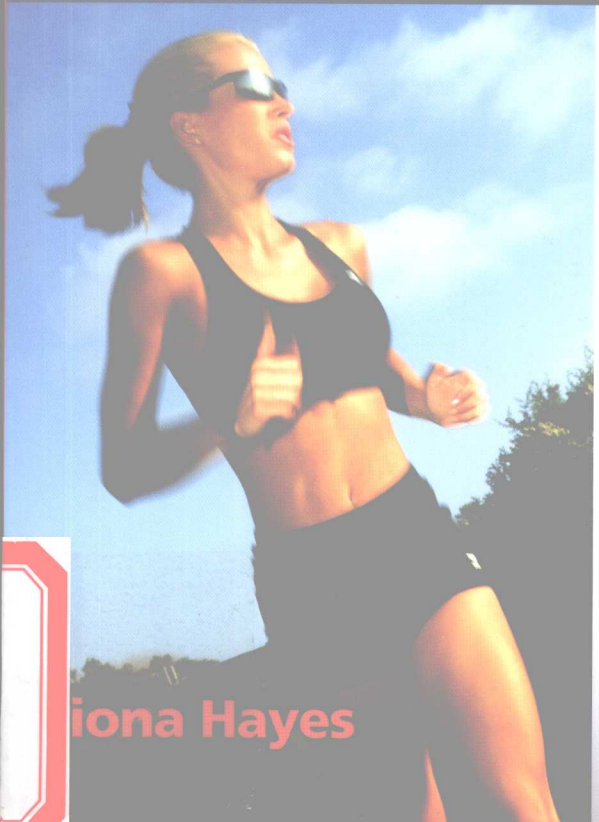
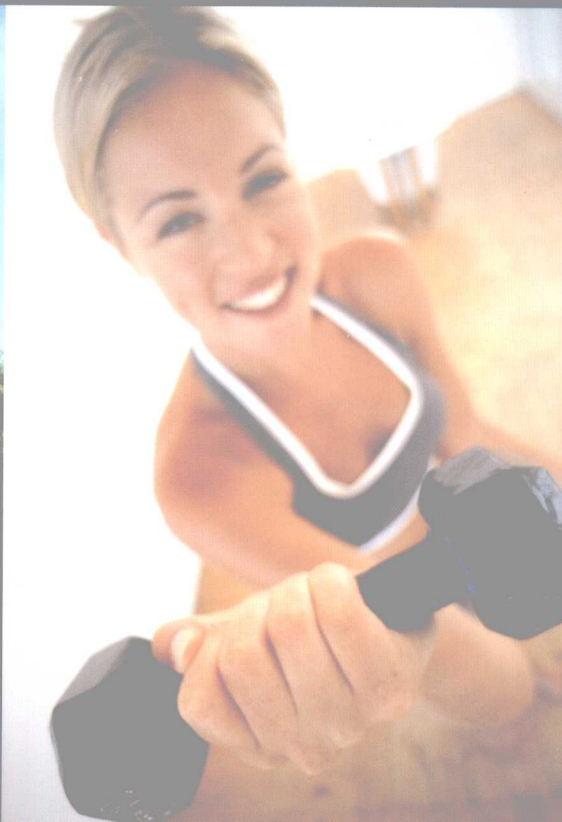
Fitness Trainers

Multi-sport Training for Fitness





iona Hayes

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A & C Black • London

Published in 2004 by
A & C Black Publishers Ltd
37 Soho Square, London W1D 3QZ
www.acblack.com

ISBN 0 7136 6654 4

A CIP catalogue record for this book is available from the British Library.

