THE MASTERS ATHLETE

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Masters Games, Quality Before Quantity

Executive Director, Sports Federation of Q'ld
Guest Editorial, Paul Nelson,

Readers of The Masters Athlete might be interested to hear some of the background about, the proliferation of regional masters games which is causing concerns among state associations both in Queensland and other states.

Paul Nelson

The Sports Federation of Queensland is an independent association of seventy of Queensland's State sporting bodies whose registered participants are estimated at 850,000.

The Federation aims to advance the interests of organised sport in the community by representing sports views.

Rising member concerns, along with the experiences of the 1992 Confederation of Australian Sport "Play On" Report, the 1994 Brisbane World Masters, and Queensland Masters Games debriefings, has lead to the present attempts to develop a policy on masters sport. Calls for some centralised coordination of regional masters events in Queensland, and Australia, which are a reaction to games proliferation, have also reached the State Government. In August, the Queensland Ministerial Sport Advisory Committee sought a detailed submission from the Federation on the conduct and coordination of masters games.

Next time there is a fluid stop between reps, sets, or laps, spare a thought for the lot of the State official. Wait on, put that first thought aside. Yes, some do tend to be domineering types that take the fun out of sport but, bye and large they are very dedicated and necessary contributors. Often, due to resource limitations their lot is to simply try to hold the State programs together under the onslaught of ever fiercer competition for the participant and the entertainment dollar.

Here are some of the current concerns and experiences about Masters Games the Sports Federation of Queensland member associations have expressed in their move toward forming policy.

- Increasingly, local and State Government, tourism authorities and private entrepreneurs are making decisions to stage events without prior consultation with the State associations whose resources are then required to run them. Whilst it is difficult to conceive a coordinating body could exercise controls over such activity, a formal consultative process between, at least, state associations and State Government would be a first step in optimising the benefits of events.
- The decision of local representatives of sporting organisations to support regional games are often made based on enthusiasm, rather than the ability to resource the organisation of that sport.
- Event organisers are not subject to any form of quality assurance.
- There is no coordination of a calender of such events to prevent spreading the market so thinly that events fail through lack of participation and sponsorship dollars.
- An unreasonable demand is being placed on the volunteers and resources of State sporting organisations, if they are to be part of these events.
- Events do not promote membership of the State sporting organisations, who are expected to provide the infrastructure. Registered members of organisations are in effect subsidising the general community to participate at no cost.
- The economic benefits of such events appears to be limited to regional tourism, and not the sports themselves, many of whom only break even, with labour not costed.
- For those sports who already cater well for masters athletes, multi-sport games are a distraction from their own events, and result in a lower number of entries.
- There is an increasing tendency for the officials and volunteers of those sporting organisations that cater specifically for masters athletes to be too narrowly focussed, rather than seeing themselves as an integrated part of the sport as a whole.
- Masters Games do not encourage athletes to become involved in improving their skills and year round participation through training away from Games. Many State sporting organisations have special programs to increase the skills of masters athletes, but have difficulty in getting masters participants involved.
- The majority of medals tend to go to previous elite performers which belies the participation ethic, games promoters adopt. More equitable recognition of participation needs to be considered.
- Without prior consultation and planning, sport ends up with no opportunity to ensure the delivery of a quality product, or any control over ensuring that resources are planned for the good of the State sport organisation as a whole rather than only one part of it.

Masters sport is undeniably a major growth area and opportunity that some sports associations through their own limitations have been slow to exploit. But in their defence sport development is a difficult task and a complex interaction of resourcing (members, facilities and money) and upskilling, toward smarter organisations with highly professional, salaried and volunteer personnel.

The best support for organised sport is to become a member of the State Association. For a few dollars you can get yourself insured, perhaps a newsletter, and in so doing, maintain the structures by which mature athletes will be able to participate in well planned events that promote total sport development.

This Issue...

Editorial

Hopefully you've recovered from those late nights watching the Olympics. From Perkins, O'Neill, the Oarsome Foursome, Ferris, Freeman... to Rohan Robinson the 400m hurdler who achieved a lifetime dream of making the final and mixing it with the big boys, the memories are there.

We are on a promotional drive to increase subscriptions and invite your help. In this issue you will all find a blue subscription form. If you feel TMA is a great publication we ask you to encourage a friend to subscribe. We're offering prizes of one year free subscription, and two copies of 'Masters Sport-Training for enhanced performance' for the three readers who encourage others to become subscribers.

You may find it eaier to put in a friend's name as a Christmas gift. We'll draw the names at the end of November.

Stick with it. Don't forget if you've got a yellow subscription form in your issue it means your time is up and you need to renew. See you next issue.

Claire and Peter

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SPORTS MEDICINE

Medicals for Masters

© by Dr Peter Reaburn

The masters athlete is strongly advised to undertake a regular medical check-up by a sports physician (a qualified sports medicine specialist). This becomes more important the older we become or if you're commencing training after years away from sport.

The American College of Sports Medicine has long recognised that particular risk factors may be present in an older athlete that increase the risk of cardiovascular disease. They have devised categories that are summarised below:

- Group A: Individuals younger than 45 years who are healthy and have no major coronary risk factors (see below). This group should be exempt from medical testing.
- Group B: Individuals 45 years or older who are healthy and have no major risk factors. These masters athletes should have a maximal exercise stress test and a complete physical examination before commencing a training program.
- Group C: Individuals 35 years or older who have no symptoms but who have at least one major coronary risk factor (see below). These persons should undertake a maximal exercise test and a complete physical examination before commencing a training program.
- Group D: Individuals, regardless of age, with at least one major risk factor or symptoms suggestive of cardiac, lung, or metabolic diseases. These persons should undertake a maximal exercise test and a complete physical examination before commencing a training program and should be counselled regarding heart rates and monitored closely.
- Group E: Individuals, regardless of age, with known heart, lung or metabolic disease. Persons in this category incur undue risk if they involve themselves in strenuous exercise.
- Group F: Individuals, regardless of age, who are medically unstable and deemed high risk by their family doctor. Persons in this category incur undue risk if they involve themselves in strenuous exercise.

The Coronary Disease Risk Factors

The following factors are the major risk factors in heart disease:

1) Diagnosed hypertension or systolic blood pressure greater than 140mmHg or diastolic blood pressure greater than 90mmHg on at least two separate occasions, or on anti-hypertensive drugs.
2) Serum cholesterol greater than 5.5mmol /L
3) Serum triglyceride greater than 2.0mmol/L
4) Smoking
5) Diabetes mellitus Individuals with Insulin Dependent Diabetes Mellitus (IDDM) who are over 30 years of age, or have had IDDM for longer than 15 years, and persons with Non-Insulin Dependent Diabetes Mellitus (NIDDM) who are over 35 years of age.
6) Family history of coronary disease in parents or siblings prior to age 55.

Monitoring for cardiovascular disease risk factors is an important but small part of the overall screening process for the healthy masters athlete. While no guidelines exist for the screening, the pre-participation physical exam for the masters athlete should consist of the following:

- personal and family medical history
- joint examination - pain, range of motion, stability, and strength of major muscle groups
- spine examination - back and neck pain, range of motion
- muscle and tendon examination - elasticity of tendons, tendonitis, bursitis, muscle aches, ruptures.
- flexibility - joints used in the sport(s).
- coronary heart disease risk factors (see above).

Medical Concerns and the Masters Athlete

Apart from the coronary disease risk factors outlined earlier, a number of symptoms are a concern if seen when we train or compete. These symptoms or signs may be seen in an older person who has made the decision to commence a training program after years of no exercise.

