THE MASTERS ATHLETE

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Australian Masters Athlete of the Year 1997

Peter Gilmour - Masters Swimmer

At the recent Australian Masters Games in Canberra, the winners of the inaugural Australian Masters Sport Awards were announced and presented with their trophies. These awards were decided on by an academy of voters nominated by National and Masters Sporting Organisations and are designed by the Confederation of Australian Sport. The sponsors of the award recognise the outstanding achievements of Masters participants. The Masters Athlete of the Year was presented to Peter Gilmour. The following is what Peter wrote for us, when we asked him about masters swimming. If I've followed Peter's story correctly, it's the people, that make Masters sport worthwhile.

"Hi, Nadine. How was your trip to New Zealand? They flew you business class! Boy, some people go in style. Next week you won't want to talk to us plebs at the pool."

Nadine Neumann is the star at the Ryde swimming pool between 8 and 10 each morning. She is 22, lovely looking — incredibly athletic, a magnificent swimmer and she talks to all of us oldies down at the pool! She swims five sessions each week by herself at the Ryde pool; her other sessions she does with the squad at Homebush. Last year she won theOlympic trials in the 200m breastroke and she came 6th in the final in Atlanta. This year she has qualified for the World Championships in Perth in the 400m IM, the 800m freestyle and the 200m breastroke."Hello, Guy." That's Nadine's Dad.He is here to time her for a couple of race-pace swims at the end of her training session. He writes the times in his little book."How did she do today Guy? Did she swim her goal time? She looked great!" "I didn't feel great" puffs Nadine. "My pulse is over 190 and my knees hurt. I can't wait to next week when I start to taper." "OK", Guy says to me," are you ready? "I'm ready to time you."Greg McWhirter, Nadine's coach, has me on a three month program — six sessions a week each between three and a half and four and a half kilometres. He has just arrived at the pool. I am working on my 50m butterfly. He watches my time trial. "Push harder off the block,keep kicking hard the last 15m and make sure your catch is not slipping towards the end." Greg, Nadine, Guy, Josh — Nadine's boyfriend who has just arrived — and I talk about the scheduling of her events in Perth and the really good training times she has been doing."

> "I DO IT BECAUSE I LIKE GOING TO THE POOL AND CHATTING AND SWIMMING WITH ALL MY MATES DOWN THERE. MY MATES WHO ARE OLYMPIANS, HOPELESS SWIMMERS, NATIONAL MASTERS RECORD HOLDERS, SOLID SWIMMERS, AND WHALES. WE ALL ENJOY THE COMRADERIE, THE EXERCISE, AND THE SPIRIT AT THE SHANE GOULD RYDE POOL."

Good morning David, morning Jenny." It's the next morning, Wednesday. Nadine doesn't come on Wednesdays. David and Jenny train together most days, David has just gone up into the 45 to 49 year age group for Masters swimming. Jenny has gone up into the 40 age group. On New Years Day David had said "Today I am five years older (ages for masters swimming are taken from the 1st of January). Its strange to be this happy that I'm older! Both David and Jenny have their sights on a number of national records this year.

Just as I am about to start my session John arrives. John is about my age and works in marketing for a multi-national company. I'm not looking forward to it", he says. I've been slack and haven't been in the water for about three weeks." "When you are our age", I tell him, you've got to keep plugging away or its hard to get back to where you were. John does his twenty laps and comments as he leaves that it wasn't so bad.Judy is walking backwards in the lane next to mine. (She does aerobics in the indoor pool three times a week and swims twice a week.) "Here comes Mr. Kong" she yells. Down the side of the pool comes Mr. Kong — walking backwards. We are not to sure where Mr. Kong comes from because he doesn't have much English. But we wave and smile. Some time ago someone at the pool saw him get off the bus and, just as he does at poolside, walk backwards down Victoria Road toward the Ryde complex. But Mr. Kong doesn't swim backwards. He swims forwards; in a very slow and considered fashion.

Other regulars are there. Alison, thirtysomething, is a really good swimmer who surprisingly does open turns. She doesn't talk much.

Patty, who swam for Australia in the Empire Games in Jamaica, is now in her sixties and still swims a smart thirty laps. Campbell,

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This Issue..

Editorial

Hello to all our Readers

We hope you'll find this another interesting issue. Our Guest Editorial is a great read. Congratulations to Peter Gilmour on being voted the Masters Athlete of the Year for 1997.

Liz Hepple (cycling) is back writing for us again. Liz was a world class cyclist and triathlete before kids. Now she is a very busy Mum, and cycling coach for the Queensland Academy of Sport. It's great to have Liz back as her articles are very factual and easy to read.

Dr Grant Schofield has also written another article for us - tips for triathlon speed. Grant is an elite triathlete, sports scientist and sometime coach. He told me he wrote the article in his head while out training. Where else would you write an article on triathlon training.

For improved efficiency we are changing the subscription process. Our aim is to have everyone renewing at the one time(Feb). To bring everyone into line, as your renewal comes up, we propose the following: due now you owe $27.50; due Aug, you will owe $22.00; Oct, $16.50; Dec, $11.00.

Cheers

Claire and Peter

THE MASTERS ATHLETE

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ENDURANCE

Enhancing Recovery

© by Dr Peter Reaburn

Ageing is a wonderful thing. No doubt, the wisdom comes with the greying hair. So does the ability to *listen to the body.* Unfortunately for we older competitive animals, another factor that comes with age is longer recovery times between quality training sessions. Recovery is so critical to your overall training plan. It enables you to adapt to the session(s) you've been doing and also gets you ready for the next workout without being tired.

The purpose of this article is to briefly examine some real-world ways of enhancing recovery.

1. Get enough sleep

Ensure you get what you need or do as I do and try and catch up with a weekend "camp" for a couple of hours. Try and adhere to the same going-to-bed-time and wake up time so the body clock stays in sync. There's also a list of things to avoid in the evening before bed to help you get to sleep:

- Caffeine (coffee, tea, cola drinks, chocolate)
- Nicotine
- Alcohol
- High protein meals
- Stress

2. Use active recovery

Personally, I use light jogging or easy spinning on the bike depending on my training emphasis for the week and what I've just done to make me tired or sore. Water activities such as easy swimming, spas, water running with a vest or just sitting in a pool kicking the legs is a great way to go.

3. Rest Days

These are essential. Most masters athletes have families or careers/commitments. A day of rest from the stresses of training enables us to "come up for air" and catch up. More importantly, it enables us to refill those muscle carbohydrate stores. When to take them is an individual matter but a busy work (stress) day is a good one.

4. Massage

Sports massage from a masseur or done on yourself or by a partner does a number of things to the body:

- Increases blood flow to deliver oxygen and nutrients for recovery
- Provides temporary flexibility gains through warming-up the muscles and tissues
- Psychological effects such as relaxation and stress relief.