Acknowledgements
Cover photographs © Imagestate

Typeset in 10/12pt Minion Display

Printed and bound in Great Britain by Biddles, King's Lynn

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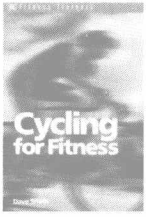

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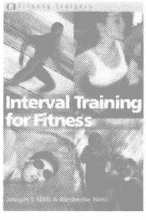

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Introduction

1 What is multi-sport training?

The boom in triathlon (swimming, cycling, running competition) led to an increase in competition that accommodates multi-sport participants. The birth of multi-sport competition as a major participation sport led to the birth of multi-sport training.

a long-term exercise programme made up of different activities and sports

Triathlon involves swimming, cycling and running and is now an Olympic sport; biathlon involves swimming and running, and duathlon involves cycling and running. These competitions are now advertised in popular running, cycling and fitness magazines and include a number of distances to accommodate all levels from beginner to seasoned athlete. Further variety is provided by changing the cycling leg, traditionally a road time-trial section, to a mountain bike section, or changing the run from a road run to a cross-country run. In some events a kayak or sailing section is included as well as or instead of the swimming. Also increasing in popularity is adventure racing, involving outdoor activities such as fell running, walking, climbing, kayaking, skiing, mountain biking and horse riding: competitive multi-sport training for the outdoor enthusiast and survival specialist.

Preparing for these events requires that the participant train in each different sport involved. From a physiological perspective this ensures that all aspects of fitness are covered, whereas often one component of fitness is addressed and another ignored. So from these multi-sport events, was born multi-sport training, a long-term exercise programme made up of different activities and sports in order to provide variety and reduce the risk of injury whilst improving all-round fitness.

A multi-sport training programme may include competitive sports, outdoor activities such as those already mentioned and indoor fitness activities such as weight training and aerobics. The appeal of multi-sport training is in the variety of exercise in the programme, which serves to maintain long-term interest and to tax different muscle groups in different ways. One day the participant may run, putting greater stress on the muscles and joints of the legs, and the next day may swim, reducing the impact on the joints and working the upper body more.

'Everyone has limits on the time they can devote to exercise, and multi-sport training simply gives you the best return on your investment. Balanced fitness with minimum injury risk and maximum fun.'

Top triathlete Paula Newby-Fraser

Who is it for?

Multi-sport training is for everyone. No matter what a person's age or level of fitness, anyone who wants balanced, all-round fitness and enjoys a variety of activities will benefit from and enjoy multi-sport training.

I run and weight train. Why do I need to multi-sport train as well?

If you run and weight train you are already multi-sport training. Running works your cardiovascular system and develops muscular endurance in the legs. Weight training works on muscular strength and endurance in your upper body, so your training programme may be more balanced than if you simply run or simply weight train. Most people who work out in clubs multi-sport train using CV machines such as treadmills, steppers, rowing machines, static bikes etc. to improve their aerobic fitness, and using resistance equipment to work on muscular strength.

Many people combine weights or resistance training indoors with walking, running or cycling outdoors to the same effect. Combining different activities utilises different parts of the body, different combinations of muscles, and even different combinations of muscle fibres within a muscle. This does not happen to the same extent in single-activity training; overall a more balanced fitness programme emerges.

Is multi-sport training OK for young athletes?

Most experts recommend that before puberty children participate in a variety of sports rather than specialising, even if a particular talent is discovered at an early age. Too early specialisation may result in 'burn out' or in overuse injury. Injury prevention is particularly important in growing children, who should be supervised by a trained coach or instructor with specialist knowledge of coaching children. Careful monitoring of training will help protect against the possibility of serious injuries occurring to bone growth centres. This makes multi-sport training particularly suitable for young athletes because full and rounded development is encouraged by participation in a number of different activities, each putting different stresses on the body.

Is multi-sport training useful for competitive sports people?

The more highly trained an athlete becomes the more difficult it is to improve performance. In relative beginners, or those less dedicated to training, improvements to any physiological area may improve performance in any one sport. For the athlete who is seriously dedicated to high-level competitive sport, then specificity of training becomes more of an issue. For these athletes multi-sport training is unlikely to improve performance in a single sport: the training must be focused on and specific to that sport to allow for the tiny improvements in performance that may make the difference between winning and losing.

What are the benefits of multi-sport training?

Multi-sport training and health

The well-researched and documented health benefits associated with exercise are only apparent in those who exercise regularly and long term. Statistics show that

'Multi-sport training is not the key to performing a specific sport at your best. Training in that sport is.