1. Chest pain

Chest pain while training and relieved by rest is a strong indication of angina (cardiac pain). It is characterised by tightness in the centre of the chest and may radiate into the jaw, the left or both arms, and even the back. It may also be bought on by anxiety, food or cold temperatures. The masters athlete displaying these signs should visit a sports physician who may then refer them to a cardiologist for more detailed examination. Both a resting and exercise electrocardiogram may be normal with the only definite means of identifying heart disease being an angiogram.

2. Breathlessness

Shortness of breath may be produced by reduced oxygen delivery to muscles due to low fitness levels, airway obstruction, lung or cardiac disease. This symptom, particularly if combined with other warning signs, strongly suggests a visit to your sports physician.

3. Palpitations

Most of us are aware of the rapid pulse observed during exercise or when anxious. However, medical intervention is advised when the pulse is irregular or rapid and associated with chest pain, dizziness, or breathlessness.

4. Dizziness

Faintness or fainting on completion of exercise is usually due to the blood pooling in the legs or arms and is due to a drop in blood pressure. However, older people are more prone to falls in blood pressure when rising quickly from a seated or lying position. This is more likely to occur if the person is taking diuretic (fluid loss) or anti-hypertensive drugs or dehydrated following exercise. Regular fainting may be serious and warrant medical intervention.

5. Fatigue

Fatigue may be related to poor fitness, illness, or medication such as tranquillisers or beta-blockers. It may also be due to overtraining. Again, a sports physician should be contacted.

The older we get, the wiser we get. The fitter we get, the more we believe ourselves to be invincible. I hope the above goes a long way to making us more aware that wisdom need to override invincibility.

ENDURANCE

Determining Maximum Heart Rate

© by Dr Peter Reaburn

One of the best ways to monitor training intensities in endurance athletes is to check pulses. Science has shown us that training at percentages of our maximum oxygen consumption (aerobic capacity or VO_2max) will lead to improved endurance capacities.

Peter Reaburn

Furthermore, sports science has also indicated that heart rate and oxygen consumption increase linearly (in a straight line). Therefore, to train smart we can train at percentages of our maximum heart rate.

While previous articles [illegible] have examined the different heart rate [illegible]ve should train in (summarised in Table below), all these depend on us knowing our maximum heart rate for our chosen sport(s).

Zone	Name	Intensity
1	Recovery	<65% Max HR
2	Aerobic	65-75% Max HR
3	Extensive Endurance	75-80% Max HR
4	Intensive Endurance	80-85% Max HR
5	Anaerobic Threshold	85-90% Max HR
6	Maximal Aerobic	>90% Max HR

Table 1: Endurance training intensities based on percentages of maximal heart rate.

■ Different strokes and different folks

It is important to understand that maximum heart rate (and VO_{2max}) even within an individual athlete is invariably different for swimming, cycling, running, rowing etc. due to the different muscle masses being used and the different body positions involved with each sport. Generally, the bigger the muscle [illegible] rowing versus swimming) or the more [illegible]art has to work against gravity (running [illegible] swimming), the higher the maximum heart rate. Thus, our maximum heart rate for running might be the highest we can achieve due to the big muscle mass and the heart working against gravity. In contrast, our swimming maximum heart rate will be lower because of the smaller muscle mass used and the fact that we lie down which means our heart doesn't have to work so hard to pump the blood around.

Max. heart rates also differ dramatically between individuals. Some will have high ones, some low, and very few will have what the books say as 220-age. So when you're working out with someone and they say they're working at 160 and you're poking along at 140, don't worry, they may have a higher max than you. The important thing is that you are training in the right zone for yourself, not them.

■ Determining Maximum Heart Rate

While it is strongly recommended that maximum heart rates for an older (>40 years) athlete be determined within a sports science laboratory with a doctor in attendance, the experienced and healthy endurance athlete with no signs of problems (see Sports Medicine article) may decide to determine maximal heart rate themselves (see Table 2, below). This can be done by warming up well for 10-15 minutes, then doing 8-10 continuous one minute increases in intensity starting easy then gradually building till the last minute is flat out. The test should be done with a heart rate monitor on, with a buddy for safety, and be followed by a 10-15 minute warm down.

Now that we know maximum heart rate, we can refer to Table 1 and previous issues of TMA to know when and how to train in these zones. However, the heart rate zones are scientifically-based guidelines and that is all they are - guidelines. I hear too many stories of endurance athletes becoming slaves to a heart rate monitor or a heart rate that they saw in one of the many heart rate training books available. Many of these books assume each person has a maximum heart rate of 220-age, or that the level 2 training zone can be determined by taking your age from 180. The only real way to determine your maximal heart rate is in a laboratory or using the incremental test referred to in Table 2.

Sport Test	Venue		Warm-up
Running	Oval	2k jog, 4x100m strides, easy 200m jog	8x300m runs - increasing speed
Swimming	Pool	800m swim, 4x50m swims (25m push, 25 easy), 200 easy	10x100m swims - increasing speed
Cycling	W/trainer	10min spin in small gear 4x10 sec pushes, 30sec spin easy between, 2min spin	10x1min efforts increasing gears, hold cadence
Rowing	Ergo	10min easy, 4x10 sec pieces with 30sec between, 3min easy	10x1min pieces increasing rating and pressure

Table 2: Suggested sports-specific methods for determining maximum heart rates.

Factors affecting heart rates

1) *Heat:* When using these heart rate zones, it is also important to remember that heart rates will elevate when exercising in the heat. This is due to the fact that when you train in the heat, you may dehydrate slightly through sweat loss. This lowers your blood volume which results in the heart having to pump more quickly and harder to get the same amount of blood and oxygen to the working muscles. Secondly, when training in the heat, blood is diverted to the skin to help offload the heat generated in the muscles. Again, the heart has to work harder to keep the amount of blood pumping to the muscles to give them the oxygen they require to maintain speed.

Research suggests that heart rates during submaximal work increase by 1.4% for each degree above 21 degrees Celsius. For example, at a constant pace, a heart rate of 140 at 21 degrees will become 160 at 31 degrees.

2) *Fatigue*: Sometimes we have trouble getting the heart rate up or keeping it down for a certain pace. While in inexperienced athletes

continued on Page 4...

The Team

PETER REABURN - Editor

CLAIRE REABURN - Co-ordinator

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EDITORIAL CORRESPONDENCE

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***PHONE (07) 3358 4654* FAX (07) 3358 1351**

SPORTS NUTRITION

To Supplement or Not to Supplement

© by Holly Frail

The magic pill or tonic - will it make me stronger, leaner, fitter, faster, healthier.... or just poorer? These are the questions constantly asked by masters athletes searching for potential performance enhancement.

Holly Frail

The age old adage "if a little is good then more must be better" has been challenged often by the scientific community, yet some of us still line up at the supermarket, pharmacy or health food store to hand over our cash to a multi- billion dollar industry. However, much of the promotion of these supplements is based on anecdotal evidence from other athletes. There is also increasing evidence that wanton pill popping may lead to potentially dangerous imbalances and toxicities. Let's look at the supplement issue from a rational scientific viewpoint.

Why master's athletes use supplements?

- They feel they eat poorly
- They have a busy lifestyle
- They consider their needs for training or competition are greater than can be achieved through food
- They are looking for performance enhancement

The first two concerns are easily 'fixed' by optimal individual planning of your training and competition diet by a qualified professional (sports dietitian) with the correct safe supplementation, if necessary.

With regards to performance enhancement, controlled studies have failed to show any convincing evidence that supplements have a role in enhancing performance, decreasing rate of injury or hastening recovery in healthy masters athletes - except when reversing a pre-existing nutrient deficiency. Studies have shown that dietary deficiencies are quite uncommon in this population except in those who restrict their food intake in order to maintain a low body weight such as lightweight rowers or distance runners.

