Editorial

In this issue we focus on issues encountered by teams travelling to compete overseas in International competition. Dr Wayne Diesel, chief physiotherapist for the South African Olympic team at the 1996 Olympic Games at Atlanta – an event which he describes as the greatest experience of his life and one that he would highly recommend to anyone – has kindly co-ordinated contributions form physiotherapy colleagues who work with our National cricket and soccer teams. Together with his own contribution these articles provide an interesting insight into the role of the physiotherapists who travel with national teams.

This issue is rounded off with contributions from Judith Johnson, a dietician in private practice who discusses: Nutritional Challenges for Olympic Athletes and by Professor Tom Reilly and his colleagues who discuss Jet Lag. Professor Reilly from Liverpool is one of the leading authorities on Jet Lag and the co-author of the definitive book on the topic. His contribution explains the physiological basis for this complex condition and provides practical ways in which the negative effects of this condition on athletic performance, might be reduced. Travelling with International teams is perhaps the greatest challenge to any professional involved in Sports Medicine and Sports Sciences.

Hopefully, the expertise shared in this issue of the Journal will further enhance the quality of services we can provide to our teams travelling to International competitions.

Professor Tim Noakes
Editor

My thanks to the Editors of the South African Journal of Sports Medicine for affording me the honour to be guest editor of this issue of your Journal.

I would like to introduce this issue by paying special tribute to all my colleagues who have worked tirelessly, and often very much behind the scenes to entrench the role of the physiotherapist in Sports Medicine. The fruits of our efforts can be seen from the fact whereas no physiotherapists travelled with our team to the 1992 Barcelona Olympic Games, a contingent of 5 South African physiotherapists was present at the Atlanta Games. This change has occurred because of calls by both the athletes themselves as well as the sports administrators to include physiotherapists in the team. Clearly the athletes and administrators would not have requested our presence had it not been for the excellent work done by our profession in the handling of sports injuries at all levels, including those that occur to our elite athletes.

Working and travelling with sports teams appears both glamorous and a wonderful way to see the world. The physiotherapists who have contributed to this edition have all toured extensively with the most prominent of our National sports teams. In our articles we share our views on some of the pro's and cons of travelling with our respective national teams. Craig Smith was perhaps the first South African physiotherapist to work with a National team. He was appointed to the National cricket team for their first tour to India in 1991; he has been a consistent and important member of that team ever since.

David Becker and Steve Felsher have worked with our soccer World Cup hopefuls, the Bafana Bafana for some years and will likely have the experience of their lives at the World Cup in France in 1998. I, on the other hand had the huge honour of heading up the physiotherapy teams to the 1995 All African Games as well as the 1996 Olympic Games.

Having read these articles I can certainly relate to both the rigors and delights of travelling with a sports team as their physiotherapist. A message to those physiotherapists contemplating getting involved with a sports team: "Should you be given the opportunity to become involved, grab it with both hands. Don't seek the limelight and your rewards will come from the appreciation and performances of the team. And perhaps most importantly, do it because you enjoy it!"

Wayne Diesel
Guest Editor

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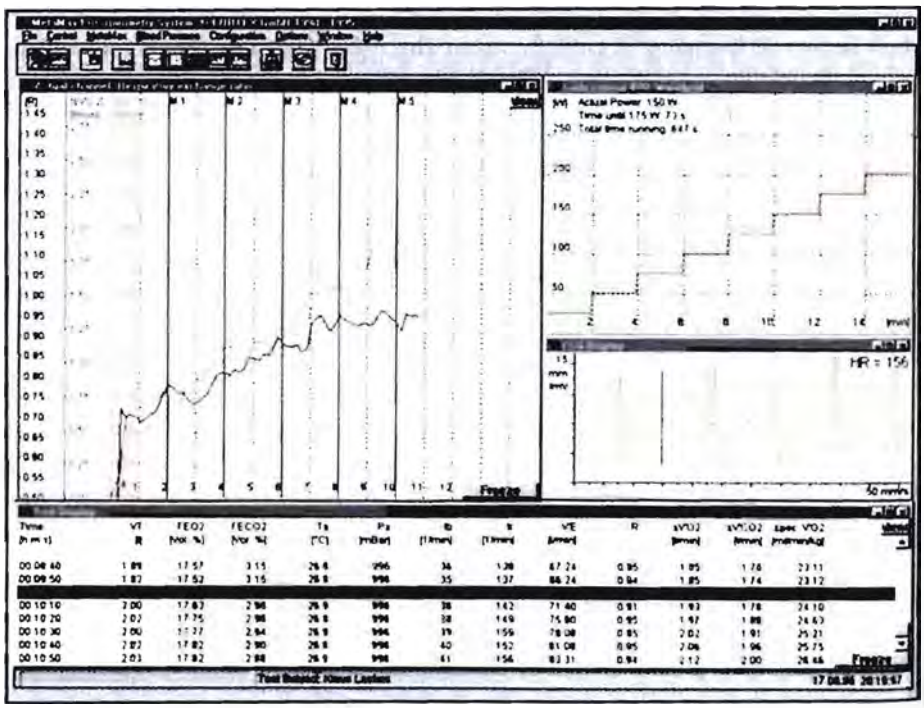

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Travel and body clock disturbances

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SUMMARY
Rapid journeys to distant places across time zones produce a general malaise that lasts for up to one week. It can reduce an athletes' peak performance and disrupts training schedules and preparations for competition. It results from the slow adjustment of the body clock to the new time zone. Methods for reducing the severity and duration of these negative effects - for use before, during, and in the days after the flight - are described and their scientific basis is explained.

INTRODUCTION

Competitive sport is now recognized on a global scale and people at many levels, from the Olympic Games' athlete to the recreational runner, have the opportunity of competing abroad. Travelling to strange places for purposes of competing in sport might seem attractive; in reality it makes great demands on team managers, coaches, and athletes, irrespective of a trip abroad for a single competition or preparations for a prolonged tour.

Problems are encountered as a result of crossing time zones which are very different in nature from the 'travel-fatigue' after flying north or south, or after long journeys in cars or buses. Regular walks on the plane, some stretching and static exercises will all help in minimizing this form of fatigue during this latter type of journey, and a refreshing shower or a good night's sleep will be totally restorative. This is not the case after quickly crossing time zones, either coast to coast in Australia or North America, across Europe or Asia, or trans-oceanic flights. Then the problem is longer lasting and called 'jet-lag'. It has been described recently by Reilly et al.[1] It is based upon abnormal timing of circadian rhythms, described extensively by Minors & Waterhouse,[2] the importance of these to athletes being reviewed by Atkinson & Reilly.[3] The present review concentrates also on counter measures that can be used to minimize the detrimental effects of jet-lag.

