THE MASTERS ATHLETE

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Guest Editorial - Ron Burns - Confederation of Australian Sport

International Year of the Older Person 1999

1999 has been declared the International Year of Older Persons by the United Nations with the theme for the year to be *Towards a Society for All Ages*. In Australia this has been modified to *an Australia for All Ages*.


Ron Burns

The Australian Government has established the Conference for Older Australians to devise strategies, policies and events that promote a positive image of older Australians. The Australian Sports Commission has a role to play with the Conference and will be ensuring that sporting activities and active leisure will be included in the strategies and special events developed by governments. State Governments will be involved with the Conference.

The non government sector has formed an organisation, Coalition '99, to coordinate its cooperation with government agencies and to develop strategies and events for the non government sector. The Confederation of Australian Sport is a member of Coalition '99.

What does all this mean for Masters Sport and Masters Athletes?

There is a growing recognition among health professionals and bureaucrats that continued participation in physical activity is a vital factor in healthy ageing (a current buzz phrase in relevant government departments) and that any effective strategy to create healthy ageing will need to promote and assist development of physically active lifestyles.

As a result ACTIVE AUSTRALIA, the new national framework to promote increased participation by Australians in physically active recreation, including sport, will concentrate on the needs and interests of older Australians in 1999. The Australian Masters Games will be conducted in Adelaide in 1999 and Coalition '99 has decided that the Games will be one of the major events for the year. This will mean that the Games and the participants will be supported and promoted by a number of organisations thus increasing the profile of the event and the participants.

As there is this increasing interest in physical activity for older people a major international conference on Masters Sport and Masters Athletes will be conducted in Adelaide following the Games. While there have been a number of conferences on older people and physical activity and the health links, most of the discussion at these conferences have centred on academic research projects, very few of which have been implemented in any way on a large scale. This conference will concentrate on sport; other structured physically active recreational activities; the people who are regularly involved in them; and the benefits, physical, mental, social, and economic coming from that ongoing participation.

It will be interesting to see whether governments, state and federal, are prepared to allocate resources to organisations, programs and activities which have the potential to make a long term difference to the participation of all Australians, particularly those in the age groups where physical activity tends to decrease. The danger in all special events like the Year of the Older Person is that there is a flurry of activity and events during the year with a sharp decline in funding and interest almost immediately after. All governments, and many economists, talk of the "problem" of our ageing population, particularly with regard to health care costs. It will be interesting to see whether there is the vision and the determination to put resources into things which could actually have a positive, preventive effect rather than concentrating on mending health problems after they develop as we seem to do now.

1997 Australian Masters Sport Awards

At the recent Australian Masters Games in Canberra, the winners of the inaugural Australian Masters Sport Awards were announced and the winners 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 awards, to recognise the outstanding achievements of Masters participants.

The Masters Athlete of the Year was presented to Peter Gilmour who this year has set five World Records in Butterfly, in short and long course meets, in the process reducing the Mens 55-59 200m Butterfly record by 13.15 seconds. The Masters Team of the Year was won by Veterans Tennis' Bueno Cup team which won the International Tennis Federation Bueno Cup for women over 50 from seventeen other nations.

Other finalist in the individual Award were Judy Dalton, Women's over 60 World Tennis Champion; Rube Howes, second in the World Masters Weightlifting in the 70 to 74 age group; and John Hunt, World Veterans Athletics High Jump Champion in the 55+ age group. Finalists in the teams were the World Champion Australian Veterans Rifle Shooting Team and the Australian 30-35 Mixed Touch Team which won the World Masters of Touch Championship this year.
Ron Burns - Deputy Chief Executive Officer, Confederation of Australian Sport

This Issue..

Editorial

Another year is almost over. It seems to us that the older we get, the faster time goes by. Maybe it's having kids or maybe the stage of life when careers seem to dominate. Whatever it is, it's wonderful to be alive.

Enough philosphising! No doubt most of us are gearing up for racing, setting the goals for the season and wondering how we'll cope with the Xmas break and training. Always an adventure!

Claire and I recently competed in teams at the fantastic Noosa Triathlon. Claire's team came third overall against two invitational teams of Olympians. Not bad when Claire's 38 and Cheryl Ogden, the cyclist is 43. Gotta keep the youngster's honest!

In this issue we continue our new *What's Hot* section and examine glycerol as a substance that may help us retain fluids when racing in the heat. We also introduce a new *Workout* section where we present training sessions that optimise performance for the older and busier athlete. This issue *Workout* focusses on swim sets but we'll rotate our sports for future issues.

We wish our readers a safe and well-deserved break over Xmas - watch the calories!!

Peter and Claire

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SPORTS MEDICINE

Heart Disease-On the Road to Recovery

© by Jacque Dacey-Crighton

Heart Disease is a devastating event in anyone's life. It is often the first time an individual has been faced with their own mortality. With medical advances, early interventions and increased public awareness, survival has improved dramatically since the 1960's. Today, cardiac patients can look forward to returning to a full and productive life. For the athlete, who strives for physical excellence, heart disease need not provide limitations but an adequate recovery may require some patience.

There are many factors to consider when developing a cardiac rehabilitation plan:

- Type of disease (genetic defect, cardiomyopathy, electrophysiological, coronary artery disease)
- Medical condition prior to treatment (no symptoms, severe angina, heart failure, heart attack etc.)
- Treatment or intervention used (medications, angioplasty, open heart surgery etc.)
- Complications during hospitalisation (easy recovery, bed rest, late discharge)
- Heart function (good/poor left ventricular function)
- Physical condition prior to the event (inactive, regular exerciser, athlete)
- Individual goals and return to activities (maintenance of health, return to manual job, competitive athlete)

It can be quite a complicated puzzle and as a competitive athlete, your medical practitioner along with a cardiac rehabilitation specialist is often the best one to develop a specific plan for you. However, every cardiac patient wants to know what type of exercise they should do after discharge from hospital and when they can resume certain activities.

DISCHARGE FROM HOSPITAL

Walking is thought to be the best initial exercise when recovering from a heart condition. As with all activities, it is important to start slowly and build up your walking gradually. For the first few days after arriving home continue with the same amount of walking as you were doing in hospital. Then gradually increase your walking.

The guide below shows how you can gradually increase to a 30 minute walk, following hospital discharge.

1st week at home:	in 10 mins walk 500 - 600 m	twice a day
2nd week at home:	in 15 mins walk approx. 1 km	once a day
3rd week at home:	in 20 mins walk 1.5 - 2 km	once a day
4th week at home:	in 25 mins walk approx. 2 km	once a day
5th week at home:	in 30 mins walk approx. 2.5 km	once a day

Of course, not everyone will be able to build up to 30 minutes - the amount of walking you are able to do will depend on many factors including age, general health and if applicable, your leg wounds after cardiac surgery. Your doctor will advise you about how much walking is appropriate for you.

When can you starting doing certain activities?

When recovering from a heart condition you should slowly increase the level of activity each day and rest when you become tired. This will allow your body to gradually become stronger.

Recovering from heart disease or surgery is very individual. As a general rule you should start with light activities such as dusting or setting the table during the first few weeks and then progress to more intense activities as you feel stronger.