Two big assets that your training diet already should provide are a higher energy intake than a non-athlete (therefore more nutrients) and a wide variety of foods. There is, of course, always the possibility of a "placebo" (psychological) effect of supplementation - perhaps you want to "believe" you'll go faster after all the money that you've spent?

■ Possible Supplementation?

There are certain situations that may increase our requirements or possibly increase the risk of deficiency:

- dieting, fad diets or chronic undereating
- eating disorders
- skipping meals or making poor food choices
- vegetarianism
- pregnancy and breastfeeding
- altitude training
- heavy pollution
- food allergies/intolerances
- certain medical conditions or medications
- travelling
- heavy smoking and drinking

If you are deficient in important nutrients, the result may be early fatigue, increased susceptibility to illness and infections, and slow recovery from illness and injury - all things we want to avoid! Vitamins do not provide energy (kilojoules). They do, however, help produce energy from fuels such as carbohydrates and fats, assist in the production of red blood cells, and promote tissue repair.

Vitamin A and beta carotene	- yellow, red and orange fruit and dark green leafy vegetables, eggs, dairy products, margarine and oils and liver.
B vitamins	- wholegrain bread and cereals, rice and pastas, wheatgerm, lean meats, poultry, liver, eggs,dairy products, green leafy vegetables, yeast and vegetable extracts, nuts and pulses.
Vitamin C	- Citrus, tropical and berry fruits, capsicum and green vegetables
Vitamin D	- fish, liver, eggs, milk and milk products, margarine.
Vitamin E	- wholegrain bread and cereals, wheatgerm, polyunsaturated fats, liver, eggs, nuts.
Vitamin K	- liver, green leafy vegetables, cheese, butter.
Zinc	- meat, seafood and eggs. Lesser sources cereals, legumes, wheatgerm
Selenium	- milk, eggs, meat, seafood and some vegetables and wholegrains

Table 1: Best vitamin and mineral sources

■ The important ones

Athlete's bodies rely heavily on the water-soluble vitamins i.e. C and B-complex. Vitamin C plays an important role in resistance to infection and dealing with the stress of training, competing and working. A major function of the B vitamins is in energy metabolism for muscular work. When you consider the best sources of these nutrients (see Table I above) then it is unlikely that an older athlete who consumes good sources of carbohydrates and adequate protein would suffer a deficiency.

In the case of the common cold, there are many factors that determine your individual susceptibility. At certain times of the year or in stressful situations, some people like to supplement themselves with vitamin C. This may reduce the severity or length of time that you are ill, but be careful not to stay on high doses for prolonged periods as you may become dependent or suffer from other overdose symptoms. Remember to choose unflavoured and uncoloured versions as well. Don't forget that things such as garlic may have some natural antibiotic properties that are useful.

B-complex vitamins have been recommended to some women for assistance with fluid retention and pre-menstrual symptoms. Once again, a low dosage multi-supplement is the safest. If training and competing while pregnant, speak to your doctor with regards a supplement of the B vitamin, folic acid. S[illegible] vegetarians may require a vitamin B12 supplement. Table 2 below offers some useful tips to ensure you reduce the need for supplementation.

- eat a wide variety of fruits and vegetables - as colourful as possible
- choose fresh products, and where possible those in season
- don't overcook vegetables - especially if using frozen varieties
- choose wholegrain carbohydrate choices (or those that are fortified)

Table 2: Hints for "vitamising" your day

■ The risks of too much.

While a moderate excess of the water solubles (which are not stored in the body) will usually be excreted via the urine, prolonged use of megadoses (>50-100 times the recommended daily intake or RDI) may lead to dependency on a larger amount of the vitamin, or could impair the action or absorption of another related nutrient. Large doses of vitamin B6 for example, may lead to peripheral nerve damage. Megadoses of niacin (vitamin B3) which are sometimes prescribed for high

Endurance continued from Page 3...

this may be due to poor pacing, these findings may also be a sign of the muscles and/or heart being fatigued. This would suggest that the session should become an easy recovery session rather than the planned harder session. Getting the most out of quality work means we need to be fresh, not fatigued. We could also enhance the recovery process by having a massage, alternating hot and cold showers, having a spa, and pigging out on those high glycemic index foods (see Issue 3 TMA).

Hope you all got inspired by the Olympics like I did. How easy did that Ethiopian woman marathoner look? Conversely, how bad did that tough little Korean guy who hung on for second in the men's marathon look?

cholesterol, may cause skin rashes, flushing, nausea and even organ damage. Excessive vitamin C may also cause diarrhoea - leading to a loss of many other important macro-and micro-nutrients as well as dehydration.

In contrast, fat-soluble vitamins (particularly vitamins A, D, and K) are stored in the body and can produce toxic symptoms such as organ damage, hair loss, lethargy, and gastro-intestinal symptoms when taking in excess quantities. It is virtually impossible to overdose from food sources. Overdosing usually occurs through taking large amounts of single supplements or doubling up through various combinations of tablets. Older athletes may be particularly susceptible to vitamin A overload. The yellow/orange hands and feet you may suffer from after consuming large amounts of beta-carotene (the precursor to vitamin A) from fruit and vegetables will vanish when your intake is reduced. However, recent research has suggested that an excess of beta-carotene supplements may lead to increased incidence in certain types of cancer.

> "...CONTROLLED STUDIES HAVE FAILED TO SHOW ANY CONVINCING EVIDENCE THAT SUPPLEMENTS HAVE A ROLE IN ENHANCING PERFORMANCE, DECREASING RATE OF INJURY OR HASTENING RECOVERY IN HEALTHY MASTERS ATHLETES..."

Zinc is a trace element closely involved with immunity and the healing process. If, in times of illness, you rely on a zinc supplement, ensure that it is of low dosage as excess will interfere with your body's balance of other nutrients such as copper, as well as lowering your HDL-cholesterol levels (the good guy!) and leading to impaired immune response.

Antioxidants

Current research has focused on the role played by antioxidants in health and sporting performance. Some studies suggest that these are involved in the removal of free radicals from the body preventing oxidation of cells which may cause damage to tissues such as ageing, heart disease and cancer. A variety of antioxidants that have been identified include vitamin C and E, beta-carotene and selenium. These natural antioxidants may be found in a range of colourful fruits and vegetables, herbs and spices, wheatgerm, nuts and seeds, legumes, olive oil, green tea and red wine - all good and interesting components of a healthy training diet!

In athletic circles, supplements, such as vitamin E have been studied in relation to preventing muscle soreness after intense exercise at altitude and in heavily polluted environments. While the research is very promising, there is no consensus on how much of these antioxidants you should have or whether supplements are indeed the answer. It appears that a wide range of the above-mentioned sources is the best choice, as they may have an additive effect in their action that cannot be replicated by the single anti-oxidants often provided by tablets. If your diet is too low in fat then you can miss out on your best sources of vitamin E. Take note also that intakes of > 200 micrograms of selenium per day may be toxic.

Conclusion

The best response to any of your concerns is to encourage a varied and balanced diet or to add a low dose multi vitamin/mineral supplement that provides not more than the RDI for each nutrient. In the absence of a true deficiency this "insurance" policy is the most practical and safe investment for both good performance and good health - unless you are keen to act as a human 'guinea pig'! It is a good idea to take a supplement when travelling to compete, particularly when you are unsure of the local food supply.

If in doubt, contact a nutrition professional (sports dietitian or sports medicine doctor) who does not have a vested interest in selling the products. You may be interested to hear that a recent international conference summarising all the longitudinal studies on diet could only conclude that people who ate more fruit and vegetables reduced their risk of heart disease and cancer. The key is as we grow older we need to eat smarter - variety is definitely the spice of life and secret to good performance!

Question and Answer

Is 'maximal heart rate' the same as 'maximum heart rate'?