THE PROBLEM

Time zones

Because the earth is spinning on its axis, for anybody standing on the earth's surface the sun rises in the east and sets in the west and is at its highest point in the sky at noon by local time. These events must occur in the UK after they have taken place in countries to the east and before they have taken place in countries to the west. In order to resolve this problem, the world has been divided into 24 time zones centred around Greenwich and separated by lines of longitude 15° apart. These time zones determine the relationship between Greenwich Mean Time (GMT) and local time, those to the east of the UK being advanced and those to the west being delayed. Consequently, at the same moment it might be mid-day in the UK but, by local time, 16h00 hours in Afghanistan, 21h00 hours in Japan, 07h00 hours in New York and 03h00 hours in Los Angeles. Travelling to the east, therefore, means you 'lose time' (in the sense that part of the day appears to have been lost), and to the west that you gain it (in the sense that you can relive some hours).

For the seafarer or passenger on a cruise liner the biological implications of time zones are not very important. The rate of travel and of crossing time zones is slow enough to be accommodated easily. Sailing to New York, for example, entails putting the clock back 1 or 2 hours per day; in effect the traveller who stays up late may have a lie in and still be 'on schedule' by changing to local time.

Jet-lag

By contrast, problems arise when you cross several time zones in a short space of time. Jet travellers suffer from a combination of symptoms, collectively known as 'jet-lag'. The symptoms vary between individuals in details of their nature and severity, but include some or all of those shown in Box 1.

Jet-lag is accompanied by a general malaise, a sense of feeling and acting 'below par'. This is especially important in athletes who generally want to maintain their training habits or continue a systematic build-up for a forthcoming contest.

Only a few studies have dealt specifically with sports performance after time zone transitions.[4-6] Studies upon rugby players and American footballers indicate a poorer performance in the days immediately after the flight, particularly if the match was played during the night in the visitors' home time zone. Such effects are important for serious competitors and agree with results from closely controlled laboratory simulations of time-zone transitions. These simulations and field studies show that there is a loss of sleep and a general decline in motivation and physical and mental performance - in particular, the normal daytime peaks are blunted.

The severity of jet-lag symptoms is greater after eastward compared to westward flights, the syndrome affects the old rather more than the young, and depends on the number of time zones crossed rather than the distance travelled. As a rough guide, jet-lag lasts, in days, up to the number of time zones crossed after an eastward flight and about half of the number after a westward flight.

The severity of the symptoms may be related to menstrual cycle phase. Disruptions of the menstrual

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cycle in female travellers have been linked to disturbances in melatonin secretion. Higher melatonin levels in the Scandinavian winter compared with summer values have an inhibiting effect on lutenizing hormone. As a consequence, ovulation might not occur during that cycle.[7] The extent to which the menstrual disturbances accompanying travelling across multiple time zones in themselves alter athletic performance is uncertain.

As well as time-zone transitions, there are other changes that are associated with a long-haul flight, amongst which are:

1. A change of customs, including food
2. The personal discomfort associated with travel
3. The loss of sleep caused by the flight schedule
4. Anxiety owing to the sports meeting in the new time zone.

Box: Symptoms associated with the phenomenon of jet-lag

Fatigue during the new daytime, and yet inability to sleep at night.
Decreased mental performance, particularly if vigilance is required.
Decreased physical performance, particularly with regard to events that require stamina or precise movement.
A loss of appetite, coupled with indigestion and even nausea.
Increased irritability, headaches, mental confusion and disorientation.

These factors contribute to the general disruption, but most are essentially over within 48 hours. By contrast, jet-lag can last for 5 days or longer. Additional reasons why the above factors are not a sufficient explanation of jet-lag are:

a. The problems arise also when returning home.
b. The problems do not arise when flying a long way south but without crossing many time zones, from London to Lagos (Nigeria) for example.
c. The problems do not depend much upon whether it is a day or night flight, i.e. the amount of sleep lost during the flight.
d. The problems depend far more upon time zone changes rather than culture changes (compare flights from the UK to New Zealand and Central Africa, for example; jet-lag is far worse after the former flight).
e. The problems can be reproduced in laboratory based experiments. In this case, none of the other factors applies; the only change is in the local time.

These findings, particularly (e), and all other studies on circadian rhythms, confirm the view that jet-lag is a function of the abnormal relationship between the new local time and body time. Such problems will persist until the individual has synchronized fully to the new time zone.

The body clock

A large amount of experimental data[1,2] indicates that humans possess a 'body clock', located in the base of the brain. This is responsible for adjusting our physiology and biochemistry to the normal pattern of daytime activity and nocturnal sleep and recovery. The clock achieves this by exerting effects throughout the body via controlling the nervous system, hormones and body temperature. As a result of its actions, the body clock causes mental and physical performance, alertness and motivation to be high in the daytime, and it facilitates getting to sleep and remaining asleep during the night by reducing most neural activity, body temperature and adrenaline secretion. Importantly, it also helps to prepare for sleep at night and activity during the daytime by initiating the changes in physiology and biochemistry an hour or so beforehand. This drowsiness is promoted in the evening before sleep onset, and adrenaline and body temperature rise in the morning before waking up.

Three properties of the clock are important. First, it is an inexact timekeeper, tending to run slow with a period greater than 24 hours (this is why we tend to go to bed later and have a lie-in in the mornings at weekends and during holidays). Second, and related to this, it is normally adjusted to an exact 24-hour period by several rhythms in the environment. In humans in industrialized societies these rhythms are much influenced by social norms and include light/dark, feeding/fasting, social interaction, mental and physical activities. The third property of the body clock that is important is that it is slow to adjust to changes in our lifestyle. This resistance to change is normally beneficial, since it means that the body clock does not adjust inappropriately. For example, if we go to the cinema in the daytime, the clock does not adjust to the 'night' nor does it adjust to the 'day' if we get up to have a snack at night. This inertia of the body clock, which is beneficial in these circumstances, is inappropriate after a time-zone transition. There will be a mismatching between body time and local time as illustrated for a subject who has just flown eight time zones to the east (Table 1) and this is the origin of jet-lag.

Table 1
Mismatching between local and body times immediately after a flight from UK to Hong Kong

New local time	Requirement	Body Time	Desire
0800 hours	Waking	2400 hour	Going to sleep
1600 hours	Peak activity	0800 hours	Beginning to wake
2400 hours	Retiring	1600 hours	Peak activity

When the circadian rhythms of body temperature, physical and mental performance are considered, then they show this effect clearly.[8] Thus, in the above example of an eastward flight across eight time zones, minimum body temperature tends to fall near midday local time and the maximum body temperature during the night (instead of normal times of 05h00 and 20h00 hours, respectively). As a consequence of the links between temperature, sleep and mental performance, sleep will be difficult to achieve and maintain at the new night-time and the fatigue that will result will give rise to negative feelings, including irritability and headache.

Mental and physical performance and mood will deteriorate not only because they are taking place at times too far removed from the circadian peak, but also because the subject is unable to sleep properly.