GOLDEN RULE: If you find any activity causes you extreme tiredness or discomfort you should delay that activity at least a week until further along in your recovery. Be honest with yourself and remember - doing too much too soon is your greatest risk.

The following chart will provide a general guideline as to when its best to introduce each activity back into your lifestyle.

Table 1. Weekly Progress Guidelines

Week 1-2 Perform only light intensity activities such as cooking, washing dishes, riding a golf buggy etc.) Cardiac surgery patients should avoid any strenuous upper body activities for at least 6 weeks*.

Week 3-4 You may move to moderate intensity tasks such as gardening, swimming, painting etc.) Remember if any activity causes extreme tiredness or discomfort delay that activity for another week or so.

Week 4-6 Moderate intensity activities - can begin with some heavier activity such as car washing, dancing, cycling, swimming if required.

Week 7+ You can progress with any activity - REMEMBER you are the best guide for judging if an activity is too difficult.

***Please note:** For those who have had open heart surgery, you will need to progress slowly with upper body activities (eg. resumption of driving, golf, lifting objects greater than 5 kg). This is not because of your heart condition but due to the time required to heal your fractured sternum (usually 8-12 weeks)

RETURNING TO TRAINING

It is important to discuss return to training with your doctor as they are in the best position to judge your specific needs and medical condition. A maximal exercise tolerance test may assist your doctor in assessing your capacity to resume high intensity exercise. A gradual progression once you start retraining is essential. Depending on your medications and heart condition your training heart rate may not be a reliable indicator of exercise intensity. If you are honest with yourself, you are the best judge of exercise intensity. Be sensible, and let your body tell you how to pace yourself. The **GOLDEN RULE** still applies when commencing training - take it slow.

Heart disease, especially coronary artery disease, can effect the reaction time of your circulatory system. Damaged blood vessels don't respond as quickly to the body's changing activity level and it is often when there is a sudden increase or decrease in activity that the oxygen supply to the heart is compromised. Therefore, it is very important for the athlete to ensure an extended warm up and cool down during exercise as this is often where problems can arise.

Warm Up Phase

At the beginning of every exercise session

Sports Medicine continued on page 4

The Team

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SPORTS NUTRITION

Protein Power for Endurance Athletes

© by Holly Frail (B. Sc. Grad. Dip. Nutr. Diet., D.A.A., A. P. D.)

Protein requirements for athletes have been a hotly debated topic for many years. In the case of masters athletes involved in endurance sports, it sometimes happens that carbohydrates take such a priority that we forget about the importance of protein altogether. A little bit of balance is required to ensure that all essential nutrients are consumed in our training and competition eating plans.


Holly Frail

Protein consists of various combinations of building blocks known as amino acids. The body can manufacture some of these, while others (known as essential amino acids) can only be obtained from food. Animal proteins (found in meat, poultry, fish, seafood, eggs and dairy products) are the highest quality, as they contain a good variety of all the essential amino acids. Plant proteins on the other hand (found in foods such as legumes, pulses, grains, fruit and vegetables) tend to be low in one or more of these essentials. For this reason, vegetarians must carefully mix and match their food choices to obtain a balanced protein intake. (See issue 7, June 1996).

The recommended protein intake for the masters athlete engaged in endurance exercise is 1.2 - 1.4 grams of protein per kilogram body weight per day, which should be easily obtained if sensible choices are made within our high energy training diet. For those of us involved in very prolonged strenuous training, for example preparing for an ultra-marathon type event, this requirement is most likely increased to around 1.6 grams/kg/day. This should represent about 12-15% of your total energy intake, but if you are a small eater, this may need to make up closer to 15-20% of your daily kilojoules.

The problems that may arise when we fail to consume adequate protein for endurance exercise include:

- inability to reach or maintain desired lean body mass
- general fatigue poor recovery from exercise, injury and illness
- inadequate intake of essential nutrients such as iron and calcium.

These factors may in the long run be devastating to both your performance in training and races, as well as to your health. Unfortunately, poor protein intake may be quite common in the daily diet of many masters runners, triathletes, road cyclists and other distance specialists.

Our protein needs are increased by all forms of exercise. Protein is required for increased lean body mass, optimal repair and recovery and to a small extent as a muscle fuel. When our endurance sessions are long and intense, the contribution of protein as an energy source becomes more significant, and may account for 5-10% of the fuel used. As our muscle glycogen stores become low during exercise, our body converts protein, or certain amino acids, to glucose in the liver through a process known as gluconeogenesis. This glucose may then be used as a fuel source for working muscles, as well as for our brain and central nervous system. It has been estimated that during a marathon, as much as 50 grams of protein may be used. This also, of course, highlights the need for adequate carbohydrate intake before and during endurance exercise in order to preserve those hard earned muscles!

Prolonged exercise may also increase protein requirements due to degenerative and inflammatory responses in muscle and increased muscle enzyme turnover. Some recent research has suggested there may be benefit in providing protein as part of the post-exercise recovery plan. This is of particular importance for rapid glycogen restoration if you only have a short recovery time, and therefore perhaps useful for the masters triathletes amongst us. Nutrients such as protein, vitamins and minerals are involved in the first aid process for damaged tissues and the reconstruction of cells after exercise.

> "PROTEIN IS REQUIRED FOR INCREASED LEAN BODY MASS, OPTIMAL REPAIR AND RECOVERY AND TO A SMALL EXTENT AS A MUSCLE FUEL."

The message here is that if your training and/or competition schedule demanding, and you need a bit of help with recovery and repair -try a carbohydrate-protein combination in your post-exercise food or drink. In practical terms this could consist of a homemade low fat milk drink such as a "smoothie", a commercial liquid meal supplement, a "sports" bar, yoghurt, bowl of cereal with milk, or a chicken sandwich. An alternative strategy would be to consume your normal post-exercise carbohydrate drink, then make sure you eat a meal soon afterwards that contains some protein as well as more carbohydrates to complete your recovery. You could plan to have a protein drink while you are preparing your post-training meal, or eat a dessert such as yoghurt before the main course. In other words - make sure you are organised with a stock of suitable snacks and drinks, a repertoire of quick nutritious recipes for meals after training, or plan to cook ahead.

Some endurance athletes have become interested in recent research into supplementation with branched chain amino acids (BCAAs) during prolonged exercise. The theory behind this is that a fall in BCAA levels during endurance exercise may lead to a chain of events which include changes in brain chemicals such as serotonin, and may lead to what is known as "central fatigue". In simple terms, maybe you can identify this as "my brain is tired"! Some studies showed improved performance in some individuals when BCAAs were added to a carbohydrate drink during endurance exercise. However, other studies showed the same results with the carbohydrate drink alone. Further work on the effects of amino acid supplementation for endurance exercise is required before any possible benefits can be clearly decided. The best proven prevention for "hitting the wall" (or bonking if you prefer!) is to keep up your carbohydrates during long training sessions and races.

It is important to choose protein foods that keep our other nutritional goals in mind. This includes making low fat choices, using low fat food preparation methods, and including foods that are good sources of other nutrients essential to performance and health. Lean and low fat animal products supply our best sources of iron, calcium and zinc. Many plant protein foods also provide us with valuable extra carbohydrates.