5. Food

Exercising long and / or hard uses muscle, liver and blood stores of carbohydrate. To promote the after-exercise storage of carbohydrates, sports science has suggested the following crucial guidelines:

- Consume a high carbohydrate meal or snack within 30 minutes of training
- Be organised and have suitable food (breads/lollies) and drinks (sports drinks / soft drinks) available where you train
- Aim to consume 1g/kg of your body weight (BW) carbohydrate every two hours until your next meal
- Consume 8-10g/kg BW of carbohydrate daily (Banana = 20g, Bread = 15g/slice)
- Avoid alcohol – it inhibits carbo storage.
- High Glycemic Index (GI) foods are best for recovery – lollies, sports drinks, soft drinks, breads, watermelon.
- Small, regular snacks throughout the day / night are the go.

6. Fluids

All endurance athletes sweat but very few drink enough during training. This means drinking after training is crucial to enable the body to return to its normal water balance. The following guidelines are again crucial for the older endurance athlete to enhance recovery of fluids:

- Drink to a plan rather than thirst or availability. Know where the taps are on your run, take enough water / sports drink in the boat or on the bike, or have a waterbottle with you at the pool.
- Weigh yourself before and after training / racing (1kg of weight loss = approximately 1L of fluid loss).
- Drink 1.5 to 2.0 times the volume of fluid you've lost. Remember you'll keep peeing and sweating after training / showering.
- Ensure drinks are available after training or racing, preferably sports drinks with glucose and sodium needed to retain water.
- Flavoured drinks encourage drinking and therefore make it more likely you'll drink.
- Sports drinks get fluids and carbo's in at the same time – use them.
- Replace sodium – it helps hold fluid. Sports drinks or salt added to meals help.
- Avoid alcohol or caffeine since they encourage peeing.

7. Hot and Cold Baths / Showers

Different I know, but a recovery strategy commonly used by the eastern bloc countries and increasingly used by elite athletes throughout the world. This strategy involves taking alternate hot (35-38C) and cold (10-16C) showers for 1 - 2 minutes of hot and 10 - 30 seconds of cold for 3-4 repeats. Ensure you hydrate before and after the shower / bath session because you'll sweat.

Conclusion

It can't be emphasised enough that recovery from training or racing is just as important as the training itself.

Training with intensity is crucial for the older athlete. The older athlete takes longer to recover. Therefore the use of the above recovery strategies becomes even more important for we older athletes.

I know some of them might appear a little different to what you might be used to doing. However, sports science recommends them, and coaches and elite athletes are using them as they search for that extra 'edge'.

Read, digest, plan and use the above strategies – they work!

"Maybe the only reason you are 'past it' is that you over- accelerated."

from reader Bob Horman

The Team

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SPORT PSYCHOLOGY

Preventing Burnout

© by Wendy Swift

Burnout is a state of complete physical, mental and emotional exhaustion and can have a number of different causes. Overcoming burnout usually requires time out from competition and training if the athlete is to ever return to his or her previous level of competitiveness. Many athletes give up their chosen sport altogether so it is far better to recognize the signs and symptoms of burnout and aim for prevention.

Burnout is not a sudden occurrence and there are usually a number of early warning signs. A slump in performance, feeling stale, flat or unmotivated for whatever reason could be an early warning sign. These warning signs can be debilitating and depressing and if not addressed will continue on a down hill slide into burnout. Recognizing warning signs is not always easy as you may attribute them to other causes. For example you may feel that your partner is no longer as supportive as they were previously or that work is just a bit out of control at the moment, or that it is just a busy time of year. If you can recognize the early warning signs you can implement some changes to prevent burnout. Here are some more specific symptoms to look for including -:

- loss of self confidence
- irritability
- lack of appetite
- prolonged tiredness
- anxiety
- depression
- sleeping difficulties
- anger or feeling quarrelsome

Be particularly aware of these symptoms if they are not characteristic of you. Other indicators include persistent physical problems such as bowel problems, higher than normal resting heart rate, slower recovery and weight change. If these symptoms are present you should always seek a medical check up first and then ask yourself the following questions -

- how long is it since you have had a break from training?
- Is your training regime the same week in and week out without variation?
- Are you always following the instructions of others - coach, training partners -so that your training is not really in your control?
- Do you feel you are overloaded with commitments, including work, family, sport and other interests?
- Are you bored with your competition goals?
- Have you been feeling that your accomplishments are nothing great?
- Do you receive encouragement or congratulations on what you have achieved and are still doing?
- Do you feel that competition is extremely stressful?
- Do you perceive the rules of your sport to be too stringent and the administration unhelpful or abusive?

If you are an athlete who finishes competition only to head straight into off season training you are setting yourself up for a slump in performance or burnout. Even if you are physically capable of continued work your mind needs a rest too. Remember that your body is a total package and the length of your sporting season is an important factor in the occurrence of burnout. Take a break, either an end of season rest, or a simple unscheduled rest day, to put the spark back in your competition.

Monotonous training schedules can lead to mental fatigue, boredom, and loss of enjoyment which makes training harder than it should be. Put some variety into your training. If you plan your own sessions this is easily done with a bit of forethought. Establish the goal of the session then use your imagination to come up with different ways of achieving the goal. Adding in some mental skills training such as imagery can also make a useful and interesting change. If you train with a group of friends, have each person come up with a different session. Most coaches are aware of the need to put variety into their sessions, if you feel that they don't, you need to communicate how you are feeling. This will

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Guest Editorial continued from page 1

another businessman, swims with great enthusiasm but little style and not much efficiency. Ernie, eighty-five, is having some health problems but still comes to the pool and enjoys talking about his Sunday mornings over at the Bondi Icebergs. Helen, a power in the Ryde Masters Swimming club and in the NSW Masters organisation — is a dedicated swimmer and my unofficial PR manager!

In my current four week swimming cycle I am doing a sprint session, then an endurance session, then another sprint session, another endurance session and on Saturday morning a sprint and aerobic session. The Wednesday session has turned out to be the hardest. It includes a set of four 50s freestyle on 50 seconds and four 25m butterfly sprints off the blocks with no breath on one minute 15 seconds — all times five! The no breathing is hard and my heart rate is over 150. What should it be? Is the formula for your maximum heart rate eighty per cent of 220 minus your age[0.8 * (220-55) = 132]? This couldn't be right! On many days my body won't move as much as it should to get my heart rate up to where it should be. Has Greg forgotten that I am 55 and not 15 or even 22? Oh! howI wish I could swim like Nadine. Do I find her zooming past me all the time inspirational or depressing!?

So why do I keep swimming? It has been over thirty years since I went to America to swim for Cornell University. It is about forty years since I swam for Victoria in Australian championships.