For our purposes, yes. However, some sports scientists may suggest that maximal heart rate may be the one you can only achieve on a particular day, even when tired or leg heavy or unmotivated. It may not be your maximum heart rate which is the absolute highest heart rate you could achieve if you were fresh and highly motivated. That is, your maximal heart rate may change according to how you feel, while the maximum heart rate is set and will only change with age. The difference is minimal and is really only a matter of semantics.

From the Research

A Pulse ain't a Pulse

Most of us use heart rate measures at some time in training. Some of us use heart rate monitors, some measure at the wrist or neck. If you use the wrist or neck, this research will give you a shock.

Fifty-nine (43M, 16F) young (24.7 yr) subjects were instructed on how to take carotid (neck) and radial (wrist) heart rate measures. They were then asked to measure heart rate using either method over ten-seconds during the following conditions - rest, cycling at low intensity (about 60% max heart rate) and walking on a treadmill.

At the same time, heart rate was measured using an electrocardiogram (ECG). The average errors between the ECG and the subject-reported heart rates were: at rest - 8.7±8.4 beats per minute; during cycling - 26.5±24.6 beats per minute; and during treadmill walking - 20.6±20.8 beats per minute. Incredibly, the range of errors was 0 to 103 beats per minute. The results strongly suggest that palpating (feeling) a ten-second pulse may not accurately reflect actual heart rate.

Ten second pulse palpation does not accurately measure heart rate at rest or during exercise. Dunbar, C.C. & G.M. Balanos. Medicine and Science in Sports and Exercise 28(5), S183, 1996.

Muscle fibre types - does age affect them?

Most of us would be aware that fast twitch muscle fibres make us sprinters and slow twitch fibres make us endurance beasts. We can blame or thank our folks for which type we are born with.

Recent research from David Costill's Lab in Indiana examined the fibre types of 28 former champion distance runners 20 years after they were first biopsied as champion distance runners from the early 1970's. In those twenty years, seven had become non-exercisers, 10 were running for health, and 11 were still training hard.

The researchers found that the percent of slow twitch fibres increased in all the former runners, especially the untrained and health runners, with a smaller increase observed in the highly trained guys.

Interestingly, the size of both the fast and slow twitch fibres decreased over the twenty years, possibly explaining the slowing of speed that comes with age. This decrease in muscle fibre size is also a great argument for older endurance athletes to do weight training in order to hold onto fibre size.

Skeletal muscle characteristics among distance runners - a 20-yr follow-up study. Trappe, S.W. et al. Journal of Applied Physiology 78(3), 823-829, 1995.

RUNNING

Distance-Running Speed

© by Dr Colin Solomon

In competitive middle- and long-distance running, the ultimate goal is to cover the race distance in the shortest possible time. This goal dictates that running SPEED is the single factor determining success.

For distance running, the primary issue regarding speed is that the running speed must be maintained for the distance or duration of the event. Therefore, having high absolute running speed is of no advantage if this pace can not be kept at a relative high level throughout the event. Hence, when training the physiological systems controlling running speed, it is imperitive that the emphasis be on sustainable speed. This emphasis on sustained speed is achieved by manipulation of the duration of the intervals and recovery periods within the speed training session (Examples below).

Rationale for Running Speed Training:

The rationale for the use of speed training is that it allows the physiological mechanisms that control running speed to be adapted to function at the level required to produce the desired running speed.

The primary mechanism that requires adaptation is energy transfer. At higher speeds, the contribution of anaerobic sources is increased while the aerobic system is stressed.

Hence, speed training will overload the aerobic system and also utilize a percentage of the anaerobic system. The relative contribution of each system is determined by the distance and speed of the intervals.

In addition to the energy transfer adaptations, speed training adapts the biomechanical components of the running action. The nerve patterns used during running change as a function of running speed and these movement patterns must be trained.

The feeling of being uncoordinated at high speed can be reduced with training. Similarly, following speed training the running action can become more efficient, therefore using less energy.

Principles for Running Speed Training:

Although there are differences in the actual speed training sessions utilized for different distance events, the principles underlying speed training are common for all events.

- Use speeds equal to, and higher than race speed (sessions run at speeds lower than race-speed are considered endurance training).
- Use short recovery periods to train for speed maintainence, and long recovery periods to train for high absolute speed. The specific speeds and recovery periods used will be governed by the event distance (refer below).

Integration of Running Speed Training:

Speed training can be introducted into the training programme at any phase. For the untrained or recreational athlete an aerobic base (minimum of 6 weeks) should be completed prior to any high-intensity or sustained speed training. This base period will decrease the magnitude of the transition to speed running and also aid in injury prevention. Only one speed session per week should be done for 4-6 weeks then two sessions per week can be done for the following 4-6 weeks. A maximum of three speed sessions per week is recommended.

High-intensity speed training should not be performed for extensive continuous periods of time (over approximately eight weeks), as full recovery may not be obtained, and over-training can result.

Methods for Speed Training

The examples given are for the events at the extremes of the middle- and long-distance running range (1500m and 42.2km). Training sessions for the distances between these extremes can be designed to fit relatively within these extremes.

Intervals:

Interval training consists of a series of speed running intervals which cover a set distance or time. Similarly, the intervals are separated by a set recovery distance or time period. Both the interval and recovery periods can be manipulated to apply to both the specific requirements of the event, and to the training phase (Refer below).

Example

1500m;

Number = 10, Interval Distance = 100m,
Recovery = 360sec

42.2km;

Number = 6, Interval Distance = 2000m,
Recovery = 60sec

Fartlek:

A Fartlek session consists of continuous running, during which the running speed is increased and decreased for varing distances or time-periods. An example might be sprinting 100m between light posts, jogging 300m to the corner then pushing strongly for 400m to the parked car etc.. To gain the most from this form of training, the variation of the session must be maintained.

Hill Training

To utilize a hill session for speed training, the hill interval must be short enough to allow it to be run at race-pace or above, irrespective of the slope of the hill. It is useful to utilize two different hill distances and slopes for alternating sessions (refer below), as this will allow differences in running speed.

Example

1500m;

Slope = 30 degrees
Number = 5, Distance = 100m,
Recovery = return jog

42.2km;

Slope = 10 degrees
Number = 8, Distance = 300m,
Recovery = return jog

Rules for Speed Training:

- Utilize 5-10m at the start and end of each speed interval to gradually increase and decrease speed. Avoiding abrupt starts and stops will reduce the risk of injury.
- Avoid loose or slippery running surfaces that allow backward foot slippage and possible injury.
- Be aware that synthetic tracks are constructed on a "hard" base which combined with the high impact of speed running can result in injury.
- Use light training shoes, racing flats, or spikes for speed sessions, they will aid moving the foot-fall more to the fore-foot.
- Speed sessions can be used to train the biomechanical components of running. Factors including arm-swing, knee-lift, and stride-length should all be increased during high-speed running.
- Racing itself is a form of speed training and therefore must be integrated into the training program.
- There are no absolute rules governing the length of the interval or the recovery periods. The length of both the interval and recover periods should be varied within a single session.

Example

Number = 2, Interval = 800 m,
Recovery = 60 sec and
Number = 4, Interval = 400 m,
Recovery = 30 sec and
Number = 6, Interval = 200 m,
Recovery = 15 sec

Older runners need speed to stay fast - do it to fire those fast twitch fibres!

Get Set!