Despite a bit of publicity, there is no danger in consuming carbohydrates and proteins at the same time. Both these nutrients are already present in many nutritious foods that we all eat such as rice, pasta, milk and yoghurt, as well as legumes. Glenn Cardwell, a well-known sports dietitian from Perth has a great comment on this topic. He writes in his book "Gold Medal Nutrition" that "breast milk, the perfect start for babies, contains both protein and carbohydrate. We don't know of a woman with one breast labelled 'protein' and the other 'carbohydrate'"!!

Foods that provide 10 grams protein

Animal foods

grilled fish	50 g (cooked)	low fat cheese	30 g
tuna/salmon	50 g	cottage cheese	70 g
lean meat	35 g (cooked)	low fat fruit yoghurt	200 g
chicken/turkey	40 g (cooked)	low fat milk	300 ml
eggs	2 small	liquid meal supplement	150 ml

Plant foods

bread	4 slices	cooked lentils	3/4 cup
flake cereal	1 cup	baked beans	200g
untoasted muesli	1 cup	cooked soybeans/tofu	120 g
cooked pasta	2 cups	nuts and seeds	60 g

Sports Medicine continued from Page 2

a thorough warm-up is essential. The purpose of a warm up is to prepare the muscles and the circulatory system for activity. A gradual increase in exercise allows for increased circulation to all muscles including the muscle of the heart. This allows the body to meet the increased oxygen demand which occurs with activity.

The average warm up should consist of 5 to 10 minutes of steady state exercise as well as non-ballistic (non- bouncing) stretching of the major muscles which are to be used. For the cardiac patient, a more gradual and extended (15 minutes) warm up is essential to allow dilation of the blood vessels to accommodate increased blood flow to active muscles - especially the heart.

Strenuous exertion without preceding warm ups increases the possibility of myocardial ischaemia (lack of oxygen to the heart muscle). This is due to your heart asking for more oxygen but your body not being ready to meet the demand. This may increase the possibility of the onset of angina, an abnormal heart rhythm or even a heart attack. So give your heart a break and be sure to do a gradual warm up before any type of activity.

Cool Down Phase

Cooling down from exercise is just as important as warming up. It is necessary to taper off gradually - not stop abruptly. If activity is stopped suddenly there is a tendency for the blood to pool in the lower legs, this decreases the amount of blood and therefore oxygen that can be delivered to vital organs such as the heart and brain. Some of the possible side effects may be dizziness, fainting, or angina.

An adequate cool down would consist of 5 to 10 minutes of low level aerobic exercise as well as stretching the major muscle groups used during exercise. This will allow the blood vessels to adjust to the decreased blood supply and therefore maintain an adequate blood pressure.

KEEPING IT SAFE

If you experience any abnormal symptoms (dizziness, chest discomfort, nausea, etc.) **STOP AND REST.** If the symptoms subside you may continue exercising at a low level, if not - seek medical advice.

The biggest risk to the cardiac patient is over-exercising. Start gradually, build up slowly, exercise regularly and be sensible.

THERE IS MORE TO RECOVERY THAN JUST EXERCISE

Rehabilitation from heart disease involves a multidisciplinary approach and should address many factors. A cardiac rehabilitation plan should include a patient's physical, emotional, social and vocational recovery along with a secondary prevention plan to reduce modifiable heart disease risk factors, leading to a more normal state of cardiovascular health. Cardiac Rehabilitation programs are designed to assist cardiac patients and their families to a complete and holistic recovery. St Andrew's Heart Institute establish the first comprehensive cardiac rehabilitation program in Queensland and has been helping others hospitals and health professionals set up programs throughout Australia through their Facilitator Training Course in Cardiac Rehabilitation. For information about programs and services near you contact the Program Coordinator, Kylie Kidby on (07) 3834 4229 or the National Heart Foundation.

Heart disease still affects many Australians and their families, the good news is that most patients will return to their pre-hospital activities and many who were inactive or limited by their disease will experience an even higher level of fitness and well-being than before their cardiac event.

ST ANDREW'S HEART INSTITUTE

St Andrew's Heart Institute offers Australia's first comprehensive private cardiovascular care system through an alliance between leading Cardiologists, Cardiac Surgeons, associated Specialists and St Andrew's War Memorial Hospital.

St Andrew's Heart Institute combines every element of heart care - from research, education and training to prevention, diagnosis, treatment and rehabilitation.

Providing a continuum of care "second to none" in cardiac services, we aim to become internationally renowned as Australia's leading cardiac care institution.

From the Research

Creatine and Endurance

Since the discovery of creatine in 1832, it has fascinated scientists with its central role in skeletal muscle metabolism. Creatine levels in human muscle are subject to individual variations and are influenced by factors such as muscle fibre type, age and disease, but not apparently by training or gender. Daily turnover of creatine to creatinine for a 70kg male has been estimated to be around 2g. Part of this turnover can be replaced naturally through foods, especially meat and fish. Studies have shown that creatine levels in skeletal muscle can be increased, and performance of high intensity intermittent exercise enhanced, following a period of creatine supplementation. However, neither endurance exercise performance nor maximal oxygen uptake appears to be enhanced.

Balsom PD. et al. Creatine in humans with special reference to creatine supplementation. Sports Medicine. 18(4), 268-280, 1994.

Editor's Note: So why are the marketers of creatine monohydrate pushing their product at endurance athletes we might ask?!!? A major Noosa Triathlon sponsor was doing just that!!

Sports Quotes

Dr. E. Baynard (1764)

"Of exercises, swimming's best,
Strengthens the heart and the chest,
And all their fleshy parts confirms.
Extends and stretches legs and arms."

Sebastian Coe - middle distance runner

"Sport has to remain sport, a concept rooted on the track and not in the balance sheet."

Ben Jeipcho - Kenyan middle distance runner (1975)

"Running for money doesn't make you run fast. It makes you run first."

Carl Lewis - (b 1961) US sprint &long jumper

"It's unbelievable how amateurs are looked down on for accepting money. Stevie Wonder signs a $40 m recording contract and the world rejoices; I make a token of that and they say 'You dog!'."

Harry Carpenter - BBC TV Commentator

"Ah! Isn't tht nice, the wife of the Cambridge President is kissing the cox of the Oxford crew."

What's Hot

GLYCEROL

Glycerol is a naturally-occuring substance in our body and is manufactured commercially as an artificial sweetener. However, few endurance athletes would realise it can also be used as a *hyperhydrator* - a substance that helps us retain fluids. Fluid retention before endurance events in the heat may give us an advantage over opposition when it comes to regulating heat. This is due to the fact that a fluid loss of greater than 2% of body weight has been shown to decrease endurance performance. If we can store fluids, performance may be enhanced.

Available from chemists at around $3/100 mls, the glycerol (1.2g/kg of body weight) is mixed with water (26 ml/kg body weight), cordial or sports drinks and drunk over the 1-2 hours before racing.

