nuttall**

March 2007

This material relates to my experiences since starting to jog /run late in 2004, after having done nothing to directly improve my level of fitness during my entire adult life. As a senior I hope that it might encourage others in the same position to do likewise. There is a brief account of the running I have been doing, followed by sections on Heart Rate, Performance Measurement, and Injuries. I recommend the excellent book by Earl Fee [1] for those who would like more information.

I have no qualifications in the medical or fitness fields, and readers should not take action on the basis of anything they read here without first checking with an appropriate professional.

## **FITNESS HISTORY**

### **EARLY HISTORY**

As a teenager in England my only sport was Athletics (called Track and Field in North America). I was a sprinter running 100 and 220 yards, and the 4 x 110 relay. One of my highlights was when our school (Manchester Grammar School) won the Northern Public Schools mixed distance relay (440, 110, 110, 220). Our star sprinter, Alan Garner (later a well-known author of children's stories), played a large part in that race, overtaking several competitors in the last leg of the final. Later at Cambridge I helped my college (St. John's) win a university-wide relay meet.

My last performance outing as a competitive athlete was ignominious. I was representing the Cambridge second team against Oxford on the Iffley Road track in Oxford. (This track is where Roger Bannister had run the first four-minute mile two or three years earlier.) Of the four competitors in the 100 yards I was the only one using starting blocks (home made). The starter did not give me time to properly get set, and I was left at the start watching the other three tear down the track.

The coach then suggested that I try the 220 yards low hurdles, where we were short an entrant. By this time it had started raining and the dirt track was slippery. My spikes were for sprinting - they lacked the spike in the heel needed for hurdling. As a result I slipped and skidded on my back into the next lane, being lucky not to get spiked by another runner.

Apart from a very poor three mile cross-country race at age about 13, and one quarter mile (440 yards) a couple of years later that left me completely exhausted, I never ran any race longer than 220 yards. While running competitively I never trained seriously - indeed I did not know anything about how to train. Of course this was probably a good thing, because I was spending most of my time studying.

## **RETURN TO JOGGING/RUNNING**

From the end of my undergraduate years until September 2004, I took part in no organized physical activity. I walked and did various sorts of manual labour, but I did not run. My weight increased but not excessively.

As so often happens the trigger that encouraged me to begin jogging was fortuitous. For some time when walking I had noticed pain in the main joint of the big toes, which were swollen. The doctor diagnosed osteoarthritis, and suggested that I start wearing athletic shoes - he recommended New Balance. On trying a pair I found them to provide a lot of bounce, and they made me feel like running. The idea of running was reinforced when my son Geoff came to visit. He had taken up jogging fairly seriously with two of his close colleagues, and he encouraged me to start as well.

We live in the country on a gravel road, so it was easy enough to go out and start running. Usually the traffic flattens the road and it is possible find a reasonably smooth track. I found that I was unable to keep up even a modest running pace for more than about 300 yards without feeling compelled to walk for a time. However, I have never subsequently felt the slightest pain from my toe joints while running, although it sometimes reappears when walking.

During the remainder of 2004 I was able to improve my stamina to the point where I could run without stopping for a mile and a quarter. Two activities contributed to this progress. Alternate running and walking on the road (the professionals call this interval training), with a gradual increase in the distance of the runs, was one. Taking account of time off for travel and recovery from a cold, I doubt whether I was on the road more than twice a week. The other activity was to run on the spot at a moderate pace every day before breakfast. Initially I could manage one minute of this, but steadily increased the time to five minutes, including a short faster section.

## **2005**

One advantage of living in the country is that the farms are laid out on regular grid, so that in one direction there is a farm boundary every quarter mile (roughly 400 meters), and in the perpendicular direction every kilometer (5/8 mile). Thus distances are easy to estimate. Of course, these markers can be supplemented by measurements using a vehicle odometer.