Calendar of Events

OCTOBER 19 - 27 1996

Honda Masters Games
Alice Springs, N.T.
Contact: 1800 658951

OCTOBER 26 - NOV 3 1996

The Malanda Queensland Masters Games
Gold Coast, Qld.
Contact: (07) 5581 6052

NOVEMBER 10-15 1996

Australian Veteran Cycling Championships
Wagga Wagga, NSW
Contact: (02) 7642 555

FEBRUARY 1 - 9 1997

New Zealand Masters Games
Wanganui, N.Z.
Contact: +64 6 345 4555

MARCH 27-29 1997

AUSSI National Swim
Homebush, NSW
Contact: (08) 344 1217

JUNE 23- 29 1997

Pan Pacific Masters Swim
Maui, Hawaii
Contact: (08) 344 1217

OCTOBER 24 - NOV 1 1997

Australian Masters Games
AIS, Canberra, ACT
Contact: (08) 344 1217

AUGUST 9-22 1998

Nike World Masters Games
Portland, Oregan, USA
Contact: (08) 344 1217

Did You Know?

- Murray Rose set 15 world records in his swimming career.
- Australian Swimming refused to select Murray Rose for the 1964 Olympics because he missed the Australian trials. This, despite the fact he broke the 1500m World record at the USA and Canadian Nationals that year.
- Michael Johnson has won 54 consecutive 400m races and his last defeat was in 1989.
- In 1991, Australians smoked 34.3 billion cigarettes, inhaling 343,160 kilograms of tar.

Athlete Profile

Name:
Leanne Herriman (nee Francis)
Age:
39 yrs

Sports/Events:
Swimming. Also played squash for a while but a bad knee put me out of that.
Occupation:
Past: Student
Present: Relief teacher, swimming coach/teacher, part-time student, business partner, wife and mother (but not necessarily in that order!)
What do you enjoy about masters sport?
I enjoy the challenge; I like to keep fit, but the main thing about masters sport is the friendship and comradrie that exists.
What motivates you to participate?
I like to try to better myself (in times) and try new distances (eg. 200m fly - haven't done one for 25 yrs) I like the adrenalin rush, but I could do without the bats in the stomach!
How do you keep yourself motivated? My main aim is to stay fit and, because I love to eat and drink, I like to keep the weight off. I set myself goals and try to achieve them. At the moment the prospect of a new age group next year is a shining light at the end of the tunnel.
Favourite training session?:
I enjoy a number of different sessions - 50s at race pace; broken 200s and 400s; heart rate 100s.
How often do you train?:
5 mornings a week.
Do you train under a coach, with a group of friends, or by yourself? Why?
I now train under a coach - Gary Ireland. For 4 yrs I trained by myself and it became hard to push myself as well as being lonely. Now I train with a squad, have a ton of fun, keep fit and get told where I'm going wrong. It's so much better training with a group - it keeps me motivated and sessions become a challenge.
Person most admired and why?:
I don't admire one person, however, I have a great respect for elite athletes, knowing the sacrifices and the pure hard work they have to do. The people I really admire are the older people in masters swimming who have only learnt to swim in recent years and who will give anything a go. They truly have courage, since a lot had to conquer a fear of the water; they deserve all the accolades they get!
Other interests/hobbies:
My son's soccer and both of my boys development. I love to cook, read and have an interest in our environment and its preservation. I go fishing occasionally, but put the men to shame, so I leave it up to them (to protect egos).

Your most memorable moment in sport?:
I would have to say my selection in the 1972 Olympic Team. But before that was coming second to Shane Could in 1969 in 100 freestyle. She beat my by something like 10 seconds, but I was rapt - it was one of the first medals I won. I also was a member of 4 x 100 medley relay team that broke a C'wealth record in February 1972.
Your most memorable moment in life so far:
The birth of my children (even though this sounds corny), it was definitely an emotional and memorable moment. On a sad note, the death of my Mum in 1972 is something I find hard to forget.
Favourite movie:
Monty Python's Quest for the Holy Grail (you can tell I'm a 70's child); I also enjoyed Ghost, Baby's Day out and Braveheart.
Favourite book:
The Celestine Prophecy - James Redfield; The Women's Room - Marilyn French and all of Bryce Courtney's books.
Favourite 'bad' foods:
Nice crisp hot chips, boiled fruit cake and chicken with the skin on. Not to mention rum and good wines (doesn't matter what colour!). Also garlic bread.
Favourite 'good' foods:
Love pasta, rice and salads (of course without creamy sauces!)
Philosophy on life:
Always treat others the way you would like to be treated. Enjoy life - give it your best shot. Meet all challenges with strength and dignity.
Advice to masters athletes wanting to improve?:
Never give up. Do things gradually and listen to your body. Unfortunately these days, our bodies tend to do a lot of talking. Find what you enjoy and go for it.
Other Comments:
Do your best at everything you do. You can't do better than doing your best. Keep on smiling - a smile costs nothing.

Flexibility For Rowing

© by Ivan Hooper

Like pianists tuning their instruments before striking the ivory, rowers who stretch before training are better prepared for practice. Flexible muscles and joints, warmed by stretching and flexibility work respond better to training and resist injury more effectively than tight, stiff muscles and joints left "cold" before exercise.

Why Stretch?

Flexibility not only assists in avoiding injury but also enhances performance in the boat. The ability of muscles to exert force is enhanced by stretching as is the ability to attain correct technique and body positions in the boat. Muscular, joint or nerve tightness of key areas such as the lower spine, hips and hamstrings, can significantly alter an athletes position throughout the stroke.

Athletes that begin the session without warming-up and stretching spend the first 10-15 minutes getting comfortable and reaching "full length", perhaps even longer during the colder months. Athletes that are warm and stretched are able to perform at their best right from the start and receive the full benefits of the technical exercises at the beginning of the session.

Who Should Stretch?

Everyone needs to perform some warm-up and stretching program. Both increasing age and recovery from injury lead to a decrease in flexibility and therefore the need for stretching can be even greater in the Veteran rower.

Principles of Stretching

The basic principles of stretching are

- warm up prior to stretching
- stretch before and after exercise
- stretch gently and slowly
- stretch to the point of tension but never pain

The tendency to stretch harder than necessary should be avoided. Stretching into pain can result in microscopic damage in the muscle that leads to scar formation. This increase in scar tissue will actually decrease flexibility and increase the chance of injury, particularly in the veteran rower who may have years of accumulated scar tissue.

How To Stretch

Veteran rowers tend to train early in the morning and are often restricted in the time they have to complete the session before rushing off to work and / or family. The lack of incentives to warm-up and stretch at this time of the day are understandable - but not excusable.

Prior to each session, athletes should conduct an easy warm up of 5 minutes on the ergometer or jogging. This should bring you to the point of a light sweat. Once warm, a series of stretches from the ones illustrated should be completed for approximately 10 minutes.

Once the training session is completed it is just as important to stretch as you warm-down. The same routine of stretches can be used as part of the warm-down. This helps to maintain the muscle length and enhance recovery after hard sessions.

Stretches should be performed in a slow, careful manner, without pain, with the hold position maintained for 15-20 seconds for three repetitions. Breathe normally and stop if you encounter pain rather than tightness. Factors such as age, general conditioning or previous injury mean some people will require more frequent or lengthy stretching than others. If in doubt, it doesn't hurt to repeat a stretch but remember to avoid overstretching. If you know that you have a particular tight or stiff area, stretching on the days that you don't exercise will improve your flexibility more quickly. Little and often is a good rule of thumb to remember.