Glycerol retains fluid by reducing urine output. Some researchers have observed adverse effects such as nausea, gut upsets, headaches and stomach "fullness". As part of a research project, the editor tried it at his first Triathlon in 7 years at Yeppoon recently and had no problems at all. Despite drinking over 2 litres of fluid prior to the one hour race, only 50 ml of urine was produced before the race.

Previous research has shown that long duration, low intensity endurance time to fatigue improved 20-25%, heart rates and body temperature are lower during such exercise, and there were no negative side-effects. Central Queensland University is currently investigating glycerol's effects on Olympic Distance Triathlon performance.

It is not recommended for use by diabetics, those with kidney or liver disease, migraine sufferers, pregnant women, or those with cardiovascular disease.

Athlete Profile

Name: Bob Scammell

Age: 45 yrs

Sports/Events: Long distance Triathlon particularly Forster and Hawaii Ironman (if I get lucky and qualify)

Occupation: Past: Real Estate Valuer **Present:** Land Management- Dept Land and Water Conservation

What do you enjoy about masters sport? The recognition it provides for older athletes and it is symbolic of the fact that you do not have to retire from sport at 30.

What motivates you to participate? It ensures that I reach a satisfactory level of fitness.

How do you keep yourself motivated? I enjoy the psychological and physiological benefits of keeping fit and that is enough in itself.

Favourite training session: Isolated trail running.

How often do you train? About six days per week (but this varies to suit my schedule) - Three run and three bike (road or mountain) and I fit in two swims.

Do you train under a coach, with a group of friends, or by yourself? Why? I prefer to coach myself and train alone as it enables me to set my own parameters (and sleep in when I like!).

Person most admired and why?: Peter Pan and Batman: at 45 and in good shape I dream of being a super-hero and not an old man! Seriously folks, probably Fred Knudsen: 75 and going strong.

Other interests/hobbies: Mountain-biking, whitewater kayaking, environment (President of Maitland Landcare), study (finishing a resource management degree) eating and sleeping.

Your most memorable moment in sport?: Finishing the first Forster Ironman in 1985 (I have not missed one since) and winning my age division there in 1989.

Your most memorable moment in life so far: Marriage and divorce.

Favourite movie: *Delicatessan* (an obscure French movie - but any Batman movie will do).

Favourite book: *The Future Eaters*, a thesis by Tim Flannery (Reed Books, 1994) about the self destructive habits of Homo sapiens.

Favourite 'bad' foods: Cheese, cheesecake and chocolate.

Favourite 'good' foods: Lebanese, Thai and my own vegetable pie.

Philosophy on life: *You are a long time dead*

Advice to masters athletes wanting to improve: The most important part of training is recovery as well as getting a divorce and giving up your job.

Other Comments: There are no rules, laws or traditions that apply universally .... including this one. - Dyer (perhaps a reflection on masters athletes breaking down age preconceptions) **Note:** Freddie fell heavily during training in August and suffered a compound fracture of the left femur. It will be about 3 mths before he can walk properly. Fred we hope you recover soon and know this setback won't stop you living life to the fullest.

TRIATHLON RESEARCH CENTRE

Central Queensland University's School of Health and Human Performance has developed a unique research theme - a focus on Triathlon and it's subdisciplines.

The research team consists of sports physiologists, exercise biochemists, sports biomechanists, sports psychologists and sports sociologists. The approach will be multi-disciplinary in nature with projects being driven by the sport - the coaches, the athletes and administrators.

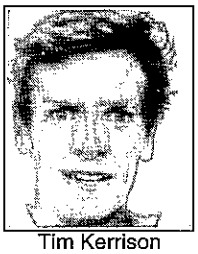
If you have ideas on problems that need researching in the sport, let us know. For more information contact Dr Peter Reaburn on 07-4930 6748 or p.reaburn@cqu.edu.au

ROWING

Biomechanics of Rowing - Part 2

© by Tim Kerrison

It is often puzzling to rowers and coaches that the speed of the boat is actually slowest during the drive phase, while the oars are in the water and work is being done to propel the boat forward. But there is a very good reason for this phenomenon, and an understanding of this concept will help athletes and coaches to better understand rowing technique.



Tim Kerrison

When I started rowing and someone tried to tell me that the boat travelled fastest in the recovery phase, when the oars weren't even in the water I thought they were crazy - but the reason for this is quite logical when you think about it. It's all to do with a concept of physics known as transfer of momentum. In simple terms, this means that in our rowing boat, momentum is transferred from the rower(s) to the boat. In other words if the rower moves in one direction, the boat will react by moving in the opposite direction, provided there are no other forces acting on the boat. Try it next time you're on the water. Go to the catch position, with the oars just resting on the water, and the boat stationary. Then push your legs down as if you're taking a stroke (but leave the oars resting on the water). Notice as you move towards the bow, the boat moves towards the stern.

When we are rowing along at speed the boat reacts to our bodies moving up and down the slide in the same way. As our bodies move towards the bow during the drive phase, the boat will slow down as a result, and as our bodies move back up towards the stern during the recovery, the boat will speed up. Fortunately, because we are applying a propulsive force to the boat during the drive phase, the boat doesn't slow down too much.

So during the drive phase there is a propulsive force acting to accelerate the boat (from the oars moving through the water) competing with a force which is trying to slow the boat down (from the movement of the rower). During the recovery the movement of the rower acts to accelerate the boat. Friction (air and water resistance) also acts throughout the whole stroke cycle to slow the boat down.

The net result of all of these forces appears in Figure 1. Figure 1 displays the velocity of a rowing boat throughout the stroke cycle. Note that the boat speed is lowest just after the catch, and peaks early in the recovery. These fluctuations in boat speed throughout the stroke, and the forces that cause them, have important implications for the way that we row.

The Catch

Note that although the boat speed is lowest just after the catch, it soon starts to increase. The drop in speed at the catch is due to the rapid change of direction of the body at the catch, and acceleration towards the bow. But once the oars are locked in and start to exert force on the water, the slowingdown of the boat is abated, and the boat speed begins to rise again. But imagine if the propulsive force doesn't start until just slightly later. The boat's already going very slow, and it's just going to keep getting slower! That is why it is so crucially important to time the placement of the blades at the catch perfectly with the change of direction of the seat. *"You're missing water at the catch"* means so much more than just losing length of the stroke - it means you're giving the boat more of a chance to slow down. Once the body starts moving back towards the bow a huge force is being applied to the boat. The longer you wait to counter that force, the slower the boat will go. I'm sure the phrase *"place before you push"*, is familiar to many of you, but now I hope there is a better understanding of why this is crucial.

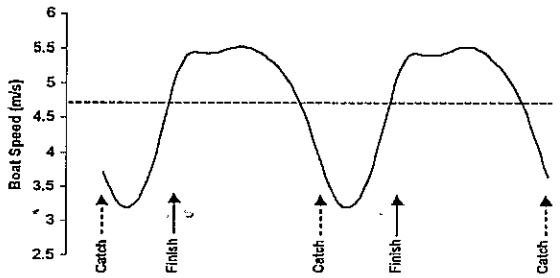


Figure 1: Shows the fluctuations in boat speed over two strokes. The dotted line represents the average boat speed. Arrows mark the position of the catch and finish.