During the first few months of the year I was out on the road whenever conditions permitted, in temperatures down to -14 deg C. What I did was recorded in a log. I usually did two miles plus warm up and cool down sections. Two mile times were 19:28 (once) and 20:00 upwards, depending on conditions. In April I started doing longer distances, up to five miles (occasionally) by October. Paces for these runs were usually slower than 9:30 miles for two miles, and up from there for the longer distances. Sometimes I did better, such as 18:19 for two miles with AHR = 144.5 (see Heart Rate Monitor below for AHR) and 29:00 for three miles. In April I did one mile in 8:44 with AHR = 150, a time that I barely beat for the rest of the year.

Progress during the year was significantly impeded by injury (see Injuries below), caused by attempting to sprint. I did no running for 30 days starting July 6 on account of pain in the right groin. In August I started very light workouts and eventually the pain subsided. However at the

end of October there was a pain in the left groin that did not disappear until February 2006, although it did not interfere much with distance running.

During the year I did about 210 workouts, a number that would have been greater had it not been for injury and a few weeks of travel. While progress during much of the year was not rapid, results in 2006 suggest that I had developed a useful base of endurance to build on.

## 2006 - Feb 2007

At the end of 2005 I acquired a treadmill that has led to an increased rate of fitness development. I would run different distances at a steady pace that gradually increased during the year. I also did various graded routines programmed by the treadmill that consisted of a succession of combinations of speed and incline. In 2006 I had 273 workouts, the great majority of them on the treadmill. There was a nagging injury to the right Achilles tendon caused by stepping on a small pebble while sprinting outside. Despite that, five weeks of travel and three colds, my times and AHRs for distances from 400 m to 10 km improved considerably. Here are my best times on the treadmill up to Feb. 11, 2007 for a selection of distances.

Distance	400 m	800 m	1 mile	2 miles	10 km
Time min:sec	1:26.0	3:21.1	7:19	15:47	51:47
AHR	N/A	N/A	148.5	146.0	144.3

On a high class outdoor track in California in December, suffering from a cold, using off-road running shoes, and with a standing start, I managed the following approximate times.

Distance	60 m	100 m	200 m
Time	10.5 s	17.0 s	36.0 s

My goal for 2007 is to improve on all these times. We can all have dreams.

# HEART RATE

## SIGNIFICANCE OF HEART RATE

Heart rate measured in beats per minute is an indication of how frequently the heart pumps blood through the vascular system. The flow of blood depends on the rate and also on the amount pumped each beat. An important function of the blood flow is to carry oxygen absorbed by the lungs into the blood to the various muscles in the body, where the oxygen serves as fuel to power movement of the limbs. This type of energy is called **Aerobic**.

There are two other mechanisms for energy supply (see [1]):

- **Power** that uses creatine phosphate to produce a short burst of energy for up to about 10 seconds - important for short sprints;
- **Anaerobic** that produces energy in excess of the aerobic supply for a few minutes.

For longer distances only the aerobic energy matters, contributing perhaps 76% in a 1500m race, and 97% over 10 km.

For each person there is a maximum heart rate (MHR) above which the heart refuses to operate. The MHR is unique to the person, although it is common to find a simple formula for the average MHR for people of a given age, such as

$$\text{MHR} = 220 - (\text{Age in years}).$$

It seems that this formula underestimates MHR for older people, and a more accurate version (still an average) may be

$$\text{MHR} = 205 - 0.5 \times (\text{Age in years}).$$

For a person aged 30 the two formulas give the same result  $\text{MHR} = 190$ . For a person aged 70 (such as myself) the first gives  $\text{MHR} = 150$ , the second  $\text{MHR} = 170$ , a significant difference. In any case the MHR for a particular individual will probably be different from both formulas.

It would seem sensible for a person whose heart functioning has not been checked by a professional to refrain from exercising at a heart rate anywhere close to the MHR.

Exercise equipment manufacturers and other sources often suggest heart rate ranges necessary to achieve different goals. Thus my treadmill indicates the following:

- **55% to 70% of MHR** Fat burn;
- **70% to 85% of MHR** Cardio - aerobic training.