Areas To Focus On

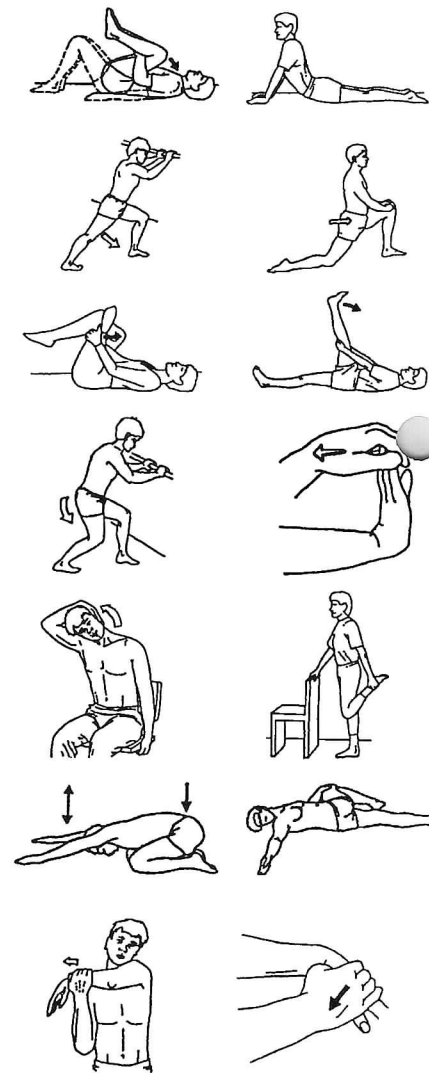
In any stretching program designed for rowers it is important to focus on the areas that are most commonly injured during rowing, as well as the areas crucial to good performance. The key areas to focus on are

- lower back and hips
- quadriceps
- hamstrings and the associated nerve tissues
- calf and ankle
- posterior shoulder
- forearm and wrist

Remember

Each person has specific requirements depending on individual flexibility, the number and intensity of training sessions and past injuries. The above are general guidelines only. If you have any doubt about your flexibility program, or lack there of, or have an existing injury, please consult your local physiotherapist.

Ivan is a practising physiotherapist , former Australian Rowing representative, and now coaches a number of elite rowers.



Stretches for Rowing

TRIATHLON

Nutrition - What and When to eat.

© by Greg Reddan

■ What to eat?

The best approach to nutrition is to 'stick to the basics'. The best basic dietary guidelines for Australians are those produced by the National Health and Medical Research Council in 1992. These serve as an excellent foundation for the more specific requirements of the triathlete and need to be emphasised from the point of view of total health:

1. Enjoy a wide variety of foods.
2. Eat plenty of breads and cereals (preferably wholegrain), vegetables, legumes and fruit(s).
3. Eat a diet low in fat and, in particular, saturated fat.
4. Balance a nutritious diet and physical activity to keep your weight within a healthy range.
5. If you drink alcohol, limit your intake.
6. Eat only a moderate amount of sugar and foods containing added sugar.
7. Use salt sparingly and choose low added salt foods.
8. Drink plenty of water.
9. Encourage and support breastfeeding.

Two other guidelines should also be used in conjunction with these to maximise health.

10. Make sure you eat foods containing available calcium, particularly females.
11. Make sure you eat foods containing available iron (particularly females, vegetarians and athletes).

Many triathletes only focus on nutrition when it comes to competition and look upon carbo-loading as a great time to 'pig out'. I remember the carbo-party before the Hawaiian Ironman when athletes would gorge themselves in an eating frenzy before the race, almost as a reward for all the hard training.

However, the more sensible triathlete knows the importance of nutrition in terms of total health and long term performance. Eating well whilst training is imperative to ensure we get the maximum return from our efforts.

■ Suitable Body Weight and Body Fat Levels.

Triathletes, especially the elite, tend to be lean with good upper body muscle development. It is a definite advantage to have low body fat levels when we have to propel our body over long distances, especially when cycling and running. Measurement of body fat is normally performed using a number of skinfolds. Reasonable ranges for triathletes are 50-80mm for women (7 folds) and 35-60mm for men (8 folds).

To achieve a suitable fat level, try the following:

a) avoid fad diets;

b) reduce total daily energy intake by approximately 2000kJ to lose approx. 0.5 kg of body fat per week;

c) maintain a high carbohydrate diet and use mainly complex carbohydrates for maximum value (e.g. wholemeal bread, rice, fruit, vegetables);

d) minimise fat intake;

e) avoid or reduce alcohol consumption;

f) ensure adequate consumption of protein is maintained;

g) drink plenty of fluids, especially water.

■ Achieving Nutrition Needs

A triathlete requires an increase in the normal requirements of nutrients, including protein, carbohydrate, vitamins, minerals and water. While this can be achieved by a high energy intake and eating a wide variety of nutritious foods, there are still certain nutrients that need extra consideration.

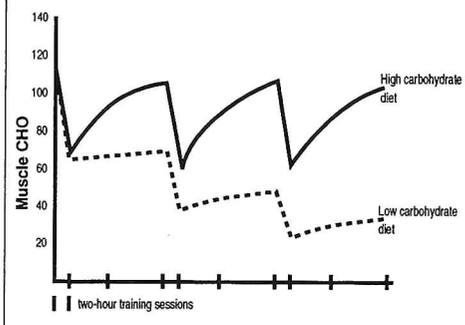
FLUIDS

We need to become very aware of the amount of fluid lost in sweat in training and continually replace it to avoid dehydration. This can be done by weighing before and after training - a loss of 1 kg indicates a loss of 1 litre of fluid.

CARBOHYDRATE (CHO)

We need to regularly consume carbohydrate to replace muscle glycogen used in each training session. The diagram below illustrates the need for a high carbohydrate diet in maintaining muscle glycogen stores.

We should take in at least 50-55% of our diet in carbohydrate to fulfil our energy requirements. When loading for a race or recovering from a long training session, this may need to be increased to 60-70%.



A high CHO diet maintains high muscle glycogen levels while a low CHO diet depletes glycogen stores rapidly.

We need to choose those CHO foods which are rich in other nutrients (vitamins, minerals and fibre) such as wholegrain breads and breakfast cereals, rice, pasta, fruit rolls, muffins, potatoes, fresh fruit and vegetables.

PROTEIN

Protein requirements increase when training heavily. Protein contributes up to 10% of the energy required during aerobic exercise, thus the protein needs of a triathlete training heavily may be double those of a sedentary person. (1.2-1.6g/kg body weight for most triathletes and 2g/kg for adolescent triathletes).

Some triathletes overlook protein foods as they become pre-occupied with high CHO foods and remove any foods containing fat from their diet. There is no need to purchase protein powders. We should choose low fat protein foods such as lean red meat, skinned poultry, low fat milk, yoghurt and cheeses, pulses and tofu.

MINERALS

Iron

Iron deficiency is reasonably common in triathletes. The usual causes are inadequate dietary iron intake and reduced iron absorption. We need to ensure a high intake by eating foods such as red meat, chicken, some seafood (oysters, mussels, sardines). The presence of such foods enhances iron absorption, as does Vitamin C. Tea and coffee reduce iron absorption and should not be consumed within an hour of meals.

Calcium

Calcium is required to protect the strength of bones that are involved in pounding actions during running. A chronically low intake of calcium can increase the risk of low bone density, especially in amenorrhoeic females. This may lead to stress fractures in young athletes and early onset of osteoporosis. Low levels of estrogen are also related to low bone density. Thus, adolescents and females should concentrate on high calcium intake. Low fat dairy products are the best source of calcium - at least two serves should be eaten each day. e.g. skim milk on cereal, low fat yoghurt as dessert. Other good sources are sardines and tinned salmon.

VITAMINS

It is unlikely we will develop a vitamin deficiency if eating a high energy and nutritious diet that includes plenty of whole grains and a variety of fresh fruit and vegetables. Athletes at risk are those on very restricted diets and those with low energy intakes. These individuals should be assessed by a sports dietitian rather than resorting to vitamin pills.

■ WHEN TO EAT - MAXIMISING RECOVERY

To be a top triathlete today requires the ability to train frequently and hard, to race regularly, and recover quickly. Recovery can be accelerated by strategies including massage, relaxation and sleep and nutritional practices such as those below.