The Recovery

So if the boat's going fastest during the recovery, shouldn't we spend more time on the recovery? Well, it's not quite that simple, but haven't we all been hearing all our rowing lives about "taking our time up the slide" and "proportion". Sure, it's the propulsive force that we apply during the drive phase that actually drives the boat, but there's no point in rushing up the slide to take the next stroke. We are only capable of doing so much work. Whereas some other sports do small amounts of work constantly, in rowing we do large amounts of work, followed by a break (or recovery) before taking the next stroke. We could take less of a break, by rushing up the slide, but then we probably wouldn't be able to do as much work next stroke. This would result in lighter strokes, but more of them. The problem with this is that fluctuations in boat speed (as in Figure 1) are not very efficient. It is therefore desirable to row in such a way that minimises these changes in boat speed. But if we row with less proportion, as just described, the boat will go slower during the drive phase (as we are doing less work each stroke) and faster during the recovery, as we are racing up the slide, therefore causing the boat to react by moving faster towards the bow. This results in even bigger fluctuations in boat speed than before. This is why it is so important to stay controlled up the slide. If we come away too quickly the boat speed will increase too much leaving only one way to go - down. If however an athlete sits back for too long at the finish, and does not flow the hands away, the opposite will happen.

Continued on Page 10..

SWIMMING

Weight Training for the Masters Swimmer

© by Dr Peter Reaburn and Brendan Humphries

The older an athlete becomes, the more important weight training becomes. The shorter the distance a swimmer races, the more important weight training becomes. For the older masters swimmer who sprints, weights become essential.

Why weights?

There are a number of reasons older sprint swimmers need weights:

- Sprinters need strength and power
- Strength and power drop with age
- Weight training improves strength and power
- Sprinters need large fast twitch muscle fibres
- Age leads to decreases in the size of the fast twitch muscle fibre
- Weight training stimulates increases in fast twitch fibre size

In most of the previous issues of TMA, we have emphasised how important weight training is for the older athlete who wants to hold on to past performances as they age. Weights can offer the "edge" over other competitors who aren't doing anything to hold on to muscle size and strength.

What exercises should I do?

The program below assumes little or no experience with weight training and is designed to develop general body strength but with an emphasis on swim-specific strength development. For more advanced programs that are periodised and individualised, you must see someone with *Australian Strength and Conditioning Association* qualifications or someone recommended by your local swim coach.

A Gym-Based Program (exercises to be done in order)

- Bench Press
- Lat Pulldowns
- Seated Leg Press
- Leg Curls
- Upright Rows
- Bicep Curls
- Tricep kickbacks
- Abdominal Crunches

A Home-Based Program

- Chin-ups for men (use a table, beam or under stairs)
- Dumbell (brick) pullovers lying on your back
- Dumbell flyes (arms at right angles to the body) using bricks
- Push ups
- Half-squats holding bricks/blocks/dumbells
- Dips between chairs or tables
- Sit-ups or crunches

How often, how many and when?

The maximum amount of weight we can lift once and only once is called a repetition maximum or 1RM. To do 8RM is the maximum weight you can lift 8 times and only eight times. To develop strength, we need to *overload* the muscles. For the fit and healthy masters swimmer, 8-12RM is recommended which will be about 65-70% of your 1RM. For the very old or the novice, lifting up to 12-15RM, a lighter weight, is the go. In the gym, these weights are easily adjusted using the pins in the machines or adding weights to the bars.

A *set* is a group of repetitions. In the above case, 8RM is one set. To develop strength in the novice weight trainer, three sets are recommended with 2-3 minutes between sets. Once you've finished doing three sets of one exercise, move onto the next exercise and do three sets of that exercise and so on.

> "WEIGHTS CAN OFFER THE "EDGE" OVER OTHER COMPETITORS WHO AREN'T DOING ANYTHING TO HOLD ON TO MUSCLE SIZE AND STRENGTH."

For the home-based exercises, do 10-15 repetitions of each exercise, take a minutes rest, then do the next exercise so that you have a circuit - three circuits and you're finished.

If you are swimming as well, you'll only need the weights twice a week. If you aren't swimming, then get to the gym 3-4 times a week and watch that strength develop very quickly. While research has shown that older people take longer to develop strength gains, if you've never done weights, the increases in strength can be dramatic, even in the very old.

The weights sessions should be at least 48 hours apart to allow recovery. Recovery can be enhanced by light exercise in the cooldown, part of which could be easy swimming or water exercises.

I'd suggest the weights be done on non-swimming days so that you aren't tired for or from the swim session.

Words of Caution

Weight training raises blood pressure. See your sports physician if you have concerns. Limiting above the head work helps keep the blood pressure under control. Breathing out on the lift or push/press phase and breathing in on the recovery phase of any of the exercises also helps control blood pressure. Getting up slowly from lying or sitting positions is also suggested.

Warming up with stretching and 10 light repetitions is also recommended to prevent injuries or cardiac events. The cool down should also include light repetitions and stretching.

Conclusion

Weight training for older sprint swimmers is critical for performance gains and getting the edge over the opposition. Use a strength specialist if you've got access to one since this area is a science unto itself and is filled with misinformation and mythology.

This article is written in response to a request from Peter Jackson (AUSSI Masters Coaching Panel and Coach of the Year) and Peter McMahon who chatted me up during the warm-up at Noosa. Both are avid readers of TMA.

RUNNING

INJURY PREVENTION IN RUNNING AND CYCLING

© by Peter Stanton (Sports Physiotherapist, UQ Sport)

Injury during sport occurs when the loads to which the body is subjected are higher than the body can tolerate. There are two main mechanisms via which such injuries can occur.

1. Acute injuries - A large force generated within the body, or applied to the body can overload a body part resulting in injury. An example of this type of injury may be an ankle sprain during running or a hamstring tear during sprinting.

2. Overuse injuries - Small forces applied repeatedly over a period of time may gradually overload the body, also resulting in injury. An example of overuse injuries include achilles tendonitis, shin splints and runners knee.

Overuse Injury

In sports such as running and cycling, most of the injuries that develop during training and competition are overuse injuries. These injuries occur due to the sustained repetition of a particular action or force that is placing undue stress on the body over a period of time.

There is a limit to what the body can endure before it gets injured - and staying below that limit is what injury prevention is all about. This can be achieved by addressing two main areas -

Training

a) Training - A carefully structured training programme allows the body to properly adapt and recover to the applied training stresses.

Graduality is one of the greatest preventors of overuse injury. Training errors are a very common factory involved in placing excessive demands on the body. It is important that the frequency, duration and quality of training sessions are only gradually increased so that the body can positively adapt to the applied training stresses.

The use of well structured 'warm up' before training and 'warm down' following training will also decrease the risk of injury. A warm up process involves running or riding at a low intensity (aerobic activity) for long enough to raise a sweat, mild stretching of the muscles about to be used, and a more specific series of run throughs or surges if the training is to be more intense. A warm down involves a similar process following training.

b) Body Preparation - Properly preparing the body can increase the loads that the body can endure, making it less likely to suffer injury.