## HEART RATE MONITOR

Early in 2005 I acquired a basic Polar heart rate monitor. A moistened transmitter strap round the chest sends a signal to a receiver on the wrist. A heart shaped icon flashes on every beat, and the current heart rate is displayed in beats per minute. One advantage of the basic

version is that the numbers are larger than for some more complicated models, and thus easier to read, especially for a person with imperfect vision. The device will also display the average heart rate (AHR) over a period between two presses of a button, and there may be a couple of other features on the latest basic model. There is a timer, but I also have used a standard wrist watch to measure times to the second.

In order to avoid incorrect heart rate readings it is necessary to make sure that the belt has not slipped downwards, and that there is sufficient moisture between the belt transmitter and the skin. Moisture is especially important at the start of a workout, before sweating has begun.

## USE OF THE HEART RATE MONITOR

When a person decides to run faster, then the heart rate increases so that oxygen is transported faster. This reaction can take place in seconds if a big increase in speed is involved. Over months or longer it is possible with training for a person to increase the amount of blood pumped on each beat, or perhaps the amount of oxygen absorbed. That means that the person can then run faster and/or longer at a given heart rate.

Here is an example of how I have used a heart rate monitor to measure my fitness levels. Each line of the table gives the average heart rate (AHR) for each mile of a 4-mile treadmill run, followed by the overall AHR. The runs occurred on the dates given with at a speed noted in miles per hour. Note that there was higher temperature and humidity on first run, which could have reduced relative performance on that run.

Date	Speed mph	Mile 1	Mile 2	Mile 3	Mile 4	Overall
Jul 13 06	6.8	137	143	145	147	143
Jan 13 07	7.0	135.5	140	140	140	138.5

There was a significant decline in overall AHR in the second run, even though it was at a higher speed. Also impressive was the constant AHR for miles 2 - 4 in the second run, as compared with a steady increase in the first run, which means increased endurance at later times. Both indicators suggest improved fitness over the six-month period.

Note that the first mile in each case had a much lower AHR than the others. This is due the fact that, even after a warm-up period, the heart rate at the start of the workout was a good deal lower than the later levels. It takes at least half a mile at speed to get close to the long term level.

It may also be of interest to note that on Feb. 23, 2007 I did a workout with results similar to the first run above. I ascribe this to the fact that for eight days from Feb. 12 to Feb. 19 I had done no training on account of a cold/cough, with symptoms that persisted to some extent during the workout. I have observed similar results after previous layoffs due to colds, and found that it takes a week or two at least to return to my previous fitness peak. Note that Fee [1, p. 30] has found that heart rate increases by 4 or 5 during a bad cold.

It is surprising that many treadmills do not seem to be able to measure average heart rate, when to me that is the most useful quantity related to heart rate.

## **IRREGULAR HEART RATE**

According to Fee [1, p. 29] many people, (including myself), have an irregular heart beat, which in most cases does not indicate heart disease. Two stress tests and a specialist examination confirm this in my case. Athletes may be particularly susceptible to this problem. After I had been running for six months I discovered, by taking my pulse, that my heart rate was sometimes irregular when resting. I could see the same effect on the heart rate monitor flashing icon. I don't know whether my heart rate was irregular before I started running.

I have found that my Polar heart rate receiver, and also the receiver on my treadmill (also made by Polar but of a different design), often fail to function properly at the start of a workout if my heart rate is irregular. After exercising for a minute or two the problem usually disappears as the heart rate increases and the beat becomes more regular. However, even well into a workout, the treadmill receiver sometime fails for a few seconds. I don't know whether this is a fault in the electronics or a genuine response to a missed beat. The Polar wrist receiver very rarely exhibits this behaviour. It could be that the memory used to calculate the 'current' heart rate is probably longer for the wrist receiver than the treadmill, and therefore less influenced by one irregular beat.

Treadmill dealers will note that a heart rate monitor will not work on some people. Before purchasing a heart rate monitor it might be wise try out a borrowed one.

