THE MASTERS ATHLETE

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Guest Editorial, Jilian Mulally
Editor of *Australian Rowing*

Australian Masters Rowing Is At The Top Spot In The World - Using Only 5% Of Eligible Athletes

Jilian Mulally

The staging of the FISA Masters Rowing Championships in Adelaide next November provides an opportunity for the Australian rowing community to stamp its seal on what must be one of the most spectacular dominations of any sport, at any level, in this country.

It is well known that Australia is the number one rowing nation in the world. This was achieved at the Atlanta Olympics with the s[illegible] elite team winning six medals.

What is not so well known is the swag of medals Australia wins every time our Masters drop their boats into the waters of international competition.

In the last decade, Australia has won more than 150 medals in international Masters competition. This includes the efforts of the Australian Police Crew which has won 42 gold medals and the "Crew of Legends" (so named from its success) which is known only to win when away.

And the competition is fierce. Masters rowing is serious business among the Europeans-more than 2000 athletes turned out for the 1996 FISA Masters in Hungary in August.

The staggering statistic about Australian Masters representation is only an estimated five per cent of rowers paddling about our waterways actually compete in international competition. Among reasons for this are that Masters rowers are entirely self-funded, and many choose to participate purely for life style.

[illegible]or Australia to use the FISA Masters in Adelaide next year to sign and seal complete domination on World Masters rowing, the other 95 per cent need to make themselves known officially and focus their efforts on this regatta.

Most are carrying full training programmes and have the fitness and abilities necessary to compete in Masters competition. In essence, many of them who row regularly, with some race training, could be competitive at Masters competition because of their ongoing fitness routines.

This was demonstrated at the 1994 World Masters Games in Queensland. About 400 rowers competed. Last year at the Australian Masters Games in Melbourne, 500 rowers were involved.

On the domestic scene, there is a smorgasbord of opportunities for Masters competition including the Australian Masters Regatta, Australian Masters Games and FISA Pleasure Rowing Tour.

> "THE STAGGERING STATISTIC ABOUT AUSTRALIAN MASTERS REPRESENTATION IS ONLY AN ESTIMATED FIVE PER CENT OF ROWERS PADDLING ABOUT OUR WATERWAYS ACTUALLY COMPETE IN INTERNATIONAL COMPETITION."

Broaden this competitive scope a few degrees to incorporate international competition and the host country of next years FISA Masters could have an awesome team.

But the flip side to this is that Masters rowing has flourished because it is largely unregulated. Rowers set their own agendas and row by them.

They are not affiliated with their state associations and organise their own functions, be that a regatta, recreational row-a-thon or otherwise.

It is a social and casual sport off the water, adopting in many cases a recreational flavour, while for those who compete, maintaining a competitive and serious focus on the water.

Rowing lends itself to this kind of organisation. Most clubs have some sort of Masters programme which includes rowers organising themselves to be at the boat shed at a certain time, seeing there is an eight not being used, taking it off the racks and having a row.

A large number of masters rowers have moved across from the senior elite level and so have the skills and technique which allow them to row without the direct guidance of a coach.

It is also a low-injury sport which builds all round fitness, enabling long careers. Ted Bromley and Spencer Grace, who rowed in the men's pair for Australia in the 1948 London Olympics, still train two or three times a week.

As for all levels of competition, Australian rowers enjoy the fortune of good weather. Nearly every other rowing nation is forced indoors for some time of the year onto rowing simulation machines because of inclement weather. In Australia this isn't necessary.

Additionally, Australia is blessed with an abundance of rowable waterways, many easily accessible for city dwellers.

Australians are well liked and respected when they travel to international Masters competition. They have to borrow boats and oars, endure foreign climates and still they win.

Five per cent of participants have put Australia on the Masters rowing map. The other 95 per cent would make Australia close to untouchable. As host nation of the biggest international competition for this level of the sport, it would augur well to have such an asset on display.

The staging of the World Masters Rowing Championships in Adelaide in November next year is the opportunity for the Australian rowing community to stamp its seal on what must be one of the most spectacular rise of any sport during a decade in this country.

Jilian is a sports journalist working for Rowing Australia and has recently taken over as editor of Australian ROWING magazine.

This Issue..

Editorial

Hello everyone

It was great meeting some of our subscribers at the recent Queensland Masters Games. I believe many of them did very well (it must be the good info they get from THE MASTERS ATHLETE!)

Thank you to everyone who helped encourage new subscribers. The winners are Adrian Morey(Papua New Guinea), Alison & Phillip Pegg (Kenmore), and Michelle Noonan (Ashgrove).

Keep the feedback coming, we appreciate it, and where possible will endeavour to incorporate the ideas into our publication. If you have suggestions for topics please let us know.

Congratulations to Faye Collins for her age category win in the 1996 Hawaii Ironman – an awesome effort!

Merry Christmas and Happy New Year to all our readers. See you in 1997.

Peter and Claire

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SPORTS MEDICINE

Circadian Rhythm - What's that?

© by Dr Peter Reaburn

Ever wondered whether it's best to train in the morning or afternoon? Or whether speed work should be done before or after work? This article will throw some light on these and other questions pertaining to how our bodies have variations that occur every 24 hours - what scientists call circadian rhythms.

Circadian Rhythms at Rest

Body Temperature: Figure 1 below shows us that body temperature varies by as much as one degree over a day. Importantly, it peaks in the early evening around 6pm and is lowest at 6am. Interestingly, the speed of nerve impulses increases about 2.4 m/sec for every one degree rise in body temperature, strongly suggesting we should be more powerful in the evening. As we'll see shortly these factors have profound influences on speed and endurance performance.

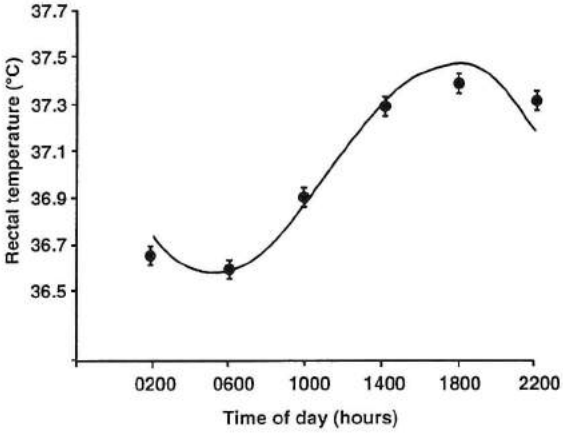

Figure 1. Daily variation in body (rectal) temperature

Ventilation: The breathing airways resistance to airflow varies throughout the day, with the greatest resistance occurring between 3am and 8am. This would suggest that asthmatic athletes should not perform strenuous training early in the morning.

Digestion: Stomach emptying rates and intestine absorption rates are also subject to daily variations with stomach emptying in the evening about 50% slower than for the same size meal eaten at 8am - another argument for a big breakfast.