During both running and cycling the biomechanics of the body movement should also be considered as a means of minimising the stresses to which the body is subjected. Assessing biomechanics in relation to injury is basically an assessment of technique. It is generally accepted that performing with good technique helps you become more successful, and also limits the likelihood of becoming injured. Poor technique on the other hand is likely to decrease your chances of improving and increase the risk of injury.

Differences between performing with good technique or poor technique occur due to differences in body structure, strength, flexibility, posture and learned movement patterns. During running some athletes seem to run with long, loping strides while others shuffle. Some roll their shoulders and trunk while others don't. The variations are limitless. (Variation in foot movement also contribute to technique and injury but won't be discussed here).

Cycling also produces numerous variations. Some cyclists are stable in the saddle, others rock from side to side. Knee movement may be straight up and down, or may drop in or out during pedalling. Some cyclists look comfortable on their bikes, others look stretched or cramped. (It is important to point out that many problems in a cyclist arise due to bike set-up rather than body set-up).

> "THE MOST COMMON AREAS OF WEAKNESS THAT CONTRIBUTE TO POOR TECHNIQUE AND INJURY IN RUNNERS AND CYCLISTS ARE THE ABDOMINALS AND GLUTEALS (BUTTOCKS)."

To properly understand some of the stretches and exercises that have the potential to prepare your body properly and improve running or cycling 'technique' it is important to gain an understanding of what the body should be doing.

The first place to look is the trunk and pelvis because it should be providing a stable platform for the legs and arms to work from. The trunk and pelvis will rotate and move a little during running to enable the legs to flex forwards and extend backwards efficiently. But the movements should be small. During cycling it is also important that the pelvis and trunk remains stable.

If you can see a lot of movement of the trunk during running or cycling it is probably excessive. Stability here is important for several reasons.

Firstly, a stable trunk and pelvis allows the forces generated by the legs to move the body forward effectively. Excess pelvic and trunk movement absorbs some of these forces, making a runner or cyclist less efficient.

Secondly a stable trunk and pelvis helps prevent injuries. Excessive movement causes the muscles and joints of the back, pelvis, hips and legs to work harder, and through a larger range of movement that they should have to. Therefore the joints, ligaments and muscles involved are of a higher risk of injury than they would be if the trunk and pelvis were more stable.

There are two common reasons that this area moves too much.

1. The muscles of the pelvic girdle (between the legs and pelvis) are too tight.

2. The muscles of the trunk and pelvis are too weak.

Stretching the tight muscles

It is important that your body has sufficient range of movement in the leg muscles that allows all the movement required in running and cycling to occur before the muscle even starts to get tight. In many athletes this means that the muscles need to be stretched sufficiently to be permanently lengthened.

Stretching to permanently lengthen the muscles should be done at a separate time of the day, in addition to the stretches before and after training. Stretching to lengthen the muscles will achieve good results if the stretches are held for 30-45 seconds and each muscle is stretched 4-5 times per session. The stretches should be held with a feeling of moderate to strong stretch, but not pain, during this time. (Warm up and warm down stretches should only be done to feel a mild stretching sensation!).

Most of the main muscles of the legs and trunk are involved with both running and cycling. If they are tight they contribute to technique problems and therefore increase the risk of injury. However, the muscles themselves are also at greater injury risk due to the tightness.

The common areas than need to be permanently lengthened because they are contributing to poor technique are the hip flexors (front of hip), gluteals (buttocks), hamstrings, iliotibial band (side of thigh), quadriceps and calves. It is important that all these areas are stretched while the trunk and pelvis are held stably in position - without letting it bend forwards, backwards or to the side.

The best way to assess the body's needs for both stretching and strengthening is to have a musculo-skeletal assessment conducted by a physiotherapist involved with running and cycling.

Strengthening Muscles

The most common areas of weakness that contribute to poor technique and injury in runners and cyclists are the abdominals and gluteals (buttocks). Strengthening these areas and "teaching" them to provide trunk stability by ensuring some of the exercises strengthen the muscles isometrically (without movement of the trunk) helps overcome some of the excessive movement seen with poor technique and therefore helps prevent injury.

Conclusion

Preparing your body for the demands of training and competition involves working on flexibility, strength and movement control to allow training with a technique that is less likely to result in injury.

CYCLING

Cycling and Technology

© by Lawrie Cranley

When Peter asked me to write this article, I thought "What can I tell these athletes that they don't already know". These days with the internet the word on new technology gets around pretty quick. So I thought I would start with telling you about some newish technology that you can't use.

If you're a road racing cyclist you will be affected by two rule changes brought down by the UCI (World Governing Body) recently. They, in their wisdom, have decided to ban *Spinachi* type bars from use in road races. The word is that they are dangerous because people use them while riding in the middle of the bunch, hence, they say, is the reason for all the accidents in the Tour de France. Personally I can't imagine one of the world's best cyclists being so stupid. So they're out as of January 1st although I'm sure there will be appeals from handlebar manufacturers.

The second product to get the flick from road racing is to be *Spinergy* wheels. They also are considered dangerous by the UCI. There have been reports from Europe of people getting badly damaged as a result of the sharp blades on the wheels. I must admit I have often looked at them and shuddered at the thought of what could happen in an accident with one of those wheels. They are also out as of January 1st.

So, just as in evolution, as one product disappears another one appears and so there is a range of new wheels about to hit the market. *Trek* are handling the distribution of a new wheel called the *Rolf*. I was very impressed with what I saw at their Australian release in Sydney. They are a very stiff, easily serviced and above all good looking. That is what we're all after isn't it?

Here is a few quotes off their web page which can be found at http://www.freewheel.com/rolf/

"The *Rolf* patented paired/parallel spoke design eliminates unbalanced lateral forces. Aligned in pairs, each spoke sees only half the dynamic tension of spokes in conventional spoke configurations. Each spoke's lateral pull is cancelled by the equal and opposite lateral pull of its parallel spoke. With no unbalanced lateral forces at work, the *Rolf* wheel doesn't need a big fat rim. The 30 mm deep section rim I use is the world's lightest - 480 grams. Fewer spokes - aligned the *Rolf* way - permit lighter rims. The result is a lighter wheel. And that's what you want, right?"

> "IF YOU'RE A ROAD RACING CYCLIST YOU WILL BE AFFECTED BY TWO RULE CHANGES BROUGHT DOWN RECENTLY."

Still on wheels *Mavic* have released a new range of wheels at reduced prices. They have a wheel for every occasion. A range of deep rim wheels starting with the new Equipe from $849. They also have their *Helium* wheels for the hilly courses at $1150 and another one called the *Classic* which is similar to the *Helium* but a little heavier and stronger and comes in around $800 a pair.

Trek have a great new road bike out. It's called the *Y Foil* and is similar in looks to the Y22 mountain bike but without rear suspension. It comes in two models, one with the new 9 speed *Ultegra* at $5495 and the other with *Dura Ace* at $7495. Alas though neither of these bikes can be used for road racing once again because of the draconian rules brought down by the UCI which bans bicycle frames which do not have a triangular frame.

Giant Bicycles also have a couple of new road bikes out, one in particular being the *TCR1* which is 9 speed *Ultegra* equipped with their new aluminium compact frame, carbon forks, 16 spoke wheels with carbon spokes and sells for $2695. Good Value.