Differences between flights

Accepting this desynchrony between body time and local time as the main cause of the problems, and knowing some of the properties of the body's timing system, we can understand why jet-lag is worse after an eastward flight.

Adjustment to a westward flight requires individuals to go to bed and wake up later, and their body clock to delay; by contrast, adjustment to an eastward flight requires going to bed and rising earlier, and advancing the body clock. Going to bed earlier than is habitual is not likely to be conducive to getting a good sleep. Circulating adrenaline levels and body temperature are too high and the individual has not been awake long enough to become tired.

The resulting poor sleep is inadequate preparation for the next full day and the problem is made worse by the fact that by the time the body is ready to sleep the new local time indicates that is time to get up for the next day! By contrast, after a westward flight the increase in time spent awake before the new bedtime will tend to promote sleep and to offset the fact that it is being attempted when the body temperature and plasma adrenaline levels are rising. More sleep is obtained after a westward than an eastward flight, therefore, even though it still tends to finish too soon.

In addition, the body clock can delay more easily than advance, probably because it tends to run slow unless adjusted each day (see above). As a result, eastward flights, which require the clock to advance, are associated with a longer resynchronization time than the ones to the west but crossing the same number of time zones. Also, after a flight to the antipodes, where the time shift approaches 12 hours, adjustment is almost invariably by delay of the body clock.

ADVICE

From the above, it must be clear that a full training schedule and peak athletic performance require adjustment to the new time zone. In addition, the problems can be reduced by suitable planning before the flight and actions during it.

Before the flight

If it is possible to do so, flights should be scheduled so that athletes arrive well in advance of competition. One day for each time zone crossed does leave a margin of safety, even for competitors travelling eastward.

Attempts to find the most convenient travel schedules are encouraged. Consider departure from regional airports if appropriate and also alternative carriers. An individual's routines prior to departure, on the plane and after arrival can be planned once the itinerary is established. In consequence the trial and error element in coping with jet-lag will be reduced.

In the week prior to departure it may be possible to adjust the time of rising and going to bed, the adjustment depending on the direction of flight. A change of more than 2 hours is unlikely to be productive since this would interfere with the pattern of social and domestic engagements during the day and clashes with time cues from the environment, for example light.

The advantage of this solution is that it enables the traveller not only to retain some semblance of normality during the days just before the journey but also enables the focusing of thoughts on the process of adjustment to the new time zone. In connection with this, altering training times for a few days prior to travel to take into consideration the time of competition in another time zone is known to be beneficial.[9]

During the flight

Once flight times are known, a routine on the plane may be planned. In daytime flights it will be necessary to stay awake, keep mentally active and perhaps watch the in-flight movie. On long-haul flights that entail travelling during the night it will be necessary to get some sleep on the plane. The timing of this may be decided in advance and some meals on board can be missed. Transit or transfer episodes en route should also be taken into consideration. It is advisable to set one's watch to local time at the next point of landing, once on board the plane; in a single-haul flight this would be the local time of the country of destination. This helps the traveller to 'tune into' the new local time straight-away and to adjust behaviour accordingly.

In order to compensate for the dry air on board flight, copious rehydration is advised. Fruit juices are best; fizzy drinks should be avoided. Alcohol should not be taken, since it acts as a diuretic causing loss of fluid. Caffeine (in coffee) also stimulates water loss and its arousal effect on the central nervous system means it should not be taken if sleep is desired. One suggestion has been that the last meal prior to the time allotted for sleep should be high in carbohydrates and low in protein in order to induce drowsiness (this is because carbohydrates provide the substrate for serotonin, a neurotransmitter which regulates sleep). This same line of reasoning indicates that caffeine and a low-carbohydrate high-protein breakfast would help raise the level of arousal and prevent a relapse into sleep.

Athletes may feel stiff or cramped because of their restrained posture on board flight. They can perform static exercises for arms, trunk or legs whilst in their seats. Also, they can walk down the aisle of the plane frequently and do flexibility or stretching exercises occasionally at the back of the plane. This will also serve to remind the athletes that the primary purpose of the trip is for sport and not tourism.

British sports teams travelling to Australia have used sleeping pills to induce sleep whilst on board. Although drugs, such as benzodiazepines, are effective in getting people to sleep, they do not guarantee a prolonged period asleep. Besides, they have not been satisfactorily tested for subsequent residual effects on motor performances such as sports skills. Studies on British Olympic athletes travelling to training camps in Florida (a 5-hour time-zone transition) have failed to show any beneficial effects of benzodiazepines on jet-lag.[1]

A prolonged nap at the time the individual feels drowsy (presumably at the time that he or she would have been asleep in the time zone departed from) is to be avoided - it simply anchors the rhythms at their former phases and so resists the

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adjustment to the new time zone.[10]

Immediately after the flight

In the days immediately after a flight across several time zones, when the body clock is not adjusted to the new local time, there will be a window of time during the day when the period of high arousal associated with the time zone just left overlaps with the arousal high point at the new local time. This window may be predicted in advance and should be utilized for timing of training practices in the first few days of arriving. Observations on footballers travelling eastward from the UK to Oceania (Australia, New Zealand and Papua New Guinea) indicate that late-morning training sessions suited players best over the first days, however.[11] Since such a time corresponds to night in UK time, this indicates that other factors, such as absence of fatigue, are important also.

The comments (above) relating to the use of hypnotics and naps will apply also to the first days in the new time zone. Other drugs that act as central nervous system stimulants might be useful. Thus, caffeine (in coffee) and theophylline (in tea) can increase alertness.

Promoting adjustment

The major concern, however, is to promote adjustment of the body clock. Several methods have been suggested, differing in their feasibility and in the extent to which they might have side-effects that adversely affect athletic performance. The three main suggestions are as follows:

The timing and composition of meals

It has been argued that high-protein breakfasts promote alertness and that high-carbohydrate evening meals (vegetables, potatoes, rice, bread, pasta, desserts, etc.) promote sleep.[12] The theoretical grounds for this include the effects upon plasma amino acids that such meals would have and, thence, the uptake of the amino acids into the brain, their incorporation into neurotransmitters, and the release of the neurotransmitters. High-protein meals (meat, cheese, eggs, etc.) undoubtedly raise plasma tyrosine, but whether this promotes the release of catecholamines by the activating systems of the brain, and so promote alertness, is less clear. Similarly, high-carbohydrate meals promote the concentration of plasma tryptophan, but whether this stimulates the raphé nucleus and sleep is also uncertain.[13] There is evidence that electroencephalographic waves show some changes in athletes on a carbohydrate-only diet, but effects on the quality of sleep have not been demonstrated. The method was promoted in the USA under the title 'President Reagan's Anti-jet-lag Diet'.