Adrenalin: Blood levels of adrenalin (a stimulator of energy production, heart rate and alertness) peak in the afternoon. Put this together with a higher body temperature in the evening and late afternoons are looking "the go" for quality workouts.

Flexibility: Again, the range of motion about a joint increases with body temperature which peaks about 6pm. This also suggests that an athlete may be less likely to injure themselves in the evening. It also means that stride length in runners and stroke length in swimmers and rowers may be longer - a plus for power output.

Circadian Rhythms in Sport

The most powerful influence over endurance, speed, power and strength fluctuations during a 24-hour period is the daily change in body temperature. This peaks about 6pm, strongly suggesting that this might be the best time to race, do quality workouts, or get to the gym for weight training. So what does the research say on the daily variations in strength, power and endurance.

Strength and Power: Strength appears to peak in the late afternoon with the daily variation being around six percent over a 24-hour period. Both standing long jump (a measure of lower body power) and peak power on a bike sprint also to peak around 6pm - when that magical body temperature is at its highest level. The bottom line? Speed and strength training might best be performed in the evenings.

Endurance: Also in support of the suggestion that evenings are the time for best performances, is anecdotal evidence that Seb Coe, Steve Cram, Steve Ovett and Dave Moorcroft broke the 800-1500m track world records between 7pm and 11pm at night during the mid-eighties. Furthermore, a study of swimmers in the late 80's also showed that the evening was the best time for both sprint (100m) and endurance (400m) swims. Swim bench studies from the UK have also shown that swimmers produce most of their power in the evening when the body temperature is higher.

Canadian sports scientists in the early 90's also showed that cyclists do more work on a windtrainer in the late afternoon compared to the morning. All this research strongly suggests that evenings are the time for quality workouts.

Endurance in the Heat: Summer is approaching and for those of us in hotter parts of the world that's a worry for our longer workouts. While the short quality workouts appear to be best performed in the evenings, in hot conditions it might be suggested that the longer workouts at lower intensity be done in the morning. We know from Figure 1 that body temperature is lower then - this gives us a good buffer to raise our own body temperature with exercise, without putting ourselves at risk of heat injury.

There might also be another benefit to doing our longer, easier workouts in the morning. A study from the 70's examined the power output of novice cyclists when doing between 10 and 80 minutes of self-selected work. They self-selected better quality work in the evenings up to 40-50 minutes but with the longer workouts they did more work in the mornings, again suggesting that mornings are best for easy, longer workouts.

What about Aging?

Little research has been done in this area. However, it appears that circadian timing is altered in aging people compared to the youngsters. The daily fluctuations appear smaller in size but the variation between individuals becomes larger. The peaks that we discussed above appear to occur a little earlier, most probably due to earlier wake-times. One study on veteran cyclists found that while all the recommendations above held true for them, that quality time trials were less affected by early morning starts compared to younger riders.

Conclusions

In summary, it appears that strength training and quality endurance workouts such as anaerobic threshold pieces, interval training or speed work, should be done in the evening when we're warmer, able to do more work and less at risk of injuring ourselves. In contrast, research suggests that longer easier workouts, particularly in the heat, might be better done in the cooler morning hours. Listen to that body clock!

Erratum (The editor slipped up!)

In Issue 9 (Oct 96) the column headings in Table 2 within the Endurance article should have read Sport, Venue, Warmup, Test.

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**

SPORT PSYCHOLOGY

Choking: An Avoidable Disappointment

© by Dr Stephanie Hanrahan

Stephanie Hanrahan

What is Choking?

Choking is a term commonly used in the media. Athletes are accused of choking when they fail to perform to the expectations of others. As most of us are exposed to the media on a fairly regular basis, we often begin to apply the term 'choking' to ourselves and to those we know. We may consider ourselves as choking when we fail to perform in competition at the same level that we have achieved in training. Similarly, choking is sometimes experienced at major competitions. For example, in local fun runs we may be able to maintain the pace length and pace that we desire, but then in a competition on which we place greater importance, we may struggle to maintain the same form we have demonstrated previously.

As alluded to in the above example, choking is only seen as occurring when the athlete is in a pressure situation. Not all poor performances are attributed to choking. Athletes may have less than wonderful performances when they don't care how they perform or when the competition doesn't mean anything to them. Choking refers to crumbling under pressure.

Only Good Performers are Capable of Choking

Choking is frustrating because we don't seem to be able to execute the skills or techniques that we know we are capable of doing. One positive aspect of choking, if in fact there can be one, is that in order to feel that we have choked, we earlier must have perceived ourselves as having performed well. Individuals with no talent and no skills do not choke! So if we start losing confidence because we think we have choked, we should remind ourselves that we are capable of the desired performance (otherwise we wouldn't think of ourselves as having choked).

What Might Cause Choking?

There are a number of possible contributing factors to the sense of pressure and hence choking. It should be noted, however, that an observer will never be able to accurately determine the cause. Therefore, when we read about or overhear others talking about how a particular person choked, we need to recognise the talk is pure speculation. Anyway, some of the potential influences other than pressure include:

- being ill on the day
- not having had enough sleep
- placing too much pressure on one particular performance
- thinking too much about the outcome rather than the process
- trying too hard rather then just letting things happen
- paralysing ourselves by over-analysing our performance
- having an arousal level that is too high
- having inappropriate self-talk
- being physically tense
- not having enough carbohydrates on board
- being dehydrated
- worrying about what others think

Realistically, no athlete would be expected to perform at her or his best when ill or tired. However, if the person judging the performance (whether the athlete, the coach, or another observer) believes that the person performed well below the level expected of the individual on the day, the "C" word may be applied. It seems rather unfair to accuse someone (or oneself) of choking, when the individual may actually have performed as well as could have been expected under the circumstances. So, before jumping to conclusions, consider the possible physiological factors that may have influenced performance.

> "PROBABLY THE BEST WAY TO AVOID CHOKING IS TO HAVE PRECOMPETITION AND COMPETITION PLANS THAT WE FOLLOW EVERY TIME WE COMPETE."

What We Can do to Avoid Choking

Probably the best way to avoid choking is to have precompetition and competition plans that we follow every time we compete. When we are under pressure, it is useful to have pre-established plans on which to rely. Problems frequently arise when we decide that because a particular competition is important to us, we must do something different. Introducing anything new before or during an important performance almost always backfires. Basically, if our fitness, technique, strategies and methods of preparation have gotten us into a major competition, we should stick with what we know. Once we find a routine that works, we should stick to it.

Choking does not occur when we approach a competition and maintain our focus during the competition in a manner that we have used many times before. We open ourselves up to the possibility of choking when we put unrealistic amounts of pressure on ourselves. For example, if I start to stress that, "If I don't swim a particular time, I'll never make the final", I'll be physically tense, focusing on what is happening after the race rather than what I need to do during the race, and as a result may very well swim a time that is much slower than my personal best. Instead, I should stick with my normal routine - swim my normal warm-up, do my normal stretches, focus on my normal technique cues, and then simply do what I've been training to do.