I do it because I like going to the pool and chatting and swimming with all my mates down there. My mates who are Olympians, hopeless swimmers, national masters record holders, solid swimmers, and whales. We all enjoy the comraderie, the exercise, and the spirit at the Shane Gould Ryde pool. I do it because I like how it hurts and how good you feel for the rest of the day after it has hurt. I do it because I like still being able to swim fast — not nearly as fast as I could when I was a kid, but fast enough to be pleased about my performance. I do it for the surprise of my students (all full time managers who are part time students averaging in their mid-thirties) when they discover that their old bearded professor is not uni-dimensional. I do it because I love it!

From the Research

A Pain in the Side

Every endurance athlete has experienced a "stitch" at some stage in their athletic career. Myth suggests it's caused by lack of fitness, eating or drinking too close to exercise or eating or drinking the wrong foods. Most texts suggest a digestion-related origin of the "stitch" with some evidence to suggest a ligament attaching the gut to the diaphragm may also be to blame.

New Zealand sports scientists recently examined the phenomena in 260 endurance athletes by survey. Runners were the most likely to get a stitch with rowers the least likely. Hunching forward, pressing the site of the stitch and taking deep breaths were the most common cures.

Five runners ran at high speeds on a treadmill after drinking one litre of a variety of fluids including water, a sports drink, flat coke, and a sugary drink which had a laxative in it(!). All athletes received a stitch suggesting it was the volume of fluid not the type of fluid that was the problem.

The same researchers then tried a variety of ways to get rid of the pain while running on the treadmill after drinking a litre of flat coke. Bending forward while tightening the abdominal muscles and taking deep breaths was the most effective method.

Plunkett & Hopkins (1995) The cause and treatment of side pain 'stitch' *Medicine and Science in Sports and Exercise* 27(5): S23.

SPORTS NUTRITION

Beware of Supplement Marketing

© by Gary Slater (Sports Dietician- AIS)

You're committed to regular training, never missing a session even when your training partners progressively drop out towards the end of a hard week. You're careful with what you eat and try to get at least 8 hours sleep each night but is there still something missing, something that could shave precious seconds off your PB and give you the competitive edge? If you have thought about that special "something", no doubt you have considered experimenting with dietary supplements.

When the search for the "magic bullet" strikes we often find ourselves in the supplement section of a supermarket or nearby health food store. Now the confusion begins. Bright labels with extravagant, pseudo-scientific sounding claims meet the eager consumer who is usually so engrossed with what the product may offer their performance they do not even consider questioning the feasibility of claims. Pictures and quotes of elite athletes also grace the cover of many supplements in an attempt to add credibility to a product.

The idea of simply taking a supplement to improve performance without any further commitment to training or diet sounds appealing and probably explains why the sports supplement industry has become a multi billion-dollar affair throughout the world. However the question remains, can you believe the claims made on a label of the latest sports supplements?

Who controls food labeling claims in Australia?

Food standards, which include labeling laws, are set and maintained by the Australia New Zealand Food Authority (ANZFA). All manufactured foods sold in Australia must conform to a Code of Practice that prevents manufacturers from adding unapproved ingredients or making misleading or false claims about a food and this is very tightly controlled for food at least. Sports supplements do not fall under these stringent guidelines and thus often misleading and incorrect information can be presented without fear of reprisal. The ANZFA is currently attempting to make amendments to the Australian Food Standards Code to more adequately cater for sports supplements but the issue of label claims still remain.

"Bright labels with extravagant, pseudo-scientific sounding claims meet the eager consumer who is usually so engrossed with what the product may offer their performance they do not even consider questioning the feasibility of claims"

Labeling claims are tightly controlled for foods we find in the supermarket. For example, even though the weight of scientific evidence supports the notion that a high calcium diet in combination with regular weight bearing exercise and normal hormonal profile reduces the risk of developing osteoporosis, you will never see claims on a milk carton regarding consumption of milk reducing the incidence of osteoporosis. Such tight labeling laws do not currently exist for sports supplements. Table 1 summarizes just a few of the claims

Sports Supplement	Marketing Claim	Scientific Support
Sports Drink	speeds fluid through your system & provides energy to working muscles	√
Protein Powder	helps develop muscle, minimize injury & improve recovery*	√/x
Fat Metaboliser	mobilizes dietary fat & assist athletes "cut up"	x
Creatine	fuels short energy bursts & also important for endurance athletes**	√/x
Amino Acids	needed to maintain muscle mass following workouts	x
Ginseng	improves stamina during times of physical exertion	x
High Carbohydrate powder	speeds recovery	√
Sports Bar	rich in carbohydrates to fuel optimal performance	√
Chromium	enhances energy utilization & protein synthesis	x

Table 1. Common claims made regarding sports supplements and scientific opinion of such claims.

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made by some of the most popular sports supplements. As a general rule of thumb, the more abstract a supplement is, the more imaginative claims will be regarding its ergogenic potential. However, even some of the most reputable dietary supplements, whose benefit to athletic performance is well supported, can make false and misleading claims.

*An energy dense supplement drink may support gains in muscle tissue but its benefit comes from extra energy added to the diet, not additional protein

** While creatine supplementation may be justified for athletes undertaking repeat bouts of high intensity exercise, there is no support for its use with endurance athletes

What can we believe on a sports supplement label?

Almost all supplements include a list of ingredients on labels, presented in descending order of quantity. This may give us some idea of "active ingredients" in the supplement but little else. Additionally, energy containing supplements like sports drinks, liquid meal replacement powders, high carbohydrate sources and sports bars will also include a nutrition information panel, helping you to at least ascertain nutritional value of the product e.g. energy, carbohydrate, fat and protein content. Most products also provide a recommended dosage that may or may not comply with current scientific recommendations on the most appropriate dosage and timing of consumption. Little other information of value to assisting the consumer make an informed decision is presented on a supplement label except a caption in small print which usually reads "dietary supplements may only be of assistance if dietary intake is inadquate". Even supplement companies acknowledge that a well balanced diet should still be your number one priority.

A huge array of supplements confront the eager athlete, some work, most don't and yet there are others in which we are unsure. When considering the exchange of your hard earned dollar for a sports supplement, remember that no product will work for all athletes in all situations. As such it may not be the supplement that offers the edge but knowing when and what to take in appropraite doses. Unfortunately this information is too rarely reported on a product label and its potential use, if any, may be lost.

Guaranteed more products will arrive in the market place promising bigger and better gains in athletic performance. Make use of articles presented in independent athletic magazines like TMA and if the opportunity arises, talk to sports dietitians and exercise physiologists to help you make informed decisions relating to the ergogenic potential of specific sports supplements for your individual situation. Until then, continue with the hard training, sensible eating and recovery strategies as this is without doubt a proven method of assisting you achieve your maximal potential, it's just not as marketable as most supplements!