Scientific tests of the efficacy of the diet are few and poorly designed. Even so, a variant of this proposal has been marketed. It consists of two types of pills, one to be taken in the morning and the other in the evening. Each pill is a mixture of substances, the morning pill containing tyrosine and the evening one, tryptophan. The accompanying literature does not enable a judgement to be made on the scientific evaluation of these preparations. Besides, tryptophan achieved bad publicity in the early 1990s owing to impurities found in commercially available products and its use is no longer recommended.

Melatonin capsules

In normal circumstances melatonin from the pineal gland is secreted into the blood stream between about 21h00 and 07h00 hours. It can be regarded as a 'dark pulse' or 'internal time cue'. Several studies have shown that melatonin capsules taken in the evening by local time in the new zone reduce the symptoms of 'jet-lag'.[14] This is an important finding, but there are some caveats.

1. Jet-lag, as defined in these studies, has concentrated on subjective symptoms; we do not know if there would also be improvements in mental and physical performance, and in motivation to train hard - or even if there would be further decrements.
2. It is not clear if melatonin produced its effect by promoting adjustment of the body clock or by some other means (increasing a sense of wellbeing or the ability to sleep, for example). Recent work suggests that melatonin should adjust the body clock, but this requires careful timing of ingestion according to whether you wish to advance or delay the clock.[15] Thus, melatonin taken in the evening (on body time) will advance the body clock and in the morning will delay it.
3. Melatonin is only just becoming commercially available (largely in the USA) and the results from many clinical trials are still awaited.

In summary, more information is required before melatonin can be recommended.

Bright light exposure and physical activity

Bright light (that is, of an intensity found naturally but not normally indoors) can adjust the body clock. The timing of exposure is crucially important[16,17] and is the opposite of that for melatonin ingestion; thus, bright light in the morning (05h00-11h00 hours) on body time advances the clock and bright light in the evening (21h00-03h00 hours) on body time delays it. As part of this treatment, there are also times when light should be avoided (those times which produce a shift of the body clock in a direction opposite to that desired). Table 2 gives times when light should be sought or avoided after different time-zone transitions; the timing will vary as the body-clock adjusts.

Table 2
The use of bright light to adjust the body clock after time zone transitions

	Bad local times for exposure to bright light	Good local times for exposure to bright light
Time zones to the west		
4 h	0100-0700*	1700-2300†
8 h	2100-0300*	1300-1900†
12 h	1700-2300*	0900-1500†
Time zones to the east		
4 h	0100-0700†	0900-1500*
8 h	0500-1100†	1300-1900*
10-12 h	Treat this as 12-14 hours to the west	

* Will advance the body clock; † will delay the body clock; note that this is because the body clock adjusts to delays more easily than advances.

Even though 'bright light' is of an intensity normally not achieved in domestic or interior lighting, light boxes and visors are now available commercially that produce a light source of sufficient intensity. Light visors, in particular, might prove a useful addition to one's luggage.

Since outdoor lighting is the obvious choice, it would be natural, therefore, to consider training outdoors - that is jogging, a brisk walk, a swim or a game of tennis, for example - when light is required, and to relax indoors when it should be avoided. This raises the question whether physical exercise and inactivity can, in some way, add to the effects of light and dark, respectively. Current evidence is not conclusive.

For the first few days in the new time zone, training sessions should not be all-out efforts. Skills requiring fine co-ordination are likely to be impaired and this might lead to accidents or injuries if, for example, games players conducted sessions with the ball too strenuously. Where a series of tournament engagements is scheduled, it is useful to have at least one friendly match during the initial period, that is before the end of the first week in the overseas country. Subject to these caveats, exercise for athletes is recommended also since it helps them psychologically in their preparations for competition.

In practice, therefore, to combine exposure to bright light and exercise, and to combine dim light and relaxation, would seem practicable. However, there is very little evidence to suggest that exercise by itself will alter the speed of adjustment of the body clock.

To a large extent it might be considered that to adjust as fully as possible to the lifestyle and habits in the new time zone would be the best advice. This is not always the case in the first day or so after the flight. Consider a westward flight through eight timezones. To delay the clock requires bright light at 21h00-03h00 hours body time and its avoidance at 05h00-11h00 hours. By new local time, this becomes equal to 13h00-19h00 hours for bright light and 21h00-03h00 hours for dim light (see Table 2). It can be seen that natural daylight and night would provide this. Consider, by contrast, a flight to the east through eight time zones. Now light is required 05h00- 11h00 hours body time (13h00-19h00 hours local time) and should be avoided 21h00-03h00 hours body time (05h00-11h00 hours local time). That is, morning light for the first day or so would be unhelpful and tend to make the clock adjust in the wrong direction (though afternoon and evening light are fine). The timing of exposure to bright light is critical on the first days after the flight. After a couple of days, when partial adjustment has occurred, it is then advised to adjust the timing of the light exposure towards that of the local inhabitants, so that the visitors' habits become fully synchronized with those of the locals.

CONCLUSION

By preparing for time-zone transitions and the disturbances they impose on the body's rhythms, the severity of jet-lag symptoms can be reduced. There has been little success in attempting to predict good and poor adapters to long-haul flights. Athletes are generally better than non-athletes in coping with jet-lag and they tend not to suffer as much. The fact that an individual escapes lightly from symptoms on one occasion is no guarantee that he or she will do so again on the next visit. The disturbances in mental performance and cognitive functions have consequences not only for sports performers but also for management and medical staff travelling with the team, who by no means have immunity against jet-lag symptoms. An awareness of the dynamic biological adjustments that the body is making means that the adverse effects and discomfort associated with jet-lag can be countered to some degree. It is important to allow time for the slow adjustment of the body clock, and to be patient whilst this process is taking place. Until it has, performance will be poorer and will seem harder to achieve. Adherence to the advice above will minimize these frustrations.

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Travelling with teams

W Diesel

INTRODUCTION

The purpose of this article is to highlight some important and practical hints on 'qualities' of the individual physiotherapist, appropriate equipment, daily routines, and remuneration. The views expressed in this article are entirely my own and do not necessarily reflect the views of either my colleagues or professional bodies to which I belong.

The 'ideal' physiotherapist

Not everybody is suited to travelling with sports teams. Certain physiotherapists may prefer the relative 'comfort' of their practices were everything is at their disposal and help is close at hand. Other physiotherapists, myself included, enjoy the challenge of travelling and having to make spontaneous decisions. One thing, however, is certain that the glamour associated with travelling with a National sports team is short-lived. This type of work is certainly not for the feint-hearted or oversensitive. Recall the press coverage the medical team received in Atlanta, if you need any convincing. It has been said, and written, that the best a medical team can hope for is not to get mentioned during a tour!

Physiotherapy, like any other medical profession, has its specialities. The treatment of sports injuries is constantly evolving and physiotherapists need to constantly keep up to date with new trends. It is about time that physiotherapists 'specialised' in the treatment of sports injuries were recognised as such. Perhaps a Nationally accepted accreditation programme is the solution. I will cover this area at the end of the article.