In a perfect world, with perfect bodies and no other stresses, we would not need to multi-sport train. So why do it? Because as mere mortals, our bodies get injured, our minds gets tired, and our schedules get hectic.

So, multi-sport train to maintain muscular balance and avoid injury. Multi-sport train to correct specific muscular weaknesses. Multi-sport train when time constraints keep you from doing your primary sport, but your body still needs work. Multi-sport train to work your body while resting your mind. In other words, use cross training as a means to an end, always remembering your primary performance goal, and the specific training it requires.'

Stephen Seiler, Associate Professor at the Institute of Health and Sport, Agder College, Kristiansand, Norway.

most people who start an exercise programme drop out within the first three months.[1] Even in supervised exercise programmes the drop-out rate is around 50%.[2] Cross training can provide variety which may prevent the boredom often associated with continuing an exercise programme.

Injury prevention

Studies have shown that overuse injuries are associated with an increased volume of training, and that injuries in runners are related to increased weekly mileage and/or frequency of running or racing. Runners who do not participate in any other sport are more likely to become injured.[3] By changing the activity regularly and thus reducing the repetition of movement, multi-sport training allows for the greater levels of fitness brought about by increases in training volume without a concomitant increase in the risk of injury.

Some people stop exercising because as they increase their activity levels they pick

A study on runners evaluated increased risk of injury with respect to gender

- age
- obesity
- weekly mileage
- time per mile during training
- time and place of running
- stretching habits of the of participants.

It was concluded that only weekly mileage was positively associated with increased incidence of injury.[4] A study on aerobics class participants showed that injury risk was greater in those who participated in aerobic exercise only once per week and in those who did no other sport.[5]

up an injury. Because they have to stop doing their chosen activity, temporarily or permanently, they fail to get back into a regular exercise routine or simply give up exercising, believing that the injury has prevented it.

Single-activity participants often show imbalances of muscle strength, muscle mass, and flexibility. For instance the quadriceps muscles at the front of the thigh are often visibly larger on the dominant leg (i.e. the leg most commonly lunged on) in squash players. Likewise tennis players often have greater muscle mass in the playing arm than in the non-playing arm. Imbalances of muscular strength, muscle mass, and flexibility can lead to injury. As multi-sport training utilises different disciplines these imbalances are less likely to occur in multi-sport than in single-activity participants.

Many sportspeople who become injured simply give up exercise until their injury is healed. This time of complete rest, whilst accommodating the recovery from the injury sets back their training programme dramatically. A multi-sport training programme, because it uses different sports and therefore puts different stresses on the muscle and joint complexes maintains fitness whilst the injury is healing.

One personal training client of mine, unable to continue her sport of distance running whilst recovering from a stress fracture in her foot, maintained her cardiovascular fitness and aerobic capacity by cycling and swimming. Only two weeks after she started to run again she ran a personal best in a 10-kilometre race.

Maintenance of fitness through multi-sport training not only reduces the time spent reaching playing fitness again after injury, but may speed up the healing process by reducing muscle loss, strengthening the injured area and correcting any muscular imbalances. Whilst continuing to train, the stress on the injured area can gradually be increased as healing takes place and the new tissue becomes stronger or the joint becomes more stable.

Balanced fitness

> When individuals successfully meet the challenge of exercise during the preparation for and participation in sport they do so as a result of an exquisitely orchestrated collection of physiological and metabolic events.
>
> *Professor Clyde Williams*

Whether training for general fitness and health or for sports performance the words of Prof. Clyde Williams are true. The body is a fascinating machine, beautiful in its complexity. It is a machine not only in which physiological and metabolic events interact, but psychological aspects such as motivation and mental attitude play an important role in influencing outcomes, whether that be high-level performance or simply the motivation to move.