Athlete Profile

Name: Jack Gubbins
Age: 67

Sports/Events: Veteran Athletics, Triathlon
Occupation: **Past:** Professional Engineer
Present: Professional part-time
What do you enjoy about masters sport?
Friendly competition.
What motivates you to participate?
A sense of achievement and well being.
How do you keep yourself motivated?
Focus on a future event and train to achieve your best performance. Membership of Veteran Athletic Club and Triathlon Club.
Favourite training session:
Long weekend bike ride
How often do you train?
Average four runs, three swims and three bike rides per week.
Do you train under a coach, with a group of friends, or by yourself? Why?
Usually alone because it is easier to slot training with other activities. Some swims [illegible] runs are with groups, some swim

[illegible] *and why?:*

[illegible] house building and renovation.
Your most memorable moment in sport?:
First premiership in Australian Rules Football.
Your most memorable moment in life so far?:
No particular moment either happy or sad sticks out above the rest.
Favourite movie:
The Big Steal and Dirty Rotten Scoundrols
Favourite 'bad' foods:
Ice-cream.
Favourite 'good' foods:
Fruit
Philosophy on life:
Live life a day at a time.
Advice to masters athletes wanting to improve: Train regularly and have a prearranged program of events which you want to take part in.
Other Comments:
After 29 years playing Australian Rules Football I needed some sporting outlet that catered for older people. Tennis, Veteran Athletics and triathlon have provided such an outlet.

"YOU DON'T GET TO CHOOSE HOW YOU'RE GOING TO DIE, OR WHEN. YOU CAN ONLY DECIDE HOW YOU'RE GOING TO LIVE. NOW!"
Joan Baez

What's Hot

CHLORINE RISK TO SWIMMERS

A little researched area but a commonly asked question from swimmers is: *Is swimming pool chlorine a risk to swimmers?* The Age newspaper recently ran an article on the topic. So in response to TMA reader and Katoomba AUSSI member Ray Wood's question, lets have an examination of the problem.

Greenpeace Stirs the Pot

Greenpeace Olympic campaigner Michael Bland recently said his organisation was conducting studies into the risks of chlorine use in pools in an effort to persuade councils to use alternative disinfecting techniques. He suggested that evidence from overseas suggested that swimmers training up to five hours a day were at a risk of absorbing chlorine by-products which can cause nausea and lethargy. He suggested that swimmers were particularly at risk because they breathed in high concentrations of the chemicals which hovered just above the water surface.

A Physiologist's Stand

Australian Institute of Sport physiologist, Dr David Pyne, has studied the immune system of swimmers for over seven years and has suggested that there was anecdotal evidence from swimmers at elite and non-elite levels that chlorine had an impact and caused discomfort.

A Coach's Stand

Susie O'Neill and Sam Riley's coach, Scott Volkers, has stated that there were occasions when councils super-chlorinated pools and swimmers suffered "roughed-up tongues and throats". "It takes the colour out of togs so it must do something to your body" he said.

Sport Science's Stand

What few studies have been done suggest that swimmers doing high intensity (deep breathing) work for long periods are more at risk of respiratory problems. It appears that indoor pools are more likely to cause problems due to the air containing high levels of irritants.

A 1994 survey of 738 swimmers showed a very high proportion of respiratory illnesses (10-25%) with sneezing (45%), coughing (36.4%), headaches (35.9%), sore throats (27.1%) and chest tightness (25%) common.

Conclusion

Interestingly, the Homebush swim facility for the 2000 Olympics uses ozone to disinfect the water. Ozone kills the harmful bacteria which can escape chlorination. However, coach Volkers has noticed his swimmers tended to sneeze and some received slight burns from the ozone-treated pool. Finally, research suggests that airflow of fresh air may alleviate the problems.

by Peter Reaburn

ROWING

Training in the "ZONE"

© *Dr Peter Reaburn*

Rowers, like all endurance athletes, can use heart rates to train smarter. Heart rates enable both the athlete and coach to train specific qualities necessary for successful race performance. These qualities include a high aerobic capacity or VO_2max, a high anaerobic threshold, the ability to cope with the pain of race-producing lactic acid, the ability to burn fats and carbohydrates effectively, technical excellence and speed. Each of these qualities can be trained by using specific heart rate zones. The purpose of this article is to outline these zones and to give specific examples of work pieces the masters rower can use to develop these qualites.

The Zones

Table 1 below gives the five zones that can be used by the smart rower.

Zone	Quality Developed	% of Max HR
Utilization 2 (U2)	Burning fat/technique	60-75
Utilization 1 (U1)	Burning fat/carbo/technique	75-85
Anaerobic-Threshold (AT)	Burning carbo/elevating AT/ elevating VO2max	85-90
Transport	Elevating VO2max/pain tolerance/race speed	90+
Anaerobic	Speed/pain tolerance	All out

Determining maximum heart rate

A number of ways are available to rowers depending on dollars / health / and motivation. Ideally, for the masters rower with a few dollars, this test should be done in an exercise laboratory at a University with a sports science department. Most Uni's have these nowadays. For rowers over 40, a doctor should be present or at least have screened you prior to testing on an ergo. If you've been screened by your doctor and are healthy, you may wish to do the test yourself, depending on how well motivated you are. For the recreational rower or beginner, using the formula 220-age may suffice, despite being inaccurate for most people. However, for the more competitive masters rower this formula won't do. Either of two tests are suggested if the lab test is not an option.

1) Two all-out 3-4 minute pieces on an ergo or in the boat with 1-2 mins in between.

2) A step-test consisting of 10 x 1 min pieces starting easy (rate 22-24) and gradually building rating and pressure till the last piece is all out. These are done with no break between the pieces.

Ensure a good warm-up (eg. 10-15 mins U1-U2 then a series of 3-4 x 5 on - 5 off efforts) and a good warm down. The test MUST be done with a heart rate monitor as taking the pulse manually has been shown to be highly inaccurate.

Utilization 1 and 2

The purpose of this easy work is to build a strong endurance base, teach the body to burn fat, get the muscles, tendons and ligaments ready for the harder work, and 'groove' technique. Because it's easy work, the duration of the workouts can be long.

Examples:

Reps	1	1	1-2	2-3
Duration (min)	45-90	30-75	20-60	15-20
% Max HR	60-75	60-75	70-75	70-85
Rating	18-20	18-22	18-22	22-28

Anaerobic Threshold

This type of training builds strength, pain tolerance, aerobic capacity and the ability to hold technique when hurting. The rest between sets should be easy U2 rowing at low rating (18-20)

Examples:

Reps	1	2-3	3-5
Duration (m)	20-45	8-12	3-5
% Max HR	80-85	85-90	85-90
Rating	24-28	26-30	28-32
Rest Between (min)	-	3-5	1-3

Transport

Transport training elevates the all-important VO_2max, develops the ability to tolerate lactic acid 'burn', and is race-pace training in terms of the mind and technique. Again, the rest between repetitions should be easy rowing, not sitting.