Summary

When athletes perform below expectations in important competitions, they are often accused of choking. Two points should be remembered: 1) Choking can only happen to athletes with a demonstrated good performance record; and, 2) All possible physiological or environmental causes of poor performance need to be discounted before the label of "choker" should be considered. To avoid the possibility of choking, athletes should stick to well established precompetition and competition routines or plans.

From the Research

1000m Rowing Performance and Creatine Loading.

Creatine is a naturally occurring substance in our muscles and is used in energy production during high intensity exercise. It aids in preventing fatigue and reducing the production of lactic acid that slows us down. Recent research from the University of Birmingham in the UK suggests that loading up on this commercially available product can help us improve 1000m rowing performance. Thirty eight club-level rowers (22±4 years, 78±5 kgs) were divided into an experimental and a placebo group. Over a five day period leading up to the tests, the experimental group took 0.25g of creatine monohydrate per kilogram of body weight mixed in one litre of hot cordial and taken in 250ml hits at four regular intervals each day. The placebo group (no creatine) showed no change in 1k row performance on a rowing machine. Sixteen of the 19 rowers in the creatine loading group improved their performance with the improvement being from 3m 31s±21.5s to 3m 28.7s±21.8s. This research strongly suggests that creatine monohydrate loading can improve 1000m rowing performance - the distance veteran rowers complete in competition.

The effect of oral creatine supplementation on the 1000m performance of competitive rowers. Rossiter, H.B. et al., Journal of Sports Sciences 14, 175-179, 1996.

Editor's note: If you decide to try it, ensure you buy creatine *monohydrate*. It is available commercially as *Ergomax* or as a *Musashi* product from health food stores.

SPORTS NUTRITION

Fluids and Performance

© by Dr Peter Reaburn

Summer is here and most of us will be training and competing. The greatest threat to performance during training or racing in the heat, is dehydration.

For every litre of fluid lost, body temperature rises 0.3°C, the amount of blood pumped by the heart in a minute drops one litre, and heart rate rises about eight beats per minute - all factors that will slow performance.

Fluid losses as low as 1% of body weight (one kilo lost = one litre of fluid) slow us down. Fluid replacement is therefore critical. The purpose of this article is to establish scientifically-based guidelines for fluid replacement during exercise.

To understand fluid absorption we need a little physiology about fluid emptying from the stomach and then fluid absorption from the small intestine.

Factors that affect stomach emptying

1) *Fluid volume*: When we drink fluids, they enter the stomach for storage, not absorption. The stomach contents then empty into the small intestine where the all-important absorption of water, carbohydrates and electrolytes happens. Large volumes, up to 700 ml, are emptied from the stomach at a faster rate than smaller volumes.

This suggests that, when training or racing in the heat, it is important to maintain a high stomach volume. This can be achieved by drinking 500-700 ml beforehand, and then 150-200 ml (about six mouthfuls) every 10-15 minutes. This will maintain a stomach volume of 200-300 ml and a stomach emptying rate of 20-40 ml every minute or 1.2 - 2.4 litres per hour - the sweat rate of most endurance athletes.

2) *The drink contents*: Science has shown that 6-10 grams of carbohydrate of any form (glucose, sucrose, maltodextrins) in 100 ml of fluid will enhance stomach emptying compared to water. This concentration of 6-10 g / 100 ml is what you will find in all of the sports drinks - check the labels next time you're at the supermarket!

3) *Dehydration*: If we allow ourselves to become dehydrated, stomach emptying rates are reduced. The key is to ensure we take in fluids from the gun.

4) *Exercise intensity*: Mild to moderate intensity exercise below anaerobic threshold (85-90% max heart rate) does not affect stomach emptying. Racing at threshold does - it slows it down. Thus, the ironmen / women will have no worries, but the 1-3 hour racers need to be wary.

Interestingly, running produces higher emptying rates than cycling, possibly due to the mechanical action of running. Conversely, cyclists appear to be able to handle larger volumes of fluids that runners, probably for the same reason.

Intestine absorption

Now that the fluid has been emptied into the intestine, it can be absorbed. During exercise, the rate of absorption appears to be about two litres per hour - greater than most sweat rates. Unlike stomach emptying, it appears that glucose slows the absorption of fluids compared to maltodextrins or sucrose.

Since any form of carbohydrate enhances stomach emptying, it appears wise to use sports drinks that contain maltodextrins and / or sucrose to enhance intestinal absorption of fluids.

Drinking before Exercise

As stated earlier, 500-700 ml of a sports drink or water before a race will help prevent dehydration. Drinking heaps of water the day before a race and thinking we'll store it just doesn't work - we'll just pee it out!

Some recent research suggests that *GLYCEROL* may help retain water and thus prevent heat stress and enhance performance, particularly in low to moderate intensity races such as marathons, road races, marathon rows or half or full ironmans. For example, one study found that cycling to fatigue at 60% of maximum speed in youngsters took 93.8 minutes with glycerol and 77.4 minutes with a placebo.

This stuff is available commercially as GLYCERIN in chemists for about $2-3 per 250 mls. It should be taken by mixing 1.2 grams of glycerin per kilo of body weight (BW) with 3.3 ml of orange juice per kilo BW and 21.4 ml of water per kilo of body weight. It should be drunk 90-120 minutes leading up to a race.

Drinking during Exercise

Science has shown that we should be replacing fluids at the same rate we lose them. While fluid replacement in races less than an hour has been questioned, it is critical in events longer than one hour. However, when racing hard for less than an hour in hot conditions, fluids containing carbohydrates have been shown to benefit performance.

Drinks containing a little sodium with carbohydrate have been shown to help maintain blood volume better compared to water, thus helping us to maintain our oxygen carrying capacity and ability to remove heat from the muscles. The sodium also helps improve the taste so that we'll drink the stuff!

The Ideal Sports Drink

Most of the popular, commercially available sports drinks contain the right amount of sodium, potassium and carbohydrate essential for taste, maintating blood volume and providing energy.

Conclusion

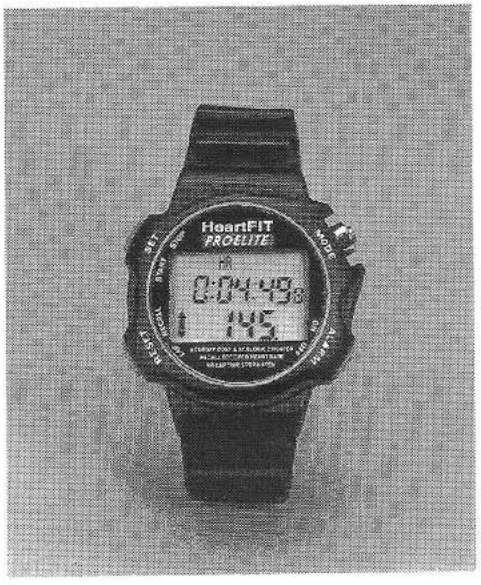
Science strongly suggests that fluids are critical in all endurance events longer than one hour and hard races less than one hour in the heat.