Having now travelled with several different sports code, I have come to the conclusion that there are certain physiotherapeutic techniques or skills which are essential. Perhaps one of the most important skills is massage. Irrespective of what team I have travelled with, the majority of my 'treatment' time is spent massaging. Massaging may be requested by the sport person for general relaxation; pre-event stimulation; post-event muscular stiffness; and even during an event. If done correctly certain massage techniques can also be used to effectively treat some chronic soft tissue injuries i.e. deep transverse friction's, deep longitudinal massage, myofascial release and trigger points. The way in which a pre-event [stimulatory] massage is given varies between sports. Apart from focusing on different muscle groups, the medium through which the individual is massaged may also change. On the one extreme I have used 'foul-smelling' oil (arnica, tiger balm, nutmeg) on hockey players who swear by its 'magic', whereas many swimmers simply will not allow you to use any oil or powder whatsoever. Swimmers prefer to be massaged over loose fitting clothing. The reason for this, according to the swimmers, is so that their ability to 'feel' the water is not affected after having 'shaved'.

Manual therapy, involving Maitland techniques which includes joint manipulation, rates as a close second to massage as far as taking up treatment time goes. Manipulative therapy, assuming it is done at the appropriate time and for the right reason, can and does lead to remarkable reduction in symptoms. A third vital skill necessary is stretching. Knowing when, and how, to use the various stretching techniques, such as PNF; neural; static; and dynamic, is important. Travelling with multi-code sports teams e.g. Olympics, challenges the physiotherapists knowledge of stretching since each code requires a unique series of stretches. Just as training is sports-specific so is stretching.

Electrotherapy, despite its proven effects in treatment of soft tissue injuries such as those commonly encountered in sport, does not feature as prominently as 'hands-on' techniques. This is mainly because it is simply not practical to travel with much more than a simple combination (ultrasound and interferential) unit. Acupuncture, on the other hand is rapidly becoming more and more popular in the treatment of sports injuries. This, I am sure will feature prominently in future tours because of its obvious ease of transport and popularity amongst sports persons.

Part and parcel of travelling with sports teams is allowing injured athletes to continue to participate. Clearly the extent of the injury will determine whether or not an injured athlete may or may not participate. However, the decision is not always an easy one. Hence, the athlete and physiotherapist may have to rely quite heavily on strapping to see them through the next match or event. As in the case of stretching, each sports code has its preferences when it comes to strapping. A gymnast's ankle cannot be strapped the same way as you would strap a rugby player's ankle. The gymnast needs to be able to point her toes and walk on a narrow beam thus heavy strapping would obviously be inappropriate.

Extended tours, anything longer than one week, will at some stage require the physiotherapist to implement rehabilitation programmes for the injured athletes. Almost without exception the physiotherapist 'inherits' a wide range of chronic low level injuries. This means that even before the tour has started some of the athletes will have an injury of sorts. In these instances the physiotherapist must continue with an existing programme or even be required to initiate one. Thus a sound knowledge of strength training and physical rehabilitation principles will also be of great benefit to the physiotherapist. In cases where the tour may last several weeks even non-injured athletes will derive benefit from strength training. Often this is done in conjunction with the coach or fitness trainer.

The physiotherapist should also be able to treat minor medical problems such as abrasions, blisters etc. as well as the more major problems such as fractures, dislocations, and spinal injuries. This knowledge is perhaps more important for physiotherapists who

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travel with the less 'professional' teams since the medical support is often limited to a physiotherapist only.

Apart from these above mentioned skills the physiotherapist may also be approached for advice on other medically-related topics. International travel brings several problems to the fore, such as acclimatisation and strange eating habits. Advice on how best to acclimatise, to time changes, humidity and temperature changes as well as what food stuffs to avoid and when to eat may also be requested from time to time.

Young inexperienced athletes who may not have travelled abroad or been away from home for such long periods struggle to remain focused throughout the tour. Because of the close personal relationship and trust that often develops between athlete and physiotherapist, we are often the first to pick up such problems. Providing the necessary psychological support may end up as the responsibilityof the physiotherapist. Again, the ideal situation would be to have a sports psychologist present. However, unfortunately this is all too seldom the case.

Warm-ups and cool downs may be taken by either the coach, fitness trainer, captain or as in the case of the National Men's Hockey team - the physiotherapist.

Thus, without trying to promote, physiotherapy too much at the expense of other professions, a physiotherapist travelling with a sports team may have to take on the roles of masseur, chiropractor, first-aider, fitness trainer, exercise physiologist, nutritionist, psychologist, and even manager!!. In the ideal situation sports teams should travel with a specialist from each field, however whenever this is not possible the physiotherapist is likely to be called upon to perform the necessary functions.

Several characteristics or personality traits which may facilitate the working relationship between the physio, the sports person, and the rest of the management include: -

Flexibility

This refers to the physiotherapist's flexibility in terms of treatment approach. Anybody who has worked on athletes, soon comes to realise that athletes are very aware of the latest treatment techniques and also what works best for them. By acknowledging that there are many different ways to sort out an injury the physiotherapist is well advised to, at least initially, use the treatment the athlete is most comfortable with. The quickest way to lose credibility with a sports person is to 'force' them to accept another form of treatment and then for things to go wrong, even if their drop in performance, or recurrence of symptoms, has nothing to do with your treatment. Once you have gained the confidence of the individual you may consider changing treatment. Perhaps the physiotherapist may even learn something new in the process! Another area which requires a degree of flexibility is the working environment. Single hotel rooms, or sharing a room with the doctor, or even another sports person, often leads to working under very cramped conditions. The 'hours' which you work are also extremely flexible and need to be worked around the teams schedules.

Physically fit

The physically demanding nature of the work, as well as the visual impressions made by the sports person of the physiotherapist, mean that by being physically fit the physiotherapist is able to cope with the work load and enhance their credibility. To the sports person it indicates that you have some understanding of the demands and requirements of their sport. If you are called upon to devise a 'fitness' test it is imperative that you understand the particular physical requirements of the sport as well as the individual's role within the sport. By being physically fit you are more likely to appreciate these needs.

Equipment

Carting heavy, and often very bulky, equipment halfway around the world is not my idea of fun. Thus the physiotherapist must consider very carefully and decide between what is 'essential' and what would be nice to have. The most important single piece of equipment is a plinth. It must be portable, reasonably solid (a compromise needs to be made between weight and strength of the plinth), have a breathing hole, and have a strong protective cover. Treating on a hotel bed not only compromises the effectiveness of your treatment but also spells disaster for your back, The approximate weight of a plinth is 18 kg's (your baggage limit is only about 20 kg's!).