Examples:

Reps / Sets	2-4	3-6	5-10/1-2
Duration (m)	4-6	3-5	30sec
% Max HR	90+	90+	90+
Rating	24-30	26-32	28-34
Rest	3-5min	3-4min	15sec/ 3-5min

Continued on Page 10..

CYCLING

Safe Cycling

© by Liz Hepple

Riding a bike in itself a bit risky? Add a few cars, some potholed roads, poor lighting, 'race track' bike paths, and a quiet bike ride can turn into a nightmare. But you can reduce the chances of injuring yourself by following a few simple guidelines.


Liz Hepple

Clothing and Equipment

What you wear and ride can make a big difference to your safety on the road.

Wear a helmet! This is absolutely crucial - and if you crash it will reduce your chances of head injury or death by more than 80%. Make sure the helmet fits securely, and the chin strap is positioned correctly. Clipping a visor to the front of your helmet also increases your vision in strong sunlight, and stops the rain blinding you if you are caught in a downpour.

Be seen on the road! The bright colours of most cycling jerseys are not just for show, they help motorists see you. If you are riding at night don't forget to wear your reflective vests and strips (on helmets and shoes), but remember these are not adequate on their own - you should have a strong headlight and taillights. Flashing taillights are ideal, as they catch the eye of motorists more easily than constant lights.

Maintain your bike. Failing brakes can cause the most serious damage. Check for worn brake pads, frayed brake cables and general maintenance of levers and calipers. Check that your tyres are in good shape, with reasonable tread for grip on slippery surfaces and no major cuts. If you use 'singles', make sure they are glued on properly. Periodically check the frame for signs of cracking, especially if you have had a crash. Ensure cranks are adequately tightened.

Cycling technique

Safe control of the bike begins with proper technique. Learn to pedal smoothly and relax the shoulders and arms. If you are tense on the bike, not only are you more likely to fall, but more likely to hurt yourself if you do. Good bike handlers treat their bike as an extension of their body, and manoever it with their hips as well as their hands. Practise steering the bike while riding 'no hands', or with hands only resting lightly on the handlebars if you are less experienced. If you master this your reaction to the unexpected will be smooth and controlled.

Bunch etiquette

While riding in a bunch stick to two abreast maximum, and follow the line of the rider in front of you. If you have to overlap the back wheel of the rider ahead (as in crosswinds or sudden slowing) be ready to react to sudden movements - if your front wheel is knocked sideways, good chance you'll end up in the dirt.

Point out obstacles such as potholes, glass, and always use hand signals if turning (especially if you will be crossing the line of the person beside you) Never make any jerky, unpredictable movements and if you need to brake, do it gently so that the rider behind doesn't crash into you. When looking behind you, make sure you hold a straight line - lightly resting your hand on your 'neighbours' shoulder will help keep you straight.

Traffic awareness

Cars and trucks are an unfortunate part of city cyclists lives. Always focus on what is happening 10 - 30 meters ahead, so that you have time to react appropriately. Watch out for recently parked cars, whose drivers are about to get out - many serious collisions are caused by motorists opening their car doors straight into cyclists.

If you cannot establish eye contact with a motorist that you have right of way over at an intersection, proceed with caution - they may not have seen you. Volvo's are great cars, but some of their drivers aren't, so be vigilant when sharing the road with them - along with good old boys, gravel truck drivers, mobile phone users and people leaving hotels. You can probably think of a few drivers to be wary of yourself.

Nothing aggravates a motorist more than cyclists who disobey the traffic rules. I know you're not hurting anyone, but don't run red lights or ignore traffic signs, and use caution if riding up the inside of traffic when they are stopped at lights.

Training times and places

One of the best ways of avoiding a bike accident is to ride at quieter times if possible. Early mornings are good, particularly on weekends. And if you have time in the middle of the weekday, you'll find the traffic more aggreeable then. If you are riding at sunrise or sunset, be aware that motorists can barely see you when the sun is in their eyes, so try and avoid narrow roads that head straight into the sun.

Use minor roads with a good surface, or busier roads that have a wide, smooth shoulder to ride on. Many bike paths are great for an easy pedal but some are obviously designed by people who don't ride bikes. With blind corners, steep bends, they should be tackled conservatively, as they are not the safe haven they are meant to be. Add a few runners, dogs and kids on bikes, and it is no surprise that more bike crashes occur on bike paths than roads, some of them very serious.

You could also do some of your rides on the windtrainer in the safety of your garage, and improve the odds of staying upright.

In summary, the general rules for safety on the bike are to use common sense, to be relaxed but prepared for the unexpected, and to be courteous to other cyclists and motorists. And if all else fails, remember the cyclists motto - "Give way to anything bigger than you".

From the Research

Life expectancy and sport

Do highly-trained athletes live longer than non-athletes? Which sports appear to lead to the longest life?

Finnish scientists studied 2,613 former male athletes who had represented Finland in a variety of sports and compared these results with those from 1,712 former army personnel. Using a statistical technique which factored in current health status, current lifestyle behaviours and numerous other factors, life expectancies were estimated.

Former endurance athletes had a life expectancy (LE) of 75.6 yr, team athletes (soccer, hockey, basketball) and sprint athletes (sprinters and jumpers) a LE of 73.9 yr, power athletes (boxers, wrestling, lifting, throwers) a LE of 71.5 yr while the sedentary army group had a LE of 69.9 yr.

Sarna et al. (1993) Increased life expectancy of world class male athletes. Medicine and Science in Sports and Exercise 25(2): 237-244.

Did You Know?

- 34% of women and 48% of Australian men aged 20 or over carry too much weight.
- obesity is more common in women (11%) than men (9%), especially in older age groups.
- 13% of women and 11% of men follow a fat-modified diet.
- At older ages, 23% of women and 20% of men eat to lower their blood fat.
- In 1991, 42% of women and 43% of men had NEVER had their blood cholesterol measured.
- The proportion of both women and men with elevated cholesterol levels increases with age.

Sport Psychology Cont'd from Page 3

give you back a feeling of control, that you are directing your own path and are not at the mercy of external factors.

Sport is not the only area in which an athlete can feel a loss of control. Family, social and work pressures often build up to intolerable levels. When the pressures come from several different sources simultaneously you may feel that you can't identify what is wrong. It is the cumulative effect that is causing the warning signs of burnout. Identify something that you have control over and make some changes to suit you. If your time schedule is too full, make a list of the things *most* important to you and make sure that these are not the things being sacrificed. Learn to say "no" to some of those things that did not make the list.