Science also says that having a stomach with fluid in before a race makes sense. Our aim is to keep that stomach topped up by drinking 150-200 ml every 10-15 minutes. The drink should be a sports drink that contains a mixture of carbohydrates, a little sodium and potassium, and be one that we like the taste of.

While science looks good on paper, we are all different. As athletes we should try the above suggestions for ourselves and see if we can handle them. There is no doubt fluids help prevent dehydration and improve performance. They may also keep us out of the medical tent. Keep cool, race hot!

BLUELINE SPORTS

Heart Rate Monitors



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RUNNING

Energy for Distance Running

© by Dr Colin Solomon

This article is designed to outline the physiology underlying the energy systems utilised for distance running, and to link this physiology to running competition and training.

Within the human body, chemical energy is required for every aspect of life from blinking an eye to running an ultra. This chemical energy originates from solar energy which is taken in and converted by plants, which are subsequently eaten by athletes like ourselves. Energy is not consumed, just transferred from one form to another, with the majority of chemical energy transferred in the body ending up as heat. For us to be able to run, the chemical energy from food must be transferred to mechanical energy by the muscles to produce movement. During running, research indicates we are only 25% efficient, meaning that 75% of the energy is lost mainly as heat.

During running the majority of energy transfer takes place in the active muscles (leg and arms), but also the breathing and heart muscles.

The three energy transfer systems which operate within the body during running are:

1) Anaerobic (without oxygen) system (Adenosine Triphosphate and Creatine Phosphate)

2) Anaerobic (without oxygen) Glycolytic system

3) Aerobic (with oxygen) Energy system.

Each of these three energy systems function to produce adenosine triphosphate (ATP).

Irrespective of which of the energy systems are involved in transferring energy for any running session, the common compound or unit through which all energy is transferred is ATP. When ATP breaks down, it causes the muscles to contract. The common function of the three energy systems is to maintain the level of ATP in the muscles.

The Three Energy Systems

1) *Anaerobic (ATP Creatine-Phosphate):*

ATP and Creatine-Phosphate are stored within the muscle in small amounts and produces the energy that is required for very high-intensity power outputs. Although the exact duration for which the ATP, C-P system can provide energy is a source of controversy in physiology research, it could be approximated to range from fractions of a second to 5-15 seconds such as a 50-100m sprint, discus throwing or javelin throwing.

2) *Anaerobic Glycolytic:*

For running to continue beyond 5-15 seconds at a high intensity, energy is derived from the glycolytic system. As for the ATP C-P system, the glycolytic energy transfer system operates without utilising oxygen - the reason why they are called anaerobic. This system transfers energy from carbohydrates (specifically glucose). The carbohydrate is stored in the muscles in the form of glycogen, which is then converted to glucose.

This system can provide energy for medium- and high-intensity running for up to approximately 2-3 minutes such as 400-1500m races. It also provides the energy during high-intensity "surges" done during a race, or the "sprint" to the line at the end of a race.

3) *Aerobic:*

To continue running for more than 2-3 minutes, it is necessary for energy to come from the aerobic system and is thus the most important system for the distance runner. Oxygen is the crucial component of the aerobic energy transfer system, and allows this system to produce ATP at a very efficient rate.

Both fats and carbohydrates are used as the fuel for the aerobic system. However, there is only enough carbohydrate stored in the muscles and liver to last about 60-90 minutes.

> "KNOWING HOW OUR BODIES PRODUCE ENERGY FOR RUNNING GIVES INSIGHT INTO THE TYPE OF TRAINING WE NEED TO IMPROVE OUR RUNNING PERFORMANCE."

When running continues beyond approximately 90 minutes, the majority of energy is derived from fat stores. The actual ratio of carbohydrate to fat used is a function of the amount of carbohydrate available and how hard we run. Fats will be utilised more at lower running intensities/speeds and when carbohydrate levels become low.

At present we are still unsure as to what mechanism/s actually limit aerobic energy transfer. Some say it is the ability of the lungs, heart and blood to deliver oxygen while others say the limiting factor is how much oxygen the muscles can take up.

Despite this dilemma, research is definite in indicating that endurance training improves both the supply and uptake of oxygen. Endurance-trained individuals can use more oxygen and therefore run at higher speeds and for longer duration with a much decreased anaerobic energy input. Also, in the trained individual, less oxygen is used for the same running speed as the runner both becomes more efficient in the mechanics of the running motion, and utilises the aerobic system more efficiently.

In terms of energy production, the trained individual will use more oxygen to produce the same amount of ATP, as they will use fat as the energy source and spare the carbohydrate stores, thus prolonging how far they can run.

Knowing how our bodies produce energy for running gives insight into the type of training we need to improve our running performance. Running once around the block twice a week, or doing 10 x 200m sprints every day will not specifically improve the aerobic system, and therefore not improve our distance running performance. Similarly if it is the finishing "kick" or hill "surge" that the athlete needs to improve, training must incorporate sessions that stimulate anaerobic glycolysis. Past and future issues of TMA focus on these very issues.

> *"I'd go out on the bike, hail, rain, snow or sunshine, and start pedalling and I'd know if it was there or not....If you feel tired, then you just don't do it....It's either all-out or recovery. There's no in-between."*
>
> Graeme Obree (former world one-hour cycling record holder).*

ROWING

Tips for Injury Prevention

© by Ivan Hooper

In the club that I coach out of, the master's rowers seem to be training all year round. There is always some regatta on the horizon and there are always plenty of "Vets" around.

As a coach, rower and physiotherapist with the Queensland Rowing Squads, I'll discuss eight tips on how to avoid injury during rowing training:

1. *Maintain flexibility*
2. *Adequately warm up and down*
3. *Avoid common technique faults*
4. *Be careful with your training volume*
5. *Ensure you periodise properly*
6. *Ensure adequate recovery*
7. *Begin the season with some fitness*
8. *Pay attention to your body*

1 Maintain flexibility:

The first tip for preventing injury is maintaining adequate flexibility of all the "at risk" areas for rowing. A thorough description of flexibility for rowing was included in the previous edition of THE MASTERS ATHLETE.

2. Adequate warm-up and down:

All athletes should warm up properly prior to getting on the water and warm down after finishing the session. A five minute jog or ergo and then 10 minutes of stretching should be sufficient, but everyone is different and some athletes may need more.