The next essential piece of physio equipment is a portable combination unit. This should ideally be battery operated and fit into a small bag or case. The two modalities which must be available are ultrasound and interferential. Be aware of the power supply of the country you are visiting as this will determine whether or not you require to take a transformer along with you. International plugs are also different so make sure you take the right adapters with you. The average weight of such units, including bag and accessories, may be 8 - 10 kg's (your total weight is now in the region of 30 kg's and you have not started packing your bag yet).

There are several essential consumables which must be included in your kit. These are massage oil, strapping, rubber tubing for strength training, acupuncture needles, and a rudimentary first-aid kit. Just how rudimentary your first-aid kit is will depend upon the presence of a doctor on the team as well as the country you will be visiting. The weight of these essential consumables can vary from as little as 5 kg's up to 15 kg's.

There is another 'essential' piece of equipment that I will not travel without, my laptop computer. The benefits, certainly in my case, definitely outweigh (excuse the pun) the disadvantages. By being able to enter my treatments on a daily basis I am now able to produce a complete medical report at the end of the tour. The amount of time and effort I save by not having to do a report when I return home is immeasurable. Having a modem and e-mail means I can communicate with my family and practice on a regular basis and a lot more cheaply. Hopefully all touring teams will travel with a laptop which can be programmed to capture data to benefit future teams and provide an ongoing medical file for our sports persons.

It is not uncommon for me to arrive at the airport with baggage which weighs in the region of 40 to 50 kg's! Maybe this is the most important reason of all as to why you should be physically fit.

Daily routine

Each team or group of athletes will have their own times when they will train and when they compete.

The temperature of the country may influence the time of day when the athletes can exercise. Working out treatment times is much harder for individual sports; such as swimming compared to team sports such as hockey. For individual sports you sit with a problem of having some athletes competing and others not. The difficulty is in not being able to be at the event for the competitors and at the hotel for those not competing at the same time. Generally speaking, you can be assured that you will be working most of the day and often well into the night. The reason is simply because when the athlete is competing you need to be present and when the athlete is 'resting' you are treating them. Teams from countries like Australia and Holland are fully aware of these demands, and for this reason often travel with more than one physiotherapist plus a masseur.

Returning from trips such as the Olympics, 6 weeks away from home, often leaves the physiotherapists drained of energy. Being away from your practice for that period of time means you cannot afford to take any more time off. Perhaps if we received adequate remuneration things would be different. However, let me assure you that this is not the case. This brings us to my next topic.

Remuneration

This is a thorny issue which I feel needs some urgent attention. The effort, responsibility, as well as direct and indirect income lost through being away on tour deserves appropriate compensation. One problem is the lack of an appropriate fee structure. The current physiotherapy (Private Practitioners Association) guidelines recommend somewhere in the region of R 2000.00 per day. To the best of my knowledge not even physiotherapists who travel with our 'professional' sports teams receive this amount. Certainly, physiotherapists travelling with 'minor' sports codes are lucky to receive anything at all. Another problem is that physiotherapists, myself included, have literally jumped at the opportunity to be linked to a National team. With the dramatic increase in sports tours it is becoming increasingly difficult to be away from your practice for a huge portion of the year and also finding suitably qualified physiotherapists to travel. This leads to a high turnover of physiotherapists working for a specific code, which in turn effects the continuity of treatment. This may be another motivating factor for the implementation of an accreditation process to help formulate policy decisions.

Implications to your practice

The decision to travel with sports teams also has direct implications for your practice.

These include :-

a) Employing sufficiently well qualified physiotherapists to run things in your absence
b) Disruptions in the treatment of some of your clientele. This can be particularly distressing to a competitive athlete whom you are treating
c) Cost and risk of employing a locum
d) Loss of income you ordinarily would have generated
e) No remuneration for time lost organising equipment, etc, before the tour

Despite these draw backs I believe my 'travelling with teams' has enriched me both as an individual and physiotherapist. The people you meet and the places you visit make it all seem worthwhile. It is also a very effective way in which we can promote ourselves and the wonderful profession of physiotherapy. □

Letters to the Editor

Readers' letters concerning articles in the journal are invited, for consideration for publication.

Please post to: The Editor, S.A. Journal of Sports Medicine, PO Box 115, Newlands, 7725.

The SA Cricket Team - The Physiotherapist's Viewpoint

C Smith, Physiotherapist, SA Cricket Team

INTRODUCTION

Since South Africa's re-introduction into the world sporting arena in 1991, we have seen most of our sporting teams compete on the international stage. This has incorporated 2 Cricket World cups, 2 Olympic games, the hockey world cup, winning the 1995 Rugby World Cup and 1996 African Nations Cup of Football, to mention but a few.

Not only have these achievements had a positive and rewarding effect on our sportsmen and women and the people of our country who support them, but also the so-called "backroom team" of the sports medicine fraternity (doctors, physiotherapists, masseurs, nutritionists and exercise specialists) who have become an integral part of keeping our teams fit and healthy and striving for their winning ways. Before 1991, the "backroom team" had very little experience in managing international sportsmen and women, let alone touring the world with our sports teams, simply because of our nation's inactivity in international competition.

However, this has now all changed and hardly a week goes by without a rugby, football, cricket or athletic event occurring where our teams and individuals challenge for the highest honours. Thus there are now those physios and doctors who find themselves in the enviable position of being able to share their experience and knowledge of working in this type of environment over the last 5 or 6 years. This article will hopefully do just that; shed some light on the workings of the physiotherapist with the South African Cricket Team over the past 6 years.

Touring preparations

Being involved with a sports team such as the SA Cricket Team, which now travels around the country and the world for about 8 to 10 months of the year, brings about a whole new work environment for the physiotherapist. The comforts of a private practice are very few. Each new hotel room doubles as the travelling surgery, and gets set-up with a portable massage bed, electrotherapy equipment and a cricket coffin full of strappings,braces, medications, cryotherapy, protective and rehabilitation equipment and other odds and ends which may be required.

It is important if you are going to be touring for longer than 6 weeks to take along extra consumables and items which you may not be able to get in the country you are touring. These include ultrasound gel, anti-inflammatory gel (which I used coupled together with the U/S gel), massage oils, sunscreen creams, specific strappings and dressings, joint guards and braces, insect repellant, superglue, international plug adapters, a neck collar, shock absorbing materials (sorbothane or poron), extra acupuncture needles and alcohol swabs, cliniband and tubigrip, finger splints, scissors and scalpal blades, coolant "magic" spray, batteries or battery charger, heel raises and arch supports, pencil torch, and an alarm clock (so you don't miss the bus and get heavily fined).

The medical bag, which is normally handled by the doctor when accompanying a tour but which may have to be stocked and carried by the physiotherapist if no doctor is present, should contain the following essential medicines. Analgesics (paracetamol), NSAIDs, antibiotics (should a doctor want to prescribe a course), antacids, antidiarrhoeals, throat lozenges, antihistamines (the non-drowsy type), eye and ear drops, topical creams (antifungal, antibiotic, corticosteroid, anti-inflammatory, antihistamine), vitamin B 12 injectibles,supplements (magnesium, calcium), cough syrup and swabs. Dressings such as flexipore to treat grass burns should also be included.