Feeling flat or unmotivated can be a result of monotonous training or a result of being bored with your goals. To turn your motivation around remember that goals are not only long term and not only for competition. Goals can cover any aspect of your life from managing your time, to making yourself plan out a new training session. By adding in some short term goals that show results immediately you develop an achievement orientation that will start you feeling motivated about your schedule. Refer back to information you may have on good goal setting and remember to include some rewards.

Keeping up your self esteem and being proud of what you have accomplished will help prevent burnout. Ensure that you build yourself a support network of friends, training partners, and family. After competition ensure that you are not judging your success in comparison to others. Look at your own personal goals and how well you progressed toward them. For example, 'Did you have an error free competition?', 'Have you reached your desired fitness level?', 'Have you improved the technical skills of your sport?'. These are accomplishments in which any athlete should take pride and will help you to continue to feel good about your sport.

Stress is another major cause of burnout. Competition can leave you in a highly emotional state, either elated or frustrated and angry. Maintaining these highly emotive states after you have left the sports venue can make competition a stressful experience, especially if you have had a run in with administration. Find some ways to wind down after competition. You could have a regular post competition outing with friends or team mates but don't allow yourself to gloat over your successes nor sink into depression over a poor performance. Discuss aspects of the performance in ways that will improve your next competition. By controlling your post-competition levels of emotion or tension you can eliminate another source of stress that would otherwise contribute to burnout.

Remember to watch for the warning signs of burnout, prevention is the aim. If they are present, look for things that you can control, add some variety to your training, re-vamp your goals, build up your support network, control your post-competition levels of emotion and remember to take a break from your sport. If you are already in a state of burnout and can't turn things around on your own seek some professional assistance from a sport psychologist.

From the Research

Fluid on the Back

The "camel pack" is a back-mounted hydration system (BHS) often seen on kayakers or the Murray River paddlers, but rarely on cyclists or runners. A recent study from USA examined the effects of wearing a BHS on fluid intake in 12 cyclists matched for riding ability over a 180k race. The cyclists were allowed to drink at their leisure during the race but half of the group used waterbottles, the other half the BHS. In the race, the BHS cyclists drank significantly more (3.55 litres) than the waterbottle athletes (2.46 litres). The BHS system appeared to encourage a greater fluid consumption, most likely due to the ease of access of the fluids.

These results strongly suggest a "camel pack" is the way to go for long duration endurance exercise, particularly in hot and humid conditions.

Rowing Continued from page 6

Anaerobic

This type of training is done closer to competition racing and develops race speed, the ability to rate while holding form, teaches the body to break down carbohydrate quickly, and helps the ability to tolerate the pain of lactic acid. Again, easy rowing between sets and reps.

Reps / Sets	Duration (m)	% Max HR	Rating	Rest (mins)
2-3	3-5	90 +	32-34	5-10
3-6	1-2	max	max	4-6
6-10 / 1-2	30-60 secs	max	max	1-3 / 6-8
5-10 / 1-2	10-15 secs	max	38-44	1-3 / 4-6

Conclusion

In the next issue we'll look at how much time should be spent in each zone as a percentage of the overall training plan as well as a sample seasonal plan for the masters rower.

Peter Reaburn worked as the Queensland Academy of Sport Rowing Consultant in 1994-5 with the Gary Lynagh/Bruce Hick/Bob Bleakley combination during their successful double sculls campaigns at the FISA World Championships.

"Progress has its drawbacks, you can't warm your feet on a microwave."

TRIATHLON

Ten Tips for Triathlon Speed.

© by Dr Grant Schofield
Triathlon Research Initiative, Central Queensland University

From my perspective as a triathlete, a sports scientist, and a sometime triathlon coach below are the ten most important factors that most triathletes could improve upon to go faster. In order of importance they are as follows:

1. Train slow, go fast

There exists an interesting paradox in triathlon, as in all other endurance sports for that matter. In order to go fast you must first go slow. you have probably heard of the importance of building an aerobic base before. This is the most important factor in beacoming a fast triathlete. The majority of your training in swimming, biking and running needs to be in the easy aerobic training zones (i.e., 50-60 beats below your max heart rate). The analogy of "not building a house without adequate foundations" is a good one. Without a foundation of fitness you have nothing on which to build your speed.

2. Don't think about winning

A second interesting paradox exists in endurance competition. In order to achieve a good result in a race, don't think about that result. It has been shown that the most successful endurance competitors concentrate on the performance aspects of their sport (e.g., relaxation and breathing while running) rather than the outcome aspects of their sport (e.g., winning), Practice this in training and you will get great technical improvements which you can carry over to a race. Practice it in a race and you will "control the controllable" and doing well and going fast will be a certain by product of r process of self-monitoring.

Stay fresh

Make sure you are fresh when you do your quality (speed) work.

When you train hard train fast. Many athletes train too hard in their easy workouts and not hard enough in their hard workouts. They are too tired to get up to speed when they need to. Solution? Have a structured training program, which means you'll be fresh when you need to be. Follow that program and have the discipline to keep going easy when everyone else in the cycle bunch gets a sudden rush of blood and decides to hammer on your easy day. Let them go. Save your efforts for the time they are needed.

4. Do some triathlon training

Be specific - do brick (bike/run and swim/bike/run) sessions. If you are a triathlete training for triathlon then you will need to train regularly for that event. Your body needs to get used to the rigors of biking after swimming and running after biking. If you are used to this scenario you will be able to let it all hang out on race day.

> "THE MAJORITY OF YOUR TRAINING IN SWIMMING, BIKING AND RUNNING NEEDS TO BE IN THE EASY AEROBIC TRAINING ZONES (I.E., 50-60 BEATS BELOW YOUR MAX HEART RATE)."

5. Keep an eye on the small stuff

Watch the details the help you recover from training. Remember improvement only comes through the body's ability to recover from hard work. Poor nutrition, sleep, and high stress levels can all hinder this process. Sometimes a little self-organisation goes a long way.

6. Get off the road

Ride the windtrainer for your quality bike work. It is often difficult to mimic the race situation on the bike. Traffic lights, other traffic, potholes etc are all things which interrupt our ability to ride fast (and safely!) on the open road. I have found the best way to do my bike speed work is to ride on the windtrainer. I can do 5 X 5 minutes with 3 minutes recovery with no interruptions and usually with a greater intensity than I could manage on the road.

7. Use a heart rate monitor

Monitor your intensity – wear a heart rate monitor to establish both your intensity and recovery. It is important to know exactly how hard or easy you are going in training. You heart's response to exercise can tell you a lot about your body's state of fatigue. Careful monitoring of heart rate will allow you train easy enough and hard enough when you are supposed to (see #3 above).

8. Watch your pace

Do your run speed sessions at the pace you want to run in a race. I see many athletes running track sessions flat out and really taxing their body well beyond what they need it to do in a race. It is better to practice what you will do in the race. I also see many athletes taking very long recoveries between intervals. There are two basic rules here. Firstly, don't recover by doing nothing. Your body will recover more quickly with active recovery. Secondly, if your intervals are somewhere around your anaerobic threshold then you will not need massive amounts of time between intervals to recover. Somewhere around half the duration of the interval is usually adequate.