Keywin pedals are not a new product but have recently been reinvented. *Keywin* are made in N.Z. and are a very light composite pedal, their downfall used to be that they had no lateral movement for people who had knee problems (which most Masters Athletes do). Now however they have brought a new model out which does have lateral movement. They have come up with an interesting concept for creating the lateral movement. Unlike most pedals which rely on the shoe cleat moving on the pedal, *Keywin* have the actual pedal body moving on the axle, thus allowing your foot to be held firm on the pedal and eliminating the problem of your shoe plate wearing and pulling your foot out of the pedal. Ideal for all cyclists.

Have you seen the new *Continental* GP3000 tyres? They're the ones with the grey tread. That grey stuff is silica. Look out for more tyres with silica, Michelin have released one in Europe and you might have seen it in the Tour de France, it was a green and black tyre. Silica has a very low rolling resistance and corners well in the dry but we've found that it's not so great in the wet.

If you would like to see some of these products you're welcome to call into my store, Bikestyle, 160 Edward St., Brisbane. Or phone for mail order if you're in the country - 07 32217228, email: lcranley@thehub.com.au

Now I've got my plug in. Enjoy your cycling. Lawrie Cranley

Did You Know?

- In 1995/96, only 30.7% of people over 15 years of age participated in sport or physical activity.
- Only 17.7% of people over 65 yrs of age participated in sport or physical activity.
- Each participant spent an average of $652 on sport and physical activity.
- In 1990-91, the govt spent 99.64% of it's health budget on health rectification.
- In the same period, 0.36% of the budget was spent on health prevention/promotion.

wing Continued from Page 6...

How can you use this to make you row faster?

Firstly, I hope that if you did not already have a strong appreciation of why these two aspects of rowing technique are so important, you do now. Next time you are working on the timing of your catches, think about what's happening to the boat speed. Feel for the 'check' at the catch, which is essentially the sudden drop in boat speed caused by the failure to place before you push. If you have a coach get him or her to observe the boat check at the catch. A coach with a good eye should be able to notice changes over time as a result of your improved technique.

The recovery is a little harder to do. In general, make sure you hold the knees down, sit back with the body and flow the hands out around the back turn. A good coach should be able to notice any surges in boat speed that accompany a hasty departure from backchocks, which will more than likely be accompanied by large boat-check at the catch. Your coxswain is often a good judge of a smooth stroke. Some coxes may think it's normal to be thrown around in the cox's seat, but an efficient crew will keep these annoying jerks under control.

In general a stroke that feels smooth, without large surges or rapid drops (checks) in boat speed is what you're looking for. Energy (your energy!) is lost every time the boat has to speed up or slow down, so row smart and row smooth.

From the Research

Solid or liquid?-that is the question

Sports drinks, sports bars or "GU" during racing? This research suggests either. The cyclists rode for two hours at 70% of O_{2max} (80% Max HR) and also completed a time-trial. They consumed the same amount of carbohydrate in either liquid form (7% carbo solution as in most sports drinks) or as solid form as a sports bar with a mix of carbo, fat and protein. Blood glucose, lactate, and insulin levels were measured as well as time-trial performance. The investigators concluded no difference between treatments (fluid vs solid) in either time-trial performance or blood measures. It would appear that individual preferences determine how you get the carbohydrate in.

Lugo, M. et al. Metabolic responses when different forms of carbohydrate energy are consumed during cycling. *International Journal of Sport Nutrition* 3(4), 398-407, 1993.

Editor's Note: While this study was done in a lab at 20 degrees C, in hot conditions it would be suggested to take in sports drinks as they contain not only carbohydrate and electrolytes, but that all-important fluid that solid food doesn't. My experience would also tell me that eating and / or drinking during racing is a highly individual matter. What suits one person may not suit another. Experiment for yourself to find what suits you and how you respond.

Workout

© by Dr Peter Reaburn

We intoroduce a new section of TMA devoted to outlining sample training sets aimed at acheiving maximal benefit from minimal time input for the busy masters athlete. **This issue we focus on swimming.**

Anaerobic Threshold Swim Sets

The following swim sessions are aimed at improving distance freestyle swimmers and triathletes's race 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.

	Novice	Intermediate	"Guns"
Warm-up	* Stretch * 200m easy * 4x50m 25m drill 25m swim * 4x50m 12.5m hard 37.5m easy	* Stretch * 300m easy * 6x50m 25m drill 25m swim * 6x50m 12.5m hard 37.5m easy	* Stretch * 400m easy * 8x50m 25m drill 25m swim * 8x50m 12.5m hard 37.5m easy
Main Set	* 8-10x100m at 85-90 % MHR with 30-45s recovery	*10-12x100m at 85-90 % MHR with 20-30s recovery	* 15-20x100m at 85-90 % MHR with 15-20s recovery
Cool-down	* 4x50m easy * Stretch	* 6-8x50m easy * Stretch	* 10x50m easy * Stretch
Total	**1600-1800m**	**2400-2600m**	**3300-3800m**

Why Coach?

Warm-up : Stretching improves flexibility in joints. An easy swim 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. Drills fine tune the stroke and should always be followed by swimming so that the drill focus can become the swim focus. 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 endurance swimmers and triathletes. It is crucial that the quality of the last repeat in the set is as good or even slightly better than the first interval. 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 : Easy recovery swims lower 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.

TRIATHLON

The Use Of Heart Rate Monitors For Triathlon

© by Greg Reddan

Heart rate monitors began to appear in Australia about a decade ago and I was at first reticent about their value. I felt that experienced athletes had a good understanding about their body and its functioning and did not need to use these new gadgets. I finally succumbed to trying one and now I am a devotee! I feel they are one of the greatest steps forward in the development of training techniques.


Greg Reddan

The strength of your heart is one of the most important reasons to exercise. By monitoring your heart rate, you can gain greater benefit out of the time you spend in developing your cardiovascular system. When we design a fitness program, we need to consider three main variables - Frequency, Duration and Intensity. The first two are easy to monitor, but intensity is more difficult. Heart rate provides us with a built-in monitor to assist us in the development of fitness

Specific improvements in fitness and health will occur if we work out regularly at certain levels of intensity. These can range from toning muscles or losing weight to building a stronger heart or developing peak performance. These levels of effort are termed Target Heart Rate Zones and are usually related to a percentage of our maximum heart rate. Burke provides four zones:

a) Moderate Activity Zone - 50-60% of Maximum Heart Rate

b) Weight Management Zone - 60 -70% Maximum Heart Rate

c) Aerobic Training Zone - 70-80% Maximum Heart Rate

d) Competitive Training Zone - 80-100% Maximum Heart Rate

Sally Edwards splits the final zone into two and terms these zones:

Anaerobic Threshold Zone - 80-90%

Red-Line Zone - 90-100%.