Studies have shown that when carbohydrate is eaten immediately after exhaustive exercise, there will be rapid resynthesis of muscle glycogen - twice as fast compared to eating carbohydrate two hours later. We should eat 50-100g of carbohydrate (sports drink, bread) within half an hour of finishing a session.

We also need to plan a drink schedule after heavy training sessions to rehydrate sufficiently. Sports drinks containing electrolytes will achieve faster restoration of fluid balance. As they contain some carbohydrate, they have a dual advantage in the process of recovery. There is also some evidence that early intake of protein can also speed up recovery. We need to continue to take in fluids until we start passing clear urine at regular intervals.

continued on Page 10...

SWIMMING

Ten Tips To Prevent Swim Injuries

© by Dr Peter Reaburn

My biggest fear as a masters athlete is injury. While I've had 25 years of injury-free swimming, I'm finding the older I get, the more I have to "listen to my body" and back off when those shoulders start sending painful messages to the brain.

As both a sports scientist and member of the AUSSI Masters National Coaching Panel, I now have an obligation to pass on information to other masters athletes. This article reviews the ten most correct ways to prevent those dreaded swim injuries.

1. Musculo-skeletal Screening

Prior to picking up the training as summer hits, you should pay a visit to your local sports physiotherapist. They will examine you for flexibility limitations, muscle imbalance, poor movement patterns and postural problems. This screening only takes 10-15 minutes and may identify problems that can be rectified before injury occurs.

2. Stretching

Most of us older athletes know the importance of stretching as part of our warm-up. However, as we age, our flexibility tends to decrease. This strongly suggests that masters athletes / swimmers should do stretching sessions at home or at the pool that take longer than our warm-up stretches.

Increasing the range of motion of the shoulder joint allows us to exert more force on the water for longer, thus improving our efficiency. Conversely, tightness in one joint, such as the hips in kicking, may cause the lower back to work more, possibly leading to poor efficiency and injury. Your sports physio can advise you.

3. Strengthening

Research has shown conclusively that older athletes lose muscle mass and strength, thus contributing to reductions in force-producing ability and speed. To improve swim performance, I strongly suggest weights training, particularly for the older performance-oriented swimmer. In terms of injury prevention, it is important in swimming to have a stable trunk and shoulder blade when applying force to the water. The gym allows us to develop specific muscle strength and swimming specific movement patterns. I cannot emphasise enough to seek expert advice here. Weight training is a science these days, not just grunt. Speak to your coach about who to see or contact your state branch of the *Australian Strength and Conditioning Association* for contacts.

4. Correct Technique

The aim of correct technique is to minimise resistance, maximise propulsion, and swim efficiently with no wasted energy. Good coaching, drills training, and an ability to concentrate on technique at all times is crucial. Early season work should emphasise correct technique before the hard work comes. Poor technique and hard work while fatigued leads to injuries.

5. Include some Backstroke

Butterfly, freestyle and breast stroke each place a high load on the shoulder muscles that rotate the shoulders inwards. Long distances and hard sessions really place a lot of strain on those muscles, sometimes causing "rotator cuff tendonitis" or swimmers shoulder. Backstroke between sets or as part of a warm-down help work the muscles that externally rotate the shoulders, thus giving those internal rotators a bit of a break.

> "MAN I HATE KICKING! HOWEVER, KICK SETS NOT ONLY DEVELOP KICKING ABILITY, THEY GIVE THOSE SHOULDERS A BREAK."

6. Kicking

Man I hate kicking! However, kick sets not only develop kicking ability, they give those shoulders a break. Physiotherapists seem to be suggesting that kicking be done with arms crossed on the kickboard or no board used at all (maybe with flippers - I love kick sets with flippers!). These strategies reduce the load on the shoulders.

7. Massage

The "laying on of the hands" by a masseur, partner or your own can be a tremendous way to reduce tension in those tight neck, upper back, arm and shoulder muscles.

8. Ice

Pain in joints or muscles generally means damage to connective tissue. The treatment for damaged connective tissue is to reduce swelling by icing the area as soon as possible after training. If pain persists, see your sports physician or sports physiotherapist.

9. Develop your Sports Medicine Network

Talk to younger swimmers, your coach, the pool leasee or other coaches to find out who the best sports physician, sports physiotherapist, sports masseur is. Hopefully they will have an understanding of swimming training demands and technique and an appreciation of how important it is to you to keep swimming or get back into the water as quickly as possible.

10. Listen to your body

Correct technique combined with good stabilising muscle strength and flexibility go a long way to preventing those niggles that can become debilitating injuries. Just as important is planning your session well (eg. long and progressively harder warm-up), gradually building how hard or how long you train for, and allowing your body to adapt by having easy sessions or rest days. As older, and hopefully wiser athletes, this should be the case. We aren't as young as we used to be, but we're not as old as we're going to be. Tune in to the bod!

Quote

"If I had nine hours to cut down a tree, I would spend six hours sharpening my axe".

Abraham Lincoln

Triathlon continued from Page 9...

SUMMARY

The most important point to absorb in this article is PLANNING. The following ideas may help:

1. Eat often and try to have at least three main meals each day.
2. Plan each meal and snack around a staple CHO food such as bread, breakfast cereal, rice.
3. All main meals and some of the snacks need to include a source of protein. e.g. milk on cereal, chicken in sandwiches, fish with dinner.
4. Minimise added fat from margarine, oil and butter.
5. Include drinks of water and/or fruit juice with meals and snacks.

Eat well, train well, race well.

CYCLING

Calculating and Training your Anaerobic Threshold.

© by Liz Hepple

Have you ever been introduced to Captain Lactate? He's the one responsible for that painful feeling in your legs as your race gets underway. That's when you may be heard to mutter 'Captain Lactate's here!'.

Liz Hepple

This is really just a lighthearted way to refer to the onset of lactic acid, a time when you are likely to be pushing into that training zone labelled the 'Anaerobic Threshold'. Unless you spend the optimum amount of time training in this zone, you are likely to be under- or over-trained, and not perform as well as possible in races.

■ Definition of Anaerobic Threshold

Anaerobic Threshold is defined as the point at which the body can no longer reprocess the amount of lactic acid it is producing, and so the amount of lactic acid in the muscles starts to rise rapidly. This varies from person to person, but is usually between 80 and 95% of maximum effort. It is this point at which the body goes from working primarily aerobically (with oxygen), to the commencement of anaerobic (without oxygen) work. At this point, athletes are able to sustain a substantial workload for between 30 and 60 minutes - any harder, and they will 'blow up' earlier; any easier, they will last much longer. Sports scientists have defined the 'Individual Anaerobic Threshold' (I.A.T.) heart rate training zone as the heart rate point at which the lactic acid reaches approximately 4 mmol/l, plus or minus 5 beats per minute (ie: if your IAT is at heart rate 170, your IAT training zone is from 165 to 175).

■ Determination of Anaerobic Threshold

By working out your IAT, and using a reliable heart rate monitor, you will be able to train much more efficiently, and reduce the chances of overtraining or undertraining. So how do you determine where your IAT heart rate zone lies?

1. Maximum Heart Rate Method

The simplest, cheapest and least accurate way of working out your IAT zone is to estimate what your maximum heart rate (Max HR) is (220 - Age), and determine the percentage your IAT is likely to be. If you are not very fit, your IAT zone will be somewhere between 80 and 87% of your Max HR. If you're well trained, it will lie between 88 and 95% of your maximum. One of the downfalls of this method is that the formula for working out your Max HR is quite inaccurate.