9. Enjoy yourself

Train with others for your intensity sessions. For some reason it is much easier to push yourself hard when you have others around you doing the same. Training is generally more enjoyable with others too. Enjoyment and good training are inseparable in my opinion. If you are not enjoying at least 90% of your training I think you should have a good look at what you are doing.

10. Get out of the pool

Practice swimming and drafting in open water. Many triathletes train consistently in the pool but get a little lost when the race day comes and

Triathlon continued on Page 12 ..

Get Set!

Calendar of Events

April 9-13 1998
Aust Vet Track & Field Champs
Brisbane, Qld
Contact: (07) 37801736

April 10-13
Suncorp North Qld Games
Mackay, Qld
Contact: (07) 4953 3114

May 2&3 1998
AUSSI Qld State Swim
Bundaberg, Qld
Contact: (07) 38762822

June 21-30 1998
World Masters Swim Champ.
Casablanca, Morocco
Contact: (08) 8344 1217

August 9 - 22 1998
Nike World Masters Games
Portland, Oregan, USA
Contact: (08) 83441217

October 19 - 27 1998
Honda Masters Games
Alice Springs, NT
Contact: (089) 515 329

October 31- Nov 8 1998
Asia Pacific Masters Games
Brisbane, Qld
Contact: (07) 55640480

May 1999
AUSSI National Swim
Darwin, N.T.
Contact: (08) 834 41217

Triathlon continued from Page 11...

they suddenly have to trade lane lines for buoys and rough seas. Be aware of the advantages of drafting in the swim section. It requires practice to stay on the feet on another swimmer. This is a great way to swim your way to a faster triathlon time.

So there are some of the more important factors in becoming a "fast" triathele. Remember though a little hard work and the use of a little gray matter go a long way in performance.

WORKOUT - ROWING

This section of TMA is devoted to outlining sample training sets aimed at achieving maximal benefit from minimal time input.

Anaerobic Threshold Rowing Sessions

The following rowing sessions are aimed at improving 1000-2000m rowing performance. The outlined workouts are designed for the precompetition phase of training commencing 6-8 weeks out from a major meet and after a build up of longer and easier aerobic work using U1 and U2 intensities as outlined in the rowing article of this issue.

	Novice	Intermediate	"Guns"
Warm-up	• stretch • 10min at U1-2 • 5min of surges • 2min easy • 4x5-10sec starts with easy recovery	• stretch • 15min at U1-2 • 5min of surges • 5min easy • 4x10sec starts with easy recovery	• stretch • 15min at U1-2 • 5min of surges • 5min easy • 6x10sec starts with easy recovery
Workout	• 2x10min pieces rating 26-28 at 85-90% max heart rate with 5mins U2 recovery	• 2x12min pieces rating 26-28 at 85-90% max heart rate with 5mins U2 recovery	• 3x12min pieces rating 26-28 at 85-90% max heart rate with 5mins U2 recovery
Cool-down	• 5-10 min U2 row • Stretch	• 5-10 min U2 row • Stretch	• 10-15 min U2 row • Stretch

Why Coach?

Warm-up : Stretching improves flexibility in joints. An easy row warms the muscles, ligaments and tendons, protects against injury, increases blood and oxygen delivery to the muscles from the heart and prepares the body and mind for the work ahead. The efforts in the warm-up specifically prepare the muscles and nerves for the quality work in the main set.

Main Set : Every workout must have a purpose and the main set is that purpose. The sets above are to develop the anaerobic threshold so important to maximising aerobic endurance and rowing performance. It is crucial that the quality of each piece is good and that the pressure and rating are maintained throughout the 10-12 minute effort. The pace is "hurt but hold". Go out too fast, you'll blow up and have to slow down or take a longer rest; go out too easy and you are not gaining the benefits of the workout. A consistent and strong pace is the key.

Cool-down : U2 work lowers heart rate, redistribute blood around the body, lower blood acid levels and remove other metabolic by products from the muscles and blood. Stretching returns muscles, ligaments and tendons to resting lengths.

SWIMMING

Maximising Propulsion

© by Dr Peter Reaburn - AUSSI Masters National Coaching Panel

Last issue we looked at the factors that increase resistance and ways masters swimmers can minimise that resistance in the water. This issue we focus on the principles important for maximising propulsion through the water. It's the balance between these two opposing forces (propulsion and resistance), as well as efficiency, that determines our speed through the water.


Peter Reaburn

Principle 1: Apply the forces in the direction of the desired motion

When we apply a backwards force to the water, the water exerts a force in the opposite direction (forward). Shouldn't we therefore always push straight back with our hands rather than sculling a la the S-shape in free or the outwards scull in breast? No! This is due to the fact that the sculling actions (see figure 1) not only cause a drag force when we apply force to the water, but also a lift force caused by pressure differences between the front and back of the hand. With correct technique, the resultant force is in the direction we want to go – forward.

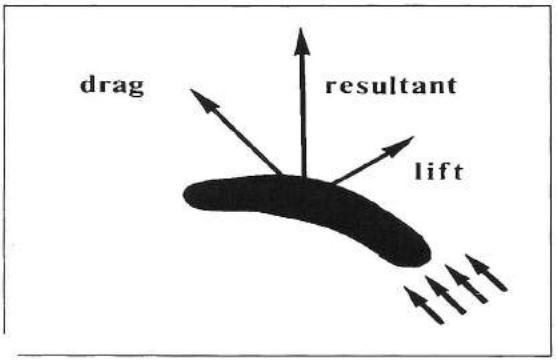

Figure 1: Forces acting on the Hand in Swimming

Thus, in freestyle and butterfly, the hand and lower arm must be directed backwards for as long as possible. After entry in backstroke, the hand may be moved downward and outward rather than straight back. In breast and fly, the outward and inward sculling motions must be performed with the hands angled so that the resultant forces are in the direction of travel.

Principle 2: The change in motion depends on the time the force acts.

Quite simply, length of stroke is crucial. However, not at the cost of being inefficient or increasing resistance forces. For example, a wide breaststroke kick may increase the time forces can act on the water, but it also increases drag forces by exposing large surface areas to the water and takes a lot of energy because of the large muscles used in the action.

In all strokes, getting out long in the front of the stroke is important. However, pulling too far back is not efficient in terms of force application and delays the entry of the next stroke. Thus we swimmers should not try for a long stroke at the expense of a low stroke rate.

Sculling actions and sweeping movements increase the distance through which forces can act. Secondly, sculling actions also allow limbs to attain high velocities without the muscles having to contract a lot, thus saving energy. Finally, sculling also allows swimmers to find and grab non-moving water. If we pull straight back, the water we grab starts to move back with the limbs, not producing a big drag force and thus resultant force forward.