Once in the boat, a warm-up from back chocs progressing through the shorter slide lengths and gradually out to full slides is the best option. This series of slide lengths may take five to ten minutes, usually in pairs if in a four or in fours if in an eight. That way the boat is stable while you are warming up. Once this is complete all members of the crew can join in and commence the workload for the morning.

At the completion of the session, the last few minutes should be rowing relatively light to allow the body to cool down and help remove any waste products from the muscles as a result of any hard work done during the session. Once off the water, five to ten minutes of stretching should again be done to ensure you maintain flexibility.

3. Avoid common technique faults:

Be very aware of your technique while rowing. There are a number of technical faults that can lead to injury. Problems such as collapsing at the finish, shooting the slide, reaching for more at the catch or simply opening the body too early through the stroke can all lead to back injury. If you grip the oar too tightly this can exert excessive strain on the wrist and forearm muscles leading to tendonitis. Footstretcher positioning can also affect injury. If the heels are too high, it takes a lot more effort to reach the catch and this can place extra strain on the hamstring tendons. Having the heel set too high can also load up the kneecap during the drive, possibly leading to pain behind the kneecap.

If you do not have a coach to give you feedback then convince one of your friends to give up some sleep and come out in a speedboat to video you, or the crew.

4. Be careful with your training volume:

When beginning a season or leading up to a major regatta, ensure that you give yourself enough time to prepare properly. If you increase your training volume too quickly you place yourself at risk of the overuse injuries that are common to rowing. You must allow enough time to give the body's muscles, bones, tendons and ligaments time to adjust to the increased stress. On the other hand, excessive volumes over long periods of time will also lead to injury due to the chronic levels of fatigue and microtrauma that build up in the body's tissues.

5. Ensure you periodise properly:

This means cycle (mix up) your hard and light sessions, your hard and light weeks. The body must be stressed with some hard training to provide a stimulus for adaption. But unless you then have some light sessions or light weeks, the body doesn't get a chance to recover and adapt to the stimulus. This is one of the basic principles of conditioning that "vets" often neglect., It not only allows for improvements in performance, but also avoids injury and overtraining if done properly.

6. Ensure adequate recovery:

Recovery after hard work is essential to allow the bodies structures to regenerate after hard use. Light sessions at a low heart rate (65-70% max heart rate) assist in recovery. These sessions include very light rows, swims or very slow jogs. Massage, saunas, spas, and stretching sessions are other techniques used by elite athletes to aid recovery from hard sessions.

7. Begin the season with some fitness:

This will allow you to handle the stresses involved in what is a very stressful sport. A mixture of gentle cycling, swimming or running will help build up some condition before you begin to flog your body up and down the river, dam or lake.

8. Pay attention to your body:

If you are feeling tired or not fully recovered from hard work then ease off training. Don't be afraid to have an easy session or even a sleep in, it is much better for you than pushing on into further fatigue.

Too many people ignore niggling soreness, aches or injuries and hope that they'll go away. With sports such as rowing those niggling injuries rarely go away by themselves, they usually get worse. Give the area some rest, or best of all get it checked out by your sports physiotherapist or doctor.

These tips should help to minimise the risks of injury during your rowing, and without injury everything is much more enjoyable. Go ahead and enjoy.

In Atlanta, Sykes Boats won:
1 Olympic Gold-Womens coxless pair
1 Olympic Silver-Womens coxless pair (USA)
1 Olympic Bronze-Mens quad scull
1 Olympic Bronze-Mens lightweight double scull

SWIMMING

Warming Up - A Scientific Approach

© by Dr Peter Reaburn

Over many years of pool and open water swimming competitions, one thing that continues to amaze me is that many masters swimmers have no idea of the benefits or art of warm-up.

Sure, most swimmers do it. But how many know what to do, how hard to do it, and when to do it? Let's try and throw some light on these questions with a scientific yet practical approach to the all-important warm-up.

Why warm-up?

Try this for a list of reasons:

1) Warmer muscles contract more powerfully
2) Blood and oxygen flows to the muscles, which are about to need plenty of oxygen to work hard
3) Hemoglobin and myoglobin, the oxygen transporters in blood and muscle, give up oxygen more quickly
4) Joints are looser and have a bigger range of motion for longer strokes
5) The movement pattern of the stroke gets grooved as the nerves and muscles remember technique
6) Psychological preparation
7) Picking landmarks (open water) or stroke counts from flags, block angles, water temperature, foot feel at the ends of the pool etc.
8) Injury prevention
9) Reduce the risk of abnormal heart patterns.

This last point is a valuable one, particularly for our older or novice middle-aged swimmers. A study as early as 1973 showed that abnormal electrocardiogram (ECG) readings were observed in 31 of 44 healthy middle-aged men when they did hard exercise without warming up. Doing the same exercise after warming up reduced the abnormal ECG traces to two out of 44. In the same study, the systolic blood pressure (the first figure we get when getting our blood pressure) got as high as 168 mmHg without warm up, but only 140 mmHg when warmed up. That finding says warm up is critical for people with blood pressure worries.

All of the above says that not only will we be safer with a warm up, but we'll perform better - as long as we do it correctly. So, Doc, what's the right way?

How hard should I go?

In the old days we used to believe just doing a slow warm up was the go. Sure that raised the muscle temperature and loosened joints, but did it warm us up for racing fast? Science now tells us that we need to rehearse race pace in order to fire up the nerves and muscle fibres that are going to be used in racing. Sure we don't flog ourselves to the point where we're producing high lactic acid levels or getting tired, but we must do some quality work after we've done our easy swimming.

For example, instead of just doing a 200-800m easy swim and some starts, have a go at 200-500m alternating 25's swim-drill, then do a set of 4-10 x 50's on a comfortable time base, then 4-8 x 50's, 25- hard 25 easy on an easy time base, then a 200-400 swim down. Sounds a lot for some, but that's a warm-up.

If you're a sprinter you must do some sprints. For example, do the 4-8 x 50's above as starts and explosions for 10m increasing to 25m with long rests (walk backs, easy 75's).

For open water swimming, the same approach holds - we just don't have the walls or steps to judge distances.

When to warm up?

As close as possible to racing is the answer. It surprises me that so many masters swimmers warm-up when they arrive at a pool at the start of the meet but aren't racing for two hours. Sure I appreciate many meets don't have the luxury of a second pool. If that's the case, warm up well until you're told to get out then stay warm and loose by throwing on a tracksuit etc and stretching regularly. If you've got access to bands, use them regularly, particularly just before you race. Ensure you mimic race pace with the bands.

If you've got access to another pool, warm up as close as possible to the event without upsetting the marshals.

Stay warm. Get rugged up, jog or jump on the spot if you're a breaststroker or flyer, do some bands if you're a freestyler.

The whole aim of being warmed up as close as possible to the event is to have the heart pumping and blood and oxygen down at the muscles before you start the race. If you don't, it will take the first 50-100m to wake up the ticker. This time delay will mean lactic acid is produced in the absence of the oxygen. Lactic acid means slowing down and pain.