Heart rate monitors allow us to determine these heart rates and train within them with great accuracy, once we have determined our resting and maximum heart rates. Training within each zone offers specific health and fitness benefits as Burke identifies:

a) The Moderate Activity Zone will start improving your overall health if you exercise for at least 30 minutes three times per week;

b) The Weight Management Zone is often referred to as the "fat burning zone" as the exercise intensity is moderate enough to make your body use fat as the primary source of fuel. If you exercise in the heart rate zone for 20 to 30 minutes per day, 3 to 5 days per week, you should lose weight and maintain a fit appearance.

c) The Aerobic Training Zone will assist you build aerobic endurance and improve your cardiovascular fitness. It also develops a sound base for the more stressful workouts required for competition.

d) The Competitive Training Zone will help you increase your speed and prepare you to race competitively. It will also improve your ability to tolerate the build-up of lactic acid, the main waste-product of anaerobic metabolism.

To determine the Target Heart Rate Zones, you can use the Training Heart Rate Calculator developed by Roy Benson for both men and women, which takes into account not only your actual or predicted maximum heart rate but also your resting heart rate, which is a good indicator of your present fitness level. To use these calculators, you will need to have established both of these factors.

Determining Your Resting Heart Rate

The fitter you are, the less effort it takes to pump blood around your body. To calculate your resting heart rate, all you need to do is put your monitor on before you get out of bed in the morning for five consecutive days and average the results. Ensure you are well-rested and relaxed when you measure yourself.

Determining Your Maximum heart Rate

You can calculate your maximum heart rate by having it tested or by using predicted values. As your MHR will vary depending upon the activity utilised in testing, triathletes need to complete a maximum test in all three disciplines. The most accurate method of testing is by a clinical test (treadmill, cycle ergometer, or swimming flume) by a cardiologist, exercise physiologist or trained technician. Field tests can also be used which are much easier and cheaper, but do have an element of danger . If you are over 35, overweight , or have a history of heart disease, then a clinical test is advised.

Edwards recommends the following field tests:

a) RUNNING

i) 1 mile rest - run as fast as you can for four laps around a track - you maximum heart rate will be the highest registered towards the end of this distance;

ii) Hill repeat test - find a relatively steep hill that takes you about 90 seconds to run. After a warm-up, run the hill four times as fast as possible, then run or jog down to recover. The MHR is usually the highest heart rate at the end of the hill climbs.

iii) Graduated test - take your best one-mile time, start out one minute per mile slower than that, and gradually increase the pace so that by the end of the fourth lap you are at your top one-mile speed and then give it everything over the last 200 metres. Your MHR will probably be recorded in the final metres.

iv) 800 metre format - run 400 metres building to 95% of your maximum, then run the second 400 metres as a real race situation by running to your maximum. You may need to have a friend to push you along in this test.

Triathlon continued on Page 12 ..

Get Set!

Calendar of Events

March 27-29 1998
NZ Masters Long Course Swim Champs
Wellington, NZ
Contact: +64-4-388-2489

March 12-14 1998
AUSSI National Swim
Hobart, Tasmania
Contact: (08) 89995829

April 9-13 1998
Aust Vet Track & Field Champs
Brisbane, Qld
Contact: (07) 38701736

June 21-30 1998
World Masters Swim Champ.
Casablanca, Morocco
Contact: (08) 83441217

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

October 17&18 1998
Veterans State Cycling Champs
Location to be advised
Contact: (07) 33901477

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

Triathlon continued from Page 11...

b) SWIMMING

Lap Test: Using your favourite stroke, hopefully freestyle, swim 50 metres aggressively. Rest for 2 minutes. Then add 10 seconds to the time gained in the first lap. Swim 6 laps (300 metres) at this calculated pace. Each lap try to decrease the time by 5 seconds until you can no loner increase your speed. Stop briefly each 50 metres and check your heart rate - the highest value being equal to your MHR.

c) CYCLING

i) Flat terrain: Begin a ladder of 30 second intervals; after each 30 seconds increase your speed by 1 kph. You should use about 4-8 steps in the ladder, so your starting speed needs to be about 3 kph less than the rate of your fastest mid-distance racing speed.

ii) Hilly terrain: Use a long uphill or a series of hills. Warm-up and hit the bottom of the hill relatively fast, ride the hill extremely hard until your heart rate no longer rises and you are near exhaustion. This final figure is your MHR.

Predicted Maximum Heart Rate

The most simple procedure is to estimate your MHR by using a well-established formula which is 220 minus your age. eg. if you're 50, 220 minus your age provides a predicted MHR of 170. However, my experience is that there are wide variations of accuracy using this method and actual maximal testing is much more valid and useful. Another formula (Ball State University) is:

MHR for women = 209- (0.7) (age)
MHR for men = 214 - (0.8) (age)

Other Benefits Of Heart Rate Monitors

Easy Days: Many triathletes tend to exercise at too high an intensity in training. Overtraining will cause poor performances in competition. Easy days allow use to recover form the hard training and gain the appropriate training effects. Heart rate monitors ensure that you keep the heart rate low on these easy days.

Hard Days: On the other hand, a heart rate monitor may also assist you in training at too high an intensity. It will also help you recover properly between repeats before performing another. This is something that has been very haphazard in the past and has been mainly based on arbitrary times which do not take into account the principle of individuality. .

Recovering from Injury: Using a monitor will assist you to gradually re-develop your fitness. Triathletes tend to be highly motivates and frequently rush back into training too quickly with further negative effects.

Post-Exercise Recovery: One of the best indicators of fitness is your ability to recover and return to normal heart rates after training. Using a monitor allows you to record your heart rate one, two and five minutes following exercise. As you get fitter, you will notice a faster return to your resting heart rate.

Technique: You can use a heart rate monitor to determine the most efficient method of climbing hills or time-trialling in different bike positions.

Racing: A heart rate monitor will help you determine if you are going into anaerobic debt during an event. This is a particular problem at the start of a race or in a long hill climb, and may stop you "blowing up" later in the race and achieving a poor result. You want to withhold this anaerobic effort until the end of the race so that it peaks when you cross the finish-line, not before!

Before the Race: Wearing a monitor will assist you to relax before a race and save your energy for racing. You may even try meditating or focusing to reduce your heart rate at this time.

Time-Trials: The environment obviously affects us in many ways which we sometimes do not realise. A monitor can help you measure the effects of factors such as temperature, wind, humidity, altitude and terrain. By racing close to your anaerobic threshold, you will finish the event with maximum effort and your best possible time.

Race Feedback: You can now purchase monitors that will store data for analysis after races or training. This will help you design your interval training sessions that are specific for your purposes. eg. you may need longer intervals or perhaps more speed work.

Equipment: You can also use a monitor to evaluate new cycling equipment such as handlebars, wheels or tyres by reviewing your heart rate at the same speed over a set course.

Conclusion

I hope I have convinced you of the many values of a heart rate monitor. Polar are one of the best brands and they have a range of monitors that carry out different functions. If you have the finance, buy one that will store data for later analysis. This evaluation is invaluable as far as your improvement is concerned. Remember it is only a tool - don't get carried away and run into the back of a parked car whilst monitoring yourself!

REFERENCES: The following are cheap and easily read texts that are well worth-while reading:

Burke, E. (1994). *Precision Cycling*. Polar Electro Oy: Finland.

Edwards, S. (1993). *The Heart Rate Monitor Book*. Polar Electro Oy: Finland.