Thus, to maximise the distance through which a force acts in swimming, we scull. Looking from above or below, the hand path of good swimmers is curved. In freestyle, the path is an S-shape or inverted question mark; in breaststroke a heart-shape, and in fly a double-S or keyhole shape.

Principle 3: Reduce the ineffective parts of the stroke.

Time taken for parts of the stroke where large forces are not generated is time wasted. During this phase, resistance forces predominate and slow us down. For example, a pause after hand-entry in freestyle is ineffective. Until the arms catch the water they are increasing drag and delaying the force-producing part of the stroke. Thus, the catch should be quick to be most effective. One-arm drills or use of a device such as *SUPER SWIM-PRO* teach us to get that catch early and strongly.

In breaststroke, taking the pull too wide is not a strong position, takes a lot of energy and exposes a large surface area to the water. Thus, breaststrokers should keep a narrow stroke and rate faster to maintain a high stroke rate and reduce resistance.

Principle 4: Accelerate the hands.

It appears that the best swimmers accelerate their hands from the beginning to the end of each phase of their stroke (catch, outsweep, insweep, back sweep) with the fastest velocities occuring during the final back sweep propulsive phase of the stroke. This is not an easy factor to master but one-arm drills enable you to focus your attentions on this crucial factor.

Conclusion

Drills are crucial to maximising propulsion in swimming. They enable us to concentrate on one facet of the stroke. Once 25 or 50m of drill has been done, you should swim to turn that drill-feel into swim-feel.

In the last issue of TMA we looked at minimising resistance. We've now examined propulsion. In the next issue, we examine the final concept crucial to maximising swim speed - efficiency. Drill-on!

"Of exercises, swimming's best,
Strengthens the heart and
the aches, And all their
fleshy parts confirms. Extends and streetches legs and
arms."
Dr E. Baynard (1764)

RUNNING

Can Running Injuries be Effectively Prevented?

adapted from an article in Sports Medicine by Willem van Mechelen

People run for many reasons: for example, for pleasure, for health and fitness, to relax and for many of us serious masters athletes, to compete. Sooner or later many of us sustain injuries. Preventing these injuries should be based on the outcome of research that has identified risk factors for running injuries.

However, to date there have been no randomised experimental studies that have determined the factors that increase the risk of sustaining running injuries, nor are there any intervention studies showing a preventive measure to be effective in reducing the number of running injuries.

The purpose of this article is to speculate as to whether running injuries can be prevented, and if so, how this can be achieved.

The Facts

The reported incidence of running injuries varies between approximately 25 and 75% with most running injuries being musculoskeletal injuries of the lower extremities, and of an overuse nature.

A strong positive association of running injuries with weekly running distance and a previous injury has been consistently reported. Furthermore, a negative association of running injuries with running experience. The available research also consistently reported that age, gender, running on hard surfaces and body weight are not risk factors for running injuries.

The role of other factors in the aetiology of running injuries is either unclear or contradictory results on the role have been provided. These factors include:

- psychological factors
- lack of stretching exercises
- warm-up or lack of
- body height
- malalignment of the lower extremity
- muscular imbalance between body compartments
- restricted range of motion
- cost and design of running shoes
- in-lay shoe orthotics
- running on one particular side of the road
- running speed and frequency
- time of the year and day
- participation in other sports.

So What?

What does this mean in terms of the prevention of running injuries? If it is accepted that prevention can only be based on identified risk factors, then the following preventive measures can be proposed on the outcome of the available research discussed above.

1. Limitation or Reduction of the Weekly Running Distance

For the average recreational runner, limiting or reducing the weekly running distance does not make much sense since his/her prime interest is to run, not to limit or reduce the distance run. However, as a general guideline (especially for runners who have previously sustained an injury), a reduction in running distance to below 32km/week has been recommended by a 1992 study. Furthermore, a 1991 study mentioned an approximately 2-fold increase in the injury risk when going from a low (less than 15km/wk) to a high (more than 50km/wk) weekly running distance.

2. Complete and Controlled Rehabilitation

A previous running injury is consistently reported as a strong predictor of sustaining another running injury and highlights the need for complete rehabilitation of an injury before starting to run again.

> "DURING RUNNING THE IMPACT FORCES RANGE BETWEEN TWICE AND EIGHT TIMES BODY WEIGHT DEPENDING ON TECHNIQUE, SURFACE AND SPEED."

3. "Listening to the body"

Research strongly suggests that inexperienced runners are most at risk of injury. The five stages we should *listen* for (in increasing levels of seriousness) are:

a) pain after a run that disappears after a few hours.

b) pain at the beginning of a run that then disappears, returning after the run then disappears with rest and has morning stiffness (sounds familiar!).

c) continuous pain and stiffness only disappearing after long rest.

d) continuous pain and stiffness only disappearing after long rest and that limits running performance.

e) continuous pain and stiffness that leads to stoppage of running.

What about Biomechanical factors?

During running the impact forces range between twice and eight times body weight depending on technique, surface and speed. To reduce these forces, we've been sold the idea of wearing shock-absorbing shoes or orthotics. However, not all researchers agree with this suggestion for a number of reasons.

Firstly, the forces experienced on muscles and bones not only come from impact, but other sources such as the muscles contracting, bending forces.

Secondly, some researchers believe that running shoes make us blase about impact moderating behaviours such as rolling heel t toe or bending more at the knee.

Finally, some researchers suggest that it is the alignment of the lower extremeties that determines susceptibility to injury and that this alignment is strongly affected by footwear. For example, behind-the-knee pain can be due to impact forces being transmitted towards the middle or outside of the knee causing the kneecap to rub on the thigh bone.

No studies have conclusively shown that footwear or orthotics work in preventing injuries.

Educating Runners

The following three factors have been shown to influence the prevention of sports injuries:

1) ***Attitude*** Attitude means knowing the knowledge and beliefs about the consequences concerning a certain behaviour.

2) ***Social Influences*** Modelling others indirectly or being socially influenced direc by training partners (running when y shouldn't, going too hard / too long / at a can conflict with our attitudes.

3) ***Self-efficacy*** or estimating our abilities taking into account all our knowledge (skill levels, fitness levels) and influences (social pressure, time, dollars to buy the right shoes, get orthotics).

Knowledge of all these factors is crucial if preventative measures are to be effective.

The Bottom Line?

The research strongly suggests the following principles are important in preventing running injuries:

- limit or reduce weekly distance run
- complete rehabilitation from a previ ous injury
- "listen to the body'
- wear the right shoe to ensure correct alignment
- be aware of the causes of running in juries and the influences on your run ning behaviour
- having *lady luck* on your side.

Run smart!