## **STRESS TEST**

I have been told that everyone in Ontario, Canada is entitled to have a free stress test once a year. A stress test is designed to monitor the heart function whilst exercising. The subject walks or runs on a treadmill with a number of electrodes on the chest being connected to a computer to analyze the signals. A more elaborate version also measures the flow of oxygen through a mask over the mouth and nose (not included in the entitlement). Apart from checking for heart disease, the output of the test consists of estimates of MHR and a quantity called  $VO_2$  max .

Some stress test operators and others will tell you that the value of MHR is not of much significance. In that case the suggested ranges for aerobic training etc. mentioned above may not be so meaningful. In any case, I do know that the MHR from my last stress test was inaccurate. The test proceeds by regularly increasing the speed and incline of the treadmill until the subject cannot carry on. That produced a MHR of 159, with an incline of more than 12 degrees. However, I have exceeded 160 when running with no incline, and once registered a heart rate of 167, so that my MHR is probably a little higher than that figure. In the stress test they should perhaps have programmed more speed and less incline.

The quantity  $VO_2$  max represents the maximum rate at which oxygen can be absorbed into the blood by the lungs and used by working tissues. It is measured in milliliters of oxygen/kg of body weight/minute. It is desirable to have a higher value, but there is not necessarily a correlation between  $VO_2$  max and speed over longer distances, since other factors might act to reduce speed from its potential. The average value of  $VO_2$  max decreases substantially as age increases. Tables of  $VO_2$  max values for different ages and fitness levels are available on the Internet.

# PERFORMANCE

## MEASUREMENT OF PERFORMANCE

For some people, especially those who train on their own, it helps to maintain the motivation to keep exercising if they have a way of measuring their performance. It adds variety to workouts to include a number of different routines to be used on different days. For instance there is a standard set of distances for races in track meets, namely 60m, 100m, 200m, 400m, 800m, 1500m, 5000m, 10,000m. There is also the marathon, which is much too far for my liking.

Over the course of a month I aim to try each of these distances more than once. (During winter I must omit the short distances up to 200m since they require an outside track, being too fast for my treadmill.) My performance is measured by time (or speed) and AHR. My running log contains a record of these performances, so that I can measure my progress over time on each distance.

It is also possible to compare an individual's performance with an independent standard for each distance. Tables of age group world records are available [2], so that anyone can compare their speeds against the appropriate record. For example below is a table giving the ratio of my current best speed (usually on a treadmill except for the short three distances) to the world record speed for men aged 70, expressed as a percentage.

Distance	60m	100m	200m	400m	800m	1500m	5000m	10000m
Ratio %	78.1	75.1	74.2	70.2	69.5	73.0	73.3	73.5

Caption. My best speed as a percentage of age group world record speeds as of February 2007.

An alternative set of standards is provided by the M70 age group medal standards of the Ontario Masters Track and Field Association [3]. Compared to these standards my current speed ratios are given below.

Distance	60m	100m	200m	400m	800m	1500m	5000m	10000m
Ratio %	126	117	113	107	109	109	109	108

Caption. My best speed as a percentage of age group OMTFA medal speeds as of February 2007.

These tables allow comparison of an individual's speed for a given distance against an independent standard. They also allow an individual to compare his/her performances for different distances. Thus the OMTFA medal comparison suggests that I should most easily be able to improve my 400m time, as my current performance ratio is worse than the distances just below and just above 400m.

There appears to be a discrepancy between the standards in the two tables, particularly for the 800m. I don't know how the OMTFA standards are calculated, but the numbers suggest that the 800m M70 world record is an exceptional performance. That record is held by Earl Fee of Ontario, the author of reference [1], and the holder of numerous age group world records.

The question arises as to how performances on a treadmill should be compared with those on the road or track outdoors. On a treadmill there is no wind resistance that becomes increasingly important outside at the higher speeds of shorter distances. Neither are there hills to climb or descend indoors. I believe that, even if the start and end of a road course are at the same level, the net effect of hills is to reduce speed. To balance these negative effects of running outdoors are two possible factors. Firstly the surface outdoors is likely to be harder, whereas the flexible nature of a treadmill deck means that more energy is lost at each step. Also, the length of the treadmill deck might constrain the runner to take unnaturally short strides for fear of falling off the end.