Other tips?

Here's some other ideas you might want to try.

- Hyperventilate just before getting onto the blocks for sprints. You only need 3-5 deep breaths. These can be done when sitting behind the blocks or waiting for starter's whistle. This doesn't get more oxygen in, it gets rid of carbon dioxide. Because carbon dioxide stimulates us to breathe, by getting rid of it from our blood through hyperventilating, our ability to hold our breath in sprints (25-100m) may be enhanced. A word of warning - hyperventilating too much can make us dizzy. If you do get dizzy, do it sitting down.
- Don't stretch immediately before getting onto the blocks. Some research suggests that this will inhibit the force of muscle contraction, something we don't need, particularly for sprints.
- Try a massage. It works for some and not for others. Theoretically, as long as it is a light massage and not a deep one, a massage can warm up muscles and loosen us up at a time when we might be tight. Don't fall asleep!

Conclusion

I cannot emphasise enough how important it is to warm up close to the event, particularly for the endurance events. I also strongly believe that we should be doing race pace work within the warm up. Give the ideas above a go and watch those times drop.

Did You Know?

- The average man will spend about 145 days of his life shaving.
- Humans shed one complete layer of skin every four weeks.
- Fifteen million blood cells are produced and destroyed every second.
- You breathe nearly two gallons of air a minute.
- Beethoven used to pour iced water over his head to stimulate his brain.
- There are more living organisms on the skin of a single human being than there are human beings on the surface of the earth.

"Not Many People Know That!" by Michael Caine

CYCLING

Indoor Cycling

© by Liz Hepple

For the busy master's cyclist, riding in the comfort of your own home may be the way to go! Riding indoors may drive some people 'nuts'- Why have a bike, if not to enjoy the fresh air and scenery? But for bike riders with limited spare time, or for those who live in big cities, where cyclists act as targets for stressed motorists - a 'stationary bike' may be the way to go.

Liz Hepple

In fact most serious cyclists use an indoor bike for riding when bad weather stops them doing their usual training, or as a supplement for their conditioning programme. The best thing about indoor training is that all you need is between thirty and sixty minutes to get a great workout. Try accomplishing that out on the road!

Many great cyclists and triathletes swear by indoor training. Dave Scott, multiple winner of the Hawaiian Ironman, was rumoured to have regularly performed six hour training sessions on a wind-trainer. Apparently, he would set up in a poorly ventilated room (for heat acclimatisation), and this torturous training would help prepare himself physically and mentally for the Ironman race. Other elite athletes to use bike ergometers on a regular basis include the hugely successful AIS track cycling team who use this as a supplement to their track and road work.

Types of indoor trainers

The type of training, and the benefits to be gained from it can vary according to the sort of indoor machine you have. There is a huge variety of indoor trainers on the market, but the most commonly used by serious cyclists are as follows:

Rollers

From early this century until recent times, cyclists only had one choice of indoor trainer - the traditional 'rollers'. And in many ways they are still the best option for indoor training. Cyclists just sit their whole bikes on top of the 'rollers' (no wheels need to be taken out), and the riding feels as natural and comfortable as being out on hot-mix bitumen.

'Rollers' are a great way to improve pedalling smoothness and leg speed, and for increasing bike handling and balancing skills. But the 'slippery' feeling of 'rollers' can be a deterrent to some, and it can be a bit scary mounting and dismounting for the first time. Fortunately for those that like the security, 'rollers' are now available with a bike holder to assist their balance. If you are learning how to ride the traditional 'rollers', you should get someone to support you, or should set up next to a wall so that you can lean on it for balance. The main drawback with rollers, is that it is very difficult to perform maximum efforts on them, as the resistance is fairly light, even in a big gear. Rollers cost between $150 and $300.

'A' Frame Trainers

These trainers are the most common and practical machines, and also enable the cyclist to use their own bike on the stand. While not as natural a feeling as 'rollers', as the bike is fixed into position, there is no problem learning to ride them, and they are quite smooth.

The rear of the bike is clamped into the stand, and the load can be varied by the use of either magnetic or wind resistance. The work load can also be altered simply by changing gears.

The main advantage of this type of trainer is it's versatility and portability. You can train on it at home, or take it to races to warm up on. This can be very useful for time trials, where you are required to remain in the start area for up to fifteen minutes prior to commencing a high intensity event.

> "...FOR BIKE RIDERS WITH LIMITED SPARE TIME, OR FOR THOSE WHO LIVE IN BIG CITIES, WHERE CYCLISTS ACT AS TARGETS FOR STRESSED MOTORISTS - A 'STATIONARY BIKE' MAY BE THE WAY TO GO."

The cost of windtrainers starts at around $150, while magnetic resistance machines cost around $300.

Custom made 'ergometers'

Ergometers can be custom built for the cyclists, or more commonly for sports physiology laboratories. They are a complete bike in themselves, and usually have quality components, comfortable seats and resistance is supplied by wind blades in the front wheel. If they are set up correctly for the individual cyclist, they are arguably the best, but most expensive option for indoor training.

They are very stable and will not move when you are doing intense efforts, but they are comparatively cumbersome and impractical to take to races. However, the type of resistance provided by these is great for developing power, as it requires the cyclist to work through the whole pedal revolution, particularly the upper and lower dead centres. So if you want a 'workhorse' machine, that you can train yourself into the ground on, the custom built ergometer is for you.

Enjoying your indoor training

By following a few basic guidelines, training indoors can be almost as pleasant as riding the roads.

1. *Ventilation*: Open all windows to ensure the air circulates, and set up a fan to blow directly on you while you are riding. This will help cool you and evaporate the sweat.

2. *Clothing*: Wear well padded and comfortable knicks. As the bike doesn't move with you while you are riding indoors, there can be a lot more pressure on your private parts. Some prefer to go 'topless' indoors, while other cyclists like to wear a light singlet to absorb the moisture.

Have a towel within reach to wipe your face and body if you get too sweaty.

3. *Hydration*: Always have a waterbottle handy, as the rate of sweating and fluid loss is greater indoors.

4. *Entertainment*: If you miss the scenery of the roads, you may need some additional stimulation to help pass the time. Television is fine - so long as you don't plan to train too hard, as you soon lose the plot of that movie you started to watch. Music is ideal, as you can pedal to the rhythm of the song, and still concentrate on your workout. The only problem is that in order to hear over the noise of your pedalling, you may have to turn the audio up so loud that the neighbours will start complaining, so it is recommended to use headphones or a 'Walkman'.

5. *Mirror*: Set up a mirror beside you and check out your technique. Is your body relaxed, your back flat and your pedalling smooth? Are you 'ankling' to the right extent?

6. *Computer and heart rate monitor*: Knowing what speed your are going, what your heart rate is, what your cadence is, how long you have been riding for, is all valuable training information that can be gained while riding indoors. It is also another way to help pass the time.