However, this 'exquisitely orchestrated collection of physiological and metabolic events' can 'get out of tune'. In order to play the perfect symphony our training must be geared to making the most of all aspects of fitness, so to multi-sport train effectively we must first understand at least a little about the orchestra and how its different sections play together. Physical fitness is the integration and balance of a variety of components affecting the cardiovascular and pulmonary systems (the

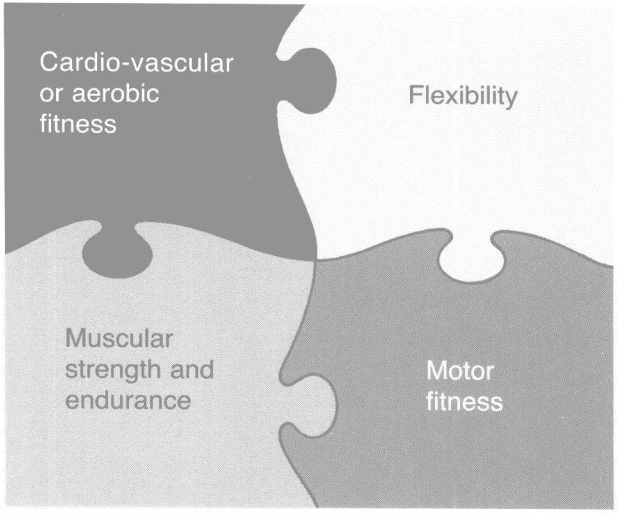

Figure 1.1 Physical fitness

heart and lungs), the skeleton and joints, the muscles, and the nervous system. To obtain all-round fitness, all aspects of fitness must be trained.

Why is training good for my heart and lungs?

Cardiovascular fitness refers to the condition of the heart and circulatory system. Training that is endurance based such as walking, running, swimming, rowing, canoeing, skating, skipping and dancing affect the heart increasing its size, strength and function such that there is an increase in **stroke volume** and **cardiac output**. That is, more blood is pumped out of the heart at every single beat. This has the effect of reducing the pulse rate both at rest and at various intensities of exercise, thus at any given intensity the heart beats more slowly in a trained than in an untrained individual and during exhaustive exercise the cardiac output is greater in the trained than in the untrained individual. This greater cardiac output is often attributed to the increase in size of the heart. In reality the increase in size is minimal and the increased cardiac output is largely the result of greater filling of the ventricles that results in a greater stroke volume.

Blood carries

- oxygen
- foodstuffs
- enzymes
- hormones
- waste products
- heat

- With the right type of training the improvements in the heart are accompanied by improvements to the general circulation – the blood transport system. There is an

Stroke volume is the amount of blood ejected from the left ventricle of the heart during contraction.

Cardiac output is the volume of blood per minute pumped by the heart and is the stroke volume times the heart rate.

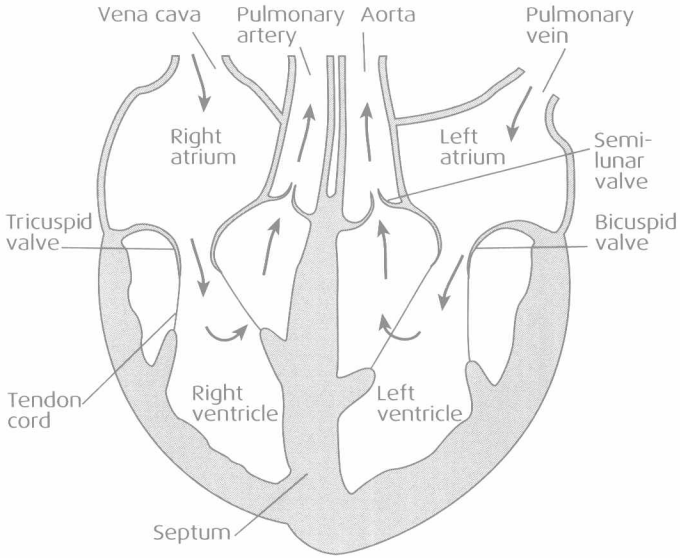

Figure 1.2. The heart

increase in the size and number of **capillaries** flowing through the regularly worked muscles. This allows the body to transport oxygen, nutrients, **hormones** and **enzymes** to the muscle and waste products away from the muscle more effectively.