A great way to work out your Max HR more precisely is to do a fairly short (ie: half to one hour duration), intense race (or training session) wearing your heart rate monitor. Two days prior to this, you should only perform light training, so that you go into the race rested, and capable of reaching your maximum. The last two minutes of the session should be at absolute maximum effort. (You have undergone a medical screening prior to this of course!) The highest reading on your monitor (probably at the end of your race) should be your Max HR.

2. Conconi Method

This method was developed by Professor Francesco Conconi who found that there was a way to establish IAT without measuring lactate levels. He found that if a workload was increased incrementally, the heart rate would increase in proportion to the workload. However, at a certain point (which corresponded to the Anaerobic Threshold), the linear increase in heart rate deflected from the workload 'line'. This 'break away point' has sometimes been criticised for not applying to some individuals, however, the Conconi test (see Fig 1.) may work for you, and is worth trying. You will need your bike and either a wind trainer or a track about 400 m around, a heart rate monitor and some graph paper.

a. Warm up for 10 - 15 minutes.

b. Start at about 25 kph, increasing your speed approximately 1 kph every minute (or lap), until you can go no further

c. Record HR at the end of every minute (lap)

d. Record riding speed (time) for each (minute) lap

e. Plot the heart rate vs speed. (If you performed the test on a track, you will need to calculate speed in m/sec)

f. The point at which the heart rate line deflects from the straight speed line represents the anaerobic threshold.

3. Individual Time Trial Method

Your Anaerobic Threshold is the highest workload you can maintain for around 30 - 60 minutes without 'blowing up'. So the perfect way to determine your IAT is in an Individual Time Trial competition of between 20 and 40 kms. Use your heart rate monitor during the test - preferably one that you can recall the heart rate at set intervals (ie: 5 - 15 sec) during a session. Your average heart rate for the race will be your anaerobic threshold heart rate. Once again, you must only train lightly for two days prior to this race.

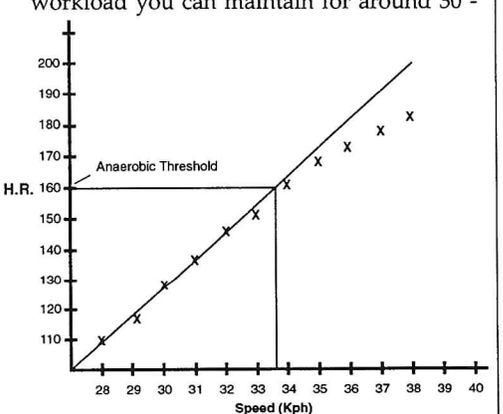


Fig. 1: Conconi test demonstrating Heart Rate vs Speed, and 'break away' point at 'anaerobic threshold'.

4. Lactate Test

This is the most accurate and most expensive way to determine your IAT. For the serious cyclist who wants to monitor the progress of their training, this test is a must. A Lactate Test is performed on a wind trainer, and starts with the cyclist riding at an easy workload. Every 3 to 5 minutes the load is increased by between 25 and 50 watts, until the rider reaches exhaustion. Blood samples are taken at the completion of every increment, and the amount of lactic acid is determined. The lactate level is plotted against the workload and a curve is developed.

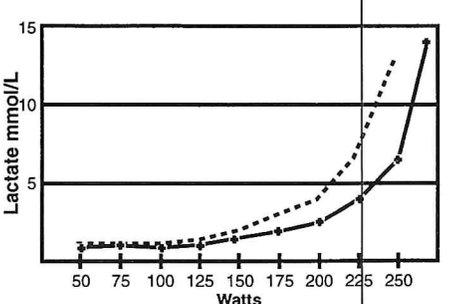


Figure 2: Lactate curve showing the lactate curve shifting to the right with endurance training.

By retesting every 4 - 6 weeks during the season, cyclists can determine whether their training is having the desired effect. Fig. 2 shows the desired changes in a lactate curve over time (ie: the lactate curve moves to the right), which means that the cyclist is accumulating less lactic acid for the same workload. Another change that occurs is that the amount of lactic acid that an athlete can withstand increases. At exhaustion, the cyclist has accumulated a higher level of lactic acid, and is able to go further on the test.

■ Improving your Anaerobic Threshold

Now that you know your IAT heart rate zone, you can better monitor and plan your training. To determine exactly when to train IAT, refer to the article in the April 1996 issue of the 'TMA' - 'Fail to Plan, then Plan to Fail' on periodisation of training. If you don't have access to this, generally speaking, this sort of training is performed 4 - 6 weeks prior to the Competition Phase, and

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Cycling continued from Page 11...

maintained during the race season (2 - 3 months).

Anaerobic threshold training involves long efforts with shorter recovery. If you are training for an individual time trial or triathlon, you should perform these efforts individually. If you are a road or criterium rider, you should find some training partners, and 'swap off turns' for the efforts.

This sort of training is taxing and should not be overdone. The average masters cyclist should allow 3 - 4 days recovery after each IAT training session, before another similar session is performed. Fitter cyclists can reduce recovery time to 2 - 3 days.

Here are some training methods and examples.

1. Continuous method

The most basic IAT training involves performing long efforts of 5 to 20 kms duration continuously, with an effort:recovery ratio of 2:1, maintaining your heart rate in the IAT zone. Perfect technique must be practised during these efforts, which should be done in a race gear (around 90 rpm), and at around race speed.

Sample session:

- 4 x 5 kms @ IAT (2.5 kms recovery between); or,
- 3 x 10 kms @ IAT (5 kms recovery between)

2. Variable method

This involves alternating between just above IAT, and just below IAT, and has been shown to improve the power output at anaerobic threshold. For an IAT of 170, the cyclist would ride for 2 minutes at 160 - 165 bpm, then 2 minutes at 175 - 180 bpm, then repeat this sequence several times before recovery.

Sample session:

- 5 x (2 km @ IAT minus 5 - 10 bpm, 2 km @ IAT plus 5 - 10 bpm)

If you are training with a partner of similar ability, this can be simulated by riding at the front into the wind for 1- 2 kms, then letting your partner ride at the front for the same distance, alternating 'turns' for 10 - 30 kms.

Variations in Anaerobic Threshold Zone

Sometimes your heart rate does not coincide with your perceived level of exertion, and you may feel that you are riding harder or easier than your heart rate monitor tells you.

1. Heart Rate lower than expected

Often cyclists find that they are feeling tired and no matter how hard they try they have trouble reaching their IAT zone. The IAT zone is affected by the state of training, and if they are unable to maintain their heart rate in this zone, it is a good indicator that a cyclist may be starting to overtrain. If this happens occasionally, it means that the cyclist is fatigued, and it is best to reduce the number or length of intervals performed this day, and to ensure a couple of good recovery days follow this training session. If you are unable to reach your IAT zone for several training sessions in a row, it is advisable to take a substantial recovery period of 7 - 10 days, as you are probably beginning to overtrain.

2. Heart Rate higher than expected

Sometimes cyclists may be feeling great, and can race for more than one hour sustaining a heart rate of around 10 bpm over their IAT. This often happens when they have successfully tapered for an important race. However, if it happens during training and you are feeling fatigued, chances are that you may be overheating and in need of some more water, or worse still, may be starting to come down with an illness.

Remember, as you get fitter (or lose fitness) your anaerobic threshold zone will probably change, so it is important to repeat your IAT test every 4 - 6 weeks so that you have accurate heart rate zones for your training. So, put yourself to the test, work out your anaerobic threshold, come in contact with 'Captain Lactate' on a regular basis, and I guarantee you'll be racing better.

"I like the marathon because it's one race where you can find out who's really toughest. On the track, sometimes a guy can just pull away, and you want to stay with him but you don't have the leg speed. The marathon is slow enough that anyone can stay with you if he wants, if he has the will. The marathon is ultimately a test of will.".

Alberto Salazar - New York Marathon winner 1980-82