Training programmes

Training indoors should vary with the phase of the season you are in, and the event/s you are aiming for. While it can be used at any time of the season, as it is generally anaerobic, it is useful for 'peaking' riders if performed 1 - 2 times/week, 4 - 6 weeks out from a major competition. If you enjoy riding indoors (or if poor weather or dangerous roads stop you from riding outdoors), you can certainly train more often than this, but if you start to go stale, it is best to take a break for a few weeks.

An interesting programme can make an in-

Continued on Page 10...

Cycling continued from Page 9...

door session pass very quickly, and can be extremely challenging. One of the greatest uses of indoor trainers is that you can train very hard without worrying about looking where you are going. If you 'go for it' during the intense efforts you'll find you can push yourself to new limits without fear of falling.

Generally, thirty to sixty minutes is the optimal duration for this training, including a minimum of 5 minutes warm up and warm down. Some suggested formats follow:

(E1 = Easy, E2 = Medium, E3 = Hard, E4 = Max. effort)

a. *Sets*

Perform a number of set efforts (eg: 4 x 5 minutes E3), perhaps varying the gear/cadence with each effort (eg: 1 @ 90 rpm, 2. @ 92 rpm, 3. @ 94 rpm, 4. @ 96 rpm)

b. *Pyramids*

Another way to train is to progressively increase the duration/intensity of the efforts to a certain level, then perhaps decrease them again.

(eg: 2 mins E3, 4 mins E3, 6 mins E3, 4 mins E3, 2 mins E3 - taking 3 minutes easy between each effort)

c. *Time trials*

Simulate a time trial, and try and see how far you can cover a certain distance (eg: 20 kms).

d. *Sprints*

Although you can't sprint out of the saddle on indoor trainers, you can certainly work on your acceleration and leg speed in the saddle for breakaways and sprint finishes. (eg: 10 x 15 sec max. sprints > 140 rpm; 5 mins E1 between each)

e. *Mixed programme*

Let you creativity run riot, and mix a variety of interval types into one session.

f. *Partner*

Grab one of your cycling buddies, and do your indoor training together. By planning regular training sessions together, you will be more committed and motivated to train indoors.

So when deciding on a programme, determine what areas of fitness need to be trained at a particular point in time, and prepare a challenging, but achievable programme before you get on your indoor trainer. Sticky tape the programme to the handlebars, and try to work to it as closely as possible, but be prepared to adapt it if it is too easy or hard. Enjoy your indoor training, and not only will you get fitter faster, but you will have more time for other things in your life.

Athlete Profile

Name:
Margaret Russell
Age:
82 years

Sports/Events:
Swimming, Athletics

Occupation:
Past: Farm Hand/Housekeeper; Bookkeeper; Naturopath; Nurse; Manufacturer

Present: Retired - all charity work now

What do you enjoy about masters sport?
The fun, friendship. The means to keep fit.

What motivates you to participate?
To prove my fitness. Keep the hope alive. That of being an inspiration to other elderly people some day.

How do you keep yourself motivated?
By thinking that there is so much to lose if I did not keep on.

Favourite training session:
Swimming before breakfast, alternating with walking and running. This keeps my Dog fit too and happy.

How often do you train:
5-6 days per week. One day swimming, the next athletics.

Do you train under a coach, with a group of friends, or by yourself? Why?
Nearly always by myself. In our small town there seems to be no other in my age group interested. Coached privately a few times per year.

Person most admired and why?:
Mary Maina. She competed in the 1994 World Masters Games at the age of 101yrs. She inspired me to join the masters.

Other interests/hobbies:
As a volunteer for Meals on Wheels; Day Car Respite, Fundraising for various organisation, there is no time for hobbies.

Your most memorable moment in sport:
Bit early to answer this. Only started to compete in 1995. Perhaps being on the podium to receive Gold at the Australian Masters Games.

Your most memorable moment in life so far:
The birth of my only child.

Favourite movie:
Today's Movies - none to my liking. In the past "Blossoms in the Dust"

Favourite book:
"From here to Eternity" by James Jones

Favourite 'bad' foods:
Cake with lots of cream. Ice cream, sweets.

Favourite 'good' foods:
All fruits, green salads, nuts, pasta, rice.

Philosophy on life:
Live by the Golden Rule; help our fellow man wherever possible. Be cheerful and contented with your lot.

Advice to masters athletes wanting to improve:
Have lots of patience, perseverance and have the services of a good coach as much as possible.

Other Comments:
Regardless of age or condition have a go. It is surprising what can be achieved, just keep at it even if results are at first not up to expectations.

From the Research

Combining Strength and Endurance Training

I'm often asked the question whether doing strength and endurance training in the same session is wise. Research from the US of A suggests no worries. Thirty non-athletic males were divided into three groups - a strength-only group, an endurance-only group, and a combined group. Each group trained 3 times per week for 10 weeks. The strength group did 8 exercises, 4 sets/exercise and 5-7 reps/set; the endurance group did 50 minutes of cycling at around 60% of max heart rate, and combined the two into a single session. Both the strength and combination groups improved squat and bench strength by about 20% while improving fat-free mass by about 5%. The endurance group did not improve strength. Importantly for us older endurance athletes in need of strength, both the combined and endurance groups improved VO_{2max} by 16 and 18%, respectively. While the study was done on young non-athletes, the results suggest that we can do strength and low intensity endurance training together.

Compatibility of adaptive responses with combining strength and endurance training. McCarthy, J.P. et al., Medicine and Science in Sports and Exercise 27(3), 429-436, 1995.

Editor's note. If you do decide to do strength and endurance training in the same session, do the strength work first while you're fresh and make sure the endurance work is easy.

Endurance Training Workshop

Venue:	James Cook University Townsville Room BOO3, Block B - School of Education
When:	14 Dec 1996
Time:	10.00am to 5.00pm
Cost:	$25.00 includes afternoon tea & lecture notes ($20.00 for TMA subscribers)
Topics:	Training Intensities; How to Plan your daily/weekly/seasonal programme; Tapering.
Presenter:	Dr Peter Reaburn Exercise Physiologist
Enquires to:	***Sports Performance Consultants*** PO. Box 779 KENMORE QLD 4069 Tel: 07 3378 1439

TRIATHLON

Ten Tips To Avoid Overtraining

© by Greg Reddan

In 1982 I completed the Hawaiian Ironman Triathlon twice as the date was changed from February to October to suit the athletes from the northern hemisphere.

Greg Reddan

On the first occasion I had ten weeks to prepare after having won my second triathlon in Melbourne and a trip to Hawaii. For seven of those weeks I was on school holidays so I was able to train solidly and rest as much as required. Despite losing over 40 minutes on the bike leg to Scott Tinley, I finished seventh overall, was very pleased with my effort and thoroughly enjoyed the experience.