Capillaries are small blood vessels forming a network throughout the body.
Hormones are chemical messengers produced by the body and transported in the blood to its target tissue.
Enzyme is a complex protein formed in living cells and assisting chemical processes without being changed itself, i.e. organic catalysts.

- **Blood pressure** is the pressure that the blood exerts on the walls of the blood vessels. Thus an increase in the size and number of capillaries will decrease blood pressure both at rest and at work. Blood pressure at rest and during submaximal exercise decreases as a result of regular aerobic training.

Blood pressure is written as two numbers, e.g. 140/90. The larger number is systolic blood pressure or the pressure during systole when the heart is contracting. The smaller number is diastolic blood pressure or the pressure during diastole when the heart is relaxing. Normal blood pressure is often quoted as 120/80, though a range from 110/60 to 140/90 is usually accepted as normal. If blood pressure is consistently above 160/90 you should consult your doctor.

- Oxygen is carried in the blood in association with **haemoglobin**. Haemoglobin, found in red blood cells, is a protein pigment containing iron. Every haemoglobin molecule can carry four oxygen molecules. When the oxygen reaches the muscle it is given up by the haemoglobin and diffuses across the cell membranes and into the muscle where it is carried on another protein pigment called **myoglobin**. Endurance training causes an increase in total blood volume and also in total haemoglobin levels in the blood. This improves the oxygen-carrying capacity of the blood. There is also an increase in the myoglobin content of the working muscle.

Haemoglobin is the iron-containing pigment of red blood cells that carries oxygen in the blood.
Myoglobin is a pigment found in muscle that transports oxygen from the cell membrane to the mitochondria.

- The lungs are the site of gaseous exchange. In the lungs oxygen enters the bloodstream from the air, and carbon dioxide, a by-product of the aerobic energy system, leaves the blood and is released back into the air. Regular endurance training improves the function of the lungs, by increasing the power and endurance of the intercostal muscles and the diaphragm. Breathing occurs when the lungs are inflated and deflated like bellows. This is controlled by the muscle of the diaphragm, which spans the bottom of the ribcage, and the intercostal muscles between the ribs. Endurance training improves the function of these muscles and is associated with an increase in breathing volume. This higher maximum ventilation is a result of increases in both breathing frequency and **tidal volume**.

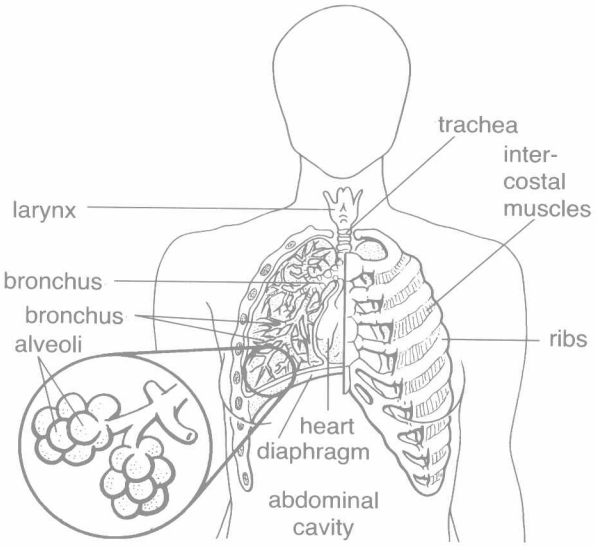

Figure 1.3 The lungs

Why is training good for my muscles?

Regular training of any kind will improve the function of muscles. Muscles rarely work in isolation. They may be causing movement around a joint or joints, they may be stabilising the body position or they may be checking movement at a joint in order to prevent injury. Whatever the job of the muscle in any particular movement or posture, both strength and endurance of that muscle or group of muscles may be involved. Maximum strength is the ability of a muscle or group of muscles to overcome a resistance once. Endurance is the ability of a muscle or group of muscles to overcome a resistance for an extended period of time, that is more than once.

Increases both in strength and in endurance of the muscles may benefit **health** by accommodating safe lifting and maintaining the integrity of the joints during movement.

Increases both in strength and in endurance of the muscles may benefit **sports performance** by increasing the total work capacity of the muscle either in terms of volume or intensity or both.