Work Environment

Once on tour, the room service staff in the hotels get to know very quickly which room is the treatment room with the endless requests for ice. Gradually, the players stream in and out of the travelling surgery until we check out and move onto the next hotel, where the same procedure begins.

The type of work on tour is not strictly confined to pure physiotherapy treatment. One has to be flexible and prepared to help out in numerous other ways, so as to blend in with the activities of the team. For example, we can be busy up to 7 days a week with practice and match days and thus it is almost expected of the physiotherapist to get involved and assist wherever possible. For example, throwing to the batters in the nets, catching the return throws from the fielders for the coach during fielding drills (this may lead to a major baseball catcher contract), acting as "wicket-keeper" to the bowlers when they practice bowling on the middle strip, and generally helping out wherever possible. This aside the physiotherapist then normally retreats to the hotel with the team where the real physiotherapy work starts. In these instances, there may not be many acute injuries to care for, and thus most of the work done is of a maintenance nature, for example mobilising chronic stiff backs, massages, rehab maintenance and then visiting cricket's equivalent of the 19th hole, the hotel team room for a chat and a sample of the local beverage.

When travelling around the world, one has to rely heavily on facilities of the host country. Work conditions and medical facilities vary greatly around the world amongst the cricket playing countries. Many of the stadia on the Asian Sub-Continent do not have an adequate medical facility. The medical/physiotherapy room is often converted from the cleaner's old storage room next to the dressing room and the massage couch looks more akin to the stadium manager's derelict bed which he's just replaced. Thus, there are times when the physiotherapist has to set up shop inside the dressing room, placing the plinth in the smallest place of available space and working in and amongst the players. There has even been an occasion in Pakistan

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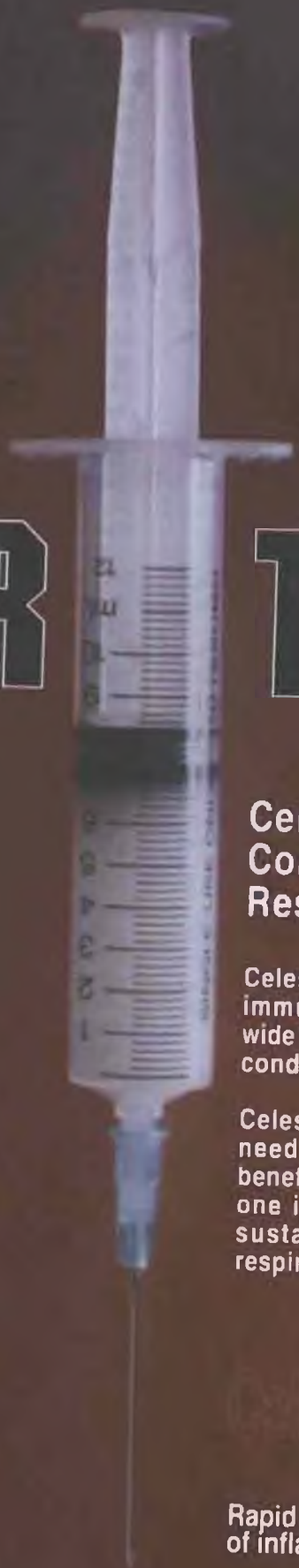

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when the dressing room was so small for the 15 players that we placed the treatment table on the patio outside the dressing room and I did my work in full view of the crowd outside. Some of the grounds do not possess a massage table and you may have to transport the portable massage couch from the hotel to the ground each day and then back to the hotel for any treatment work to be done in the evenings.

However, this is not the case everywhere through India and Pakistan. In Calcutta at the famous Eden Gardens, a ground with a crowd capacity in excess of 100 000 people, the facilities have been upgraded considerably. There is a separate and quite modern medical room inside the dressing room and even a small X-ray suite upstairs in the pavilion with a radiographer on standby if required. When South Africa played their first test match there at the end of 1996, we utilised these facilities three times for 3 separate hand and finger injuries.

The work load of the physiotherapist varies from time to time during a tour. There may be days where you're treating 75% of the players and at other times as few as 10%. Most of the work is done either before or after the game or during the batting innings, as you don't get the opportunity to work on the players while they are fielding.

A typical scenario for the physiotherapist on a match day would be to have breakfast and leave for the ground at least 2 hours before start of play. The team would start their warm-up drills about 90 minutes before play starts and include a few team games and running to increase the body temperature, stretches, fielding exercises, and then practising specific skills such as catching, throwing, bowling and batting. Any strapping or wound dressing is thus done before the warm-up commences.

The preparation for a day-night game is slightly different. The mornings are often spent treating the players and preparing them for the game (massage, mobilisation, strapping) before we head off to the ground around midday for lunch. Thereafter, the programme for the warm-up and pre-match preparation is much the same as for a day game.

Special considerations

The sporting or competitive edge is an analogy which is used to describe various methods of preparation or training which separates a winning team from the minor placers. In the SA cricket camp, that exact mind set exists; among the players, managerial staff and the administrators.

The team makes use of "specialists" in each field to hone and train the skills and habits which may help the cricketers achieve the edge over their competitors.

We use a dietician to advise on meal preparation and to educate the players regarding the kinds of foodstuffs which are best suited to providing sufficient energy to play the game effectively. We have a full-time trainer/biokineticist who supervises the players' training programmes and who takes the physical training sessions with the team. A podiatrist looks after the players footwear and also provides specialised orthotics where these may be needed. The players' fitness levels are evaluated twice a year and neurophysiological as well as optical testing procedures are also performed.

Air travel on long tours can be problematic. When crossing time zones, watches are placed onto the future time as soon as we board the plane. The players are discouraged from drinking alcohol on board because of the effects of dehydration. After a long flight or a day's travel with flight connections, we try fit in a loosening session in the afternoon to stretch the hamstrings and iliopsoas muscles which become shortened during long periods of sitting on an aeroplane.

Types of Injuries

The majority of injuries we experience with the SA Cricket Team are either of an acute traumatic (76%) or chronic overuse (24%) nature. The common acute bowling injuries which occur include ankle sprains, side strains (a strained abdominal muscle at the point of insertion onto the 12th rib), hamstring muscle strains and more rarely the spinal stress fracture, which tends to come on slowly but can occur as an acute traumatic injury. Chronic bowling injuries manifest more in the form of a posterior talar impingement syndrome, patella tendinitis, symptoms pertaining to meniscal wear and tear or lower backache of a discal nature.