For people my age or even a lot younger there is no point in worrying about the absolute values of your performance numbers. The inevitable deterioration of performance with age means that at age 10 I could probably have sprinted as fast as I can now. However for an older person who has started exercising after a long lay-off there are compensations. When I started more than two years ago my performance over middle and longer distances was abysmal. It was not difficult to make good progress relative to my initial level. Such progress is a good motivator to continue.

## **IMPROVING PERFORMANCE**

Once they have started measuring their performance, some people will want to find ways to improve it. The Fee book [1] has a wealth of information that runners of all levels will find useful, so I will refrain from making any suggestions on this topic.

## **INJURIES**

As mentioned above, three times I have suffered injuries associated with running with effects that persisted for months. In the first instance the pain in the right groin was such that I could hardly walk, never mind run, for several days, and my training schedule was seriously disrupted. In the other cases I was able to keep running at lower speeds, but I avoided sprinting. Even if there was some modest pain at the beginning of a workout, it often disappeared as the body warmed up.

The Fee book [1, p. 329] and Internet sites have some useful information on how to avoid injuries and also how to treat them if they do occur. Here we mention a few points.

One key to avoiding injury is to warm up properly before attempting vigorous exercise. This applies particularly to sprinting, where it is required to accelerate the limbs as fast as possible. Conventional wisdom has long stated that stretching is a major part of the warm up process, but of late another view has advocated that a dynamic warm up without stretching is more sensible. See the Fee book [1, p. 369] and [4]. The notion is to use a much more focused routine, specifically tailored to the particular activity to follow.

An injury to the groin, for example, will be less likely if that area (and no doubt also surrounding areas) has been strengthened and made more flexible. Various exercises can be undertaken with this in mind. The same applies to the Achilles tendon and other potential trouble spots. See the Fee book [1] and the Internet.

If a pain does appear that is not just normal stiffness after exercise, then it is often recommended that cold in the form of a bag of crushed ice be applied as soon as possible, several times. After 72 hours cold or some say heat can be applied, as well as massage. The Internet has information on DIY massage.

In the case of the Achilles tendon, I read [5] that the swelling (clearly evident by comparison with the uninjured tendon), was caused by broken blood vessels. There was a recommendation to massage the tendon between two fingers to aid in the dispersal of scar tissue. After several months of exercise the tendon eventually returned to more or less normal.

I have had several other minor injuries, some more or less chronic. For a week or two when I started I had a pain that felt to be in the upper part of the lower leg bone (shin). Such a pain may be called shin splints. It went away after some exercises intended to strengthen the muscle attached to the shin bone.

The feet are often a problem due to the pounding they get running thousands of steps a day. If the shoes are a little too short, or even if the toe nails are a bit too long, then sometimes the nails get bruised and become black or red. Eventually a nail might fall off after another has grown underneath. To avoid this problem make sure the shoes have enough room for the toes, that the toe nails are kept short, and possibly that the shoes are laced up tightly enough to stop the foot sliding forward on impact, thereby making the toes hit the front of the shoe (my theory).

## REFERENCES

1. Fee, Earl, "The Complete Guide to Running," Meyer and Meyer Sport (UK) Ltd. 2005. Available from on-line booksellers. An excellent book.
2. Age group world records - women  
[http://world-masters-athletics.org/records\\_output/rec\\_list\\_outdoor\\_w.php](http://world-masters-athletics.org/records_output/rec_list_outdoor_w.php)  
Age group world records - men  
[http://world-masters-athletics.org/records\\_output/rec\\_list\\_outdoor\\_m.php](http://world-masters-athletics.org/records_output/rec_list_outdoor_m.php)
3. OMTFA medal standards.  
<http://www3.sympatico.ca/ontario.masters/medstd.htm>
4. <http://www.pponline.co.uk/encyc/warm-up-exercises.html>
5. <http://www.thestretchinghandbook.com/archives/achilles-tendonitis-pt1.htm>

[Return to home page](#)