Tidal volume is the amount of air that is moved in or out of the lungs in one breath.

Improvements in the lungs also include greater capilliarization, that is an increase in the size and number of blood vessels in the lungs which increases the capacity for gaseous exchange.

Why is training good for my skeleton?

Osteoporosis is a medical condition often known as brittle bone disease because the bones become fragile and in severe cases may fracture spontaneously. Although this disease mainly affects women the number of men also affected is growing.

The skeleton is made up of living tissue. If the skeleton is not worked it will become weak in the same way that unused muscle becomes weak. Where the skeleton is subjected to forces it will become stronger. However, even in terms of skeletal strength, training is specific. Only those parts of the skeleton subjected to force will become stronger, thus a runner may have strong bones in the legs and hips but may not have strong bones in the forearms and wrists, and a tennis player may have greater strength in the bones in the playing arm than in the non-playing arm. Strong bones are vital to health. The widespread incidence of **osteoporosis** is believed to be at least in part due to long-term lack of exercise. Other factors include diet, age, gender and genetics.

By the age of 60 one woman in four has fractures related to osteoporosis; this becomes one in two by the age of 70[6].

Why is training good for my joints?

Wherever two or more bones meet there is a joint. Joints come in a variety of types but those most involved with movement are synovial joints: these allow for varying

Osteoporosis is a medical condition often known as brittle bone disease because the bones become fragile and in severe cases may fracture spontaneously. Although this disease mainly affects women, the number of men affected is growing.

degrees of freedom of movement, determined by the shape of the joint. For instance hinge joints such as the elbow allow for movement in one plane only, whereas ball and socket joints, such as in the hip, allow for movement in three planes. The ball and socket joint allows for a large range of movement in any one plane, whereas the joints in between each vertebrae of the spine allow for only small ranges of movement.

Stabilising the joints are ligaments made up of connective tissue, and crossing the joints are muscles that affect the movement or increase the stabilisation of the joint by holding it still or by counteracting a movement. Training may increase the strength of the stabilising muscles and also increase the strength of ligaments, thus maintaining the integrity of the joint during applications of force, such as when landing from a jump.

Why is training good for my nervous system?

The nervous system is the control centre for the body. Any movement involves contracting individual muscle fibres or groups of muscle fibres in the right sequence to cause that movement to happen. Simultaneously opposing muscle fibres must be allowed to relax in order that they do not block that movement from happening. This is known as reciprocal innervation. The nervous system controls the contraction and relaxation of muscle fibres and so is in charge of the combinations and

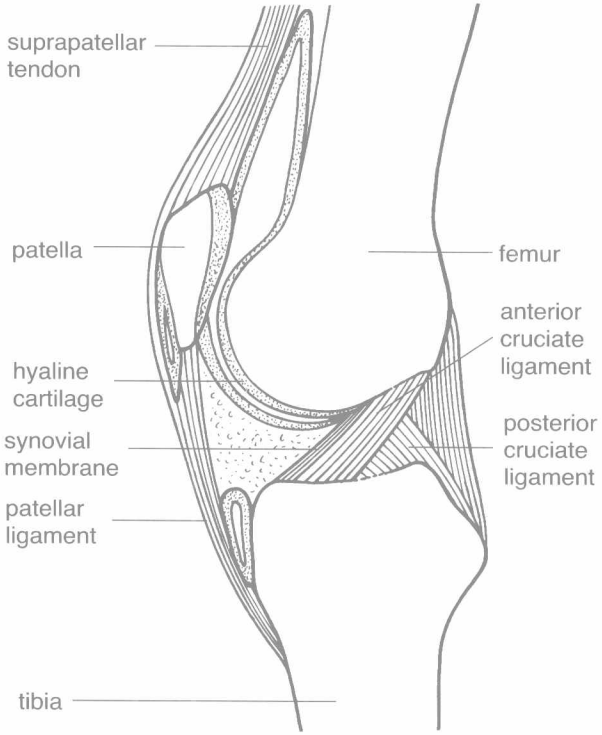

Figure 1.4 Synovial joints