When I discovered the race was to be held in October, I set my goal to finish in the top three. I increased my training dramatically to average 500 km cycling, 110 km running and 12 km swimming per week. The low swimming volume occurred because I had to cycle 30km to the nearest heated pool and could only fit three sessions into my busy time-table. This amount of training was completed whilst teaching full-time and with two children aged 4 and 2. I was constantly tired and abusive, but continued to train hard, including a 3-31/2 hour run every Saturday followed by a 5-6 hour ride on Sundays. I finished 18th and was very depressed about my performance. The only highlight was a significant improvement on my swim time, whilst my bike leg was a minute slower and I struggled all through the marathon to finish 7 minutes slower overall. My wife threatened divorce if I tried a third time - I have never done an Ironman since, nor have I wished to! I am amazed at the popularity of the event 14 years on! I recently celebrated my first half century - hopefully I am a little wiser and will attempt to help you avoid the same overtraining mistakes.

"Overtraining is a pathological state of training. It is the result of overlooking the work-recovery ratio and exposing the athlete to high intensity stimuli when he/she is in a state of fatigue." (Bompa, 1990). The greater the intensity of training, the longer the recovery required - a simple ratio, but one which is frequently overlooked.

TRAINING FAULTS	ATHLETE'S LIFESTYLE	SOCIAL ENVIRONMENT	HEALTH
- overlooking recovery - higher demand than body's capacity - abrupt increase of load in training following long pauses (rest, illness) - high volume of high intensity stimuli	- insufficient sleep - unorganized daily program - smoking, alcohol, coffee - inadequate living facilities (space) - quarrel with peers - poor diet - over exciting and agitated life	- overwhelming family responsibilities - frustration (family, peers) - professional dissatisfaction - overstressful professional activities - excessive emotional activities (TV, noisy music) - quarrel with family re sports involvement	- illness, high fever - nausea - stomach aches

Activities which may facilitate overtraining

As a result, a fatigued athlete will not recover, adaption does not occur and he/she may become exhausted.

If rest is not provided even at this late stage, the athlete may become overtrained. When we train, we are also exposed to a high variety of stressors (work, family, peers etc.), which, along with heavy training, become too great - we become overtrained.

Symptons of Overtraining

The obvious outcome of overtraining is a decrease in the athlete's working capacity and performance. However, these symptoms are usually preceded by insomnia, poor appetite, heavy sweating and even night sweating. The development of overtraining is a gradual process and occurs in stages, the first being psychological. Tantrums, moods and enthusiasm change as result.

Psychological Factors

Research has shown that psychological indices demonstrate the onset of overtraining better than physiological indices. These are easily observed in self-reporting - lack of energy and drive; lack of motivation; lethargy and excessive tiredness; irritability, anxiety and depression; inability to concentrate; drop in academic performance; problems in sleeping; loss of appetite; loss of libido.

Psychological signs are the earliest warning signals and indicate more recovery is needed, rather than continued hard work. Performance can still be at an acceptable level even though the psychological factors are deteriorating. However, soon performance changes follow psychological changes indicating failing adaptation.

Performance Factors

When overtrained, we tend to show the following symptoms when performing: reduced level in training and racing; advent of technique changes and errors; inability to finish training sessions; poor time-trials and racing.

Physiological Factors

When physiological measures indicate overtraining, the athlete will only recover when extended rest and rehabilitation is provided. Some of these symptoms are: gradual increase in joint and muscle soreness (e.g. swimmer's shoulder); decreased appetite; weight fluctuations; change in resting heart rate; drop in blood pressure on standing; swelling of lymph glands; gastro-intestinal disturbances e.g. diarrhoea and nausea; increased susceptibility to infections, allergies, headaches and injuries; poor healing of

Continued on Page 12...

Get Set!

Calendar of Events

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

MARCH/APRIL 1998
Aussi National Swim
Hobart, Tasmania
Contact: (08) 344 1217

AUGUST 9-22 1998
Nike World Masters Games
Portland, Oregan, USA
Contact: (08) 344 1217

Triathlon continued from Page 11...

skin lesions; amenorrhoea (loss of periods) in women; increased fluid intake at night.

Preventing Overtraining

The old maxim "Prevention is better than cure" is certainly true in regards avoiding the overtrained state. Some guidelines to prevent overtraining are:

1. Increase the training stimulus in graduated steps so the athlete is prepared for each increment in workload. If we increase the intensity, duration or frequency of effort suddenly, we are likely to induce an overtraining response.

2. Allow at least 48 hours of recovery time between hard training sessions - as we get older, we take longer to recover, so we may need to compensate by reducing the number of hard sessions per week. Remember, if you are not enjoying training, there is a good chance you need more recovery. Don't be afraid to go slowly on your easy days to ensure recovery!

3. Eat a balanced diet containing all the basic nutrients, with particular emphasis on the carbohydrate component for endurance sports. If you don't eat enough carbohydrate, your glycogen levels will drop. If you then continue to train, you will end up exhausted and overtrained.

4. Ensure adequate rest and sleep between training sessions. The highlight of my day now is my midday siesta - it enables me to do another easy session in the afternoon as I like to train hard in the morning. Some of my friends regard it as laziness, holding true to the Protestant work ethic, but they quite often complain of excessive fatigue!

5. Individualise the intensity and volume of training being prescribed. We need to understand our own physiological and psychological attributes and our state of fitness when working in a group situation. We need to do our own thing, rather than try to match it with a better or younger athlete on a regular basis (but it's good to beat them now and again!)

6. Be prepared to modify the training prescription to suit the environmental conditions - we need to reduce the intensity and duration of sessions in hot weather to avoid exhaustion and dehydration. Similarly, we need to be aware of hypothermia in cold conditions, especially the lean and hungry ones who are first to suffer!

7. Be aware of any aspects of our daily lives that might impact on the ability to tolerate physical training e.g. social, emotional, and work stresses need to be considered and training altered accordingly or, in some cases, cancelled.

8. Monitor our psychological, performance and physiological responses during training and competition as a guide to our ability to cope. Notes in training diaries give good indication when we are becoming overtrained. Listen to your training mates, friends or spouses - they will be the first to tell you if they notice some of these symptoms. Don't ignore them like I did!

9. Adjust training loads according to the implications of psychological and performance indices. I remember the comment of Mark Sisson, who finished fourth in Hawaii in 1982, that he would pack up and go home if he could not train at 20mph (32kph) in his long cycle rides. He would wait till the next day, rest, eat, drink and try again when fresh and ready! How often do we masochists insist we must flog our bodies because that's what the program says!

10. Organise the training year into phases, particularly the competitive season to ensure variety and recovery are plentiful. Human beings thrive on variety in all areas of life and we need to keep this in mind when planning our training year and selecting certain competitions as our goals.

In summary, listen to your body and you will be still competing when your overtrained mates are nursing their injuries.

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