Batting injuries mostly occur as a result of being hit by the ball causing severe bruising or a haematoma. The areas often involved are the thigh, arm, hand, foot or chest regions. Batsmen regularly get hit on the hand and fingers which either bruise the interphalangeal joints or fracture the metacarpals or phalanges. Simple transverse or chip fractures recover within 3 to 4 weeks but intra-articular joint fractures may need to be surgically repaired. Also be aware of an avulsion fracture of the extensor pollicis tendon attachment to the base of the distal phalanx of the bottom-hand thumb which occurs when the ball strikes the thumb and forces the DIP joint into hyper-flexion.

A blow to the foot or toe can fracture the tarsal or metatarsal bones but commonly, bleeding underneath the toe-nail is all that occurs. This is best managed with immediate draining by drilling a few holes through the toe-nail to release the blood underneath.

Injuries to the face and head are also common amongst batsmen, even though they generally wear protective headware. A glancing blow off the helmet doesn't cause much damage. However, there have been 3 separate head injuries which occurred in different ways even though the players were wearing helmets. One player fractured his medial orbit when the ball struck the player on the eye due to the gap between the helmet and the grill being large enough for the ball to penetrate. A second facial injury occurred when the ball struck the grill and pushed it back onto the batsman's cheek fracturing his zygomatic arch. Thirdly, another player was struck straight onto the helmet, which caused severe concussion. The helmet cracked from the blow of the ball, thus doing its job and was therefore replaced.

Acute fielding injuries take the form of shoulder sprains (landing on the shoulder while diving for the ball), hamstring tears and bruised hands (palmar surface) or dislocated fingers. Traumatic injuries aside, fielding injuries generally occur as a result of the fielder being inactive for a period of time when the ball does not come to them and then having to sprint off to field the ball once they have become "cold". We try to combat this by educating our players to keep active and loose in the field with regular stretching and loos-

ening exercises. The common chronic fielding injuries involve shoulder pain with throwing due to rotator cuff or long head of biceps tendon strain or minor anterior instability of the shoulder.

On analysing the general injury statistics associated with the SA cricket team, some interesting facts emerge.

The area of the body most frequently injured is the thigh (21%), followed by the knee (13%) and then the thoraco-lumbar spine (12%). The calf and shin, cervical spine, the fingers and the ankle seem to receive less trauma, but still do present a risk area for cricket injuries.

If we look at which structures are most at risk of injury, we find the following; the skeletal system (the bone and joints) comprise 31 % of injured structures, followed by the muscles 26% and tendons 18%.

The most common injuries receiving treatment are thus bone bruising/fractures and joint sprains, by muscle and tendon strains, soft tissue bruising/ haematomas and then ligament sprains or tears.

When analysing injury types, acute injuries appear to be more common than chronic injuries and extrinsic factors seem to lead to more injuries than intrinsic factors.

Injuries are more likely to occur during matches than practices. However, adding those injuries which occur during practices with chronic recurring or long-term ailments appear to equal the number of injuries which occur during matches.

There does not seem to be a significantly greater number of all general injuries caused by batting, bowling or fielding. However, if we analyse the number of serious injures which may have ruled some players out of a single or multiple number of games or an entire tour, then it appears that bowling would be the most injurious type of play and lead to the most wear and tear or attrition among international cricketers. Out of 62 major injuries, bowling caused 33 of these injuries (53%), followed by 19 as a result of batting (31%) and 15 fielding injuries (24%). The bowling injuries seem to be confined to the lower limbs or lumbar spine whereas the batting injuries to the hands and fingers and fielding a combination of leg muscle strains and hand or finger fractures.

Nearly three times as many cricket injuries occur as a result of and during the 1-day internationals than compared with the 5-day test match. Furthermore, for every one 1-day match day, at least 3 injuries occur whereas the number of injuries occurring during the 5-day game seem to be equal to the number of playing days. This merely indicates the greater intensity and the increased risk of injury of the one-day game compared to the 5-day test matches and indicates the need for a rotational system of players, especially the bowlers to reduce their wear and tear and minimise the risk of injury during the normally congested one-day match programmes.

If we look at the length of the tours and compare this to the number of injuries, then we find a trend showing that tours of a longer duration with a greater number of match days are likely to result in a greater number of injuries.

Physiotherapy Treatment Tips on Tour

Over the years I've found in my experience that the following methods of treatment have been effective in the management of the following conditions.

Acute soft tissue bruises/haematomas - treat immediately with an ice pack (10 minutes) followed by low-dosed pulsed ultrasound (5 to 8 minutes) every 2 hours. This helps to get the bruising to dissipate quickly and prevents the formation of a hard contusion with adherence or stiffness in or around the muscle belly.

Finger Bruises - treat immediately by immersing the finger into a glass with iced water every 2 hours. Twenty four hours later begin hot and cold treatment also every 2 hours to reduce the swelling.

Grass burns/skin grazes - wash immediately after play and then apply either a tegaderm or flexipore dressing with tubigrip to keep it in place. Change the dressing when it leaks exudate or if it comes off. Never apply mercurochrome to a graze as this only forms a scab over the wound which comes off if the player slides over the ground on the grazed area again. The tegaderm or flexipore dressing allows the graze to heal from within because of the good oxygen perfusion through the dressing. Full recovery normally takes 7 to 10 days.

Bruising/bleeding under the toe/or finger nail - immediately drill 2 to 3 holes into the nail bed in the area of the bleeding to drain the blood and exudate. Use either a syringe needle or a paper clip which has been heated up and is pushed through the nail. This must be done every hour to completely drain the fluid and relieve pain from pressure build-up under the nail. Apply a betadine dressing over the nail to prevent infection.

Muscle Strains - apply ice as soon as possible. Remember that rehab must be action specific ie. if it is a bowler with a torn hamstring, then his injury must be rehabbed and strengthened in the final stages with the bowling action whereas a fielder with a torn hamstring from fielding must include the same fielding drills in his final rehab stages. □

Physiotherapy in South African Soccer

D Becker and S Felsher

INTRODUCTION

Soccer is the most popular sport in South Africa and World-wide. There are approximately 40 million organised players and between 100-150 million participants in total. As the popularity of football has grown, football injuries have become the object of increasing medical attention.

South African soccer is now starting to show signs of development. The national team winning the Africa Cup of Nations in January 1996, and recently the national Under 20 side reaching the finals of the African Youth Championships thereby qualifying for the Youth World Cup in Malaysia.

There are currently 4 active national teams: Bafana Bafana, the Olympic Under 23 team, the Under 20 team and the Under 17 national team. The latter is selected from an annual U17 youth regional tournament, as is the U20 national team. The U23 team is selected from the U17/U20 teams as well as from an U19 talent identification programme which takes place annually.

Bafana Bafana is selected from the professional ranks as well as from the junior teams.

Our involvement with the national teams began in 1994. We are involved on a consultancy basis which means that during national team activity, we are with the team full-time, that is, we camp with the team usually 1 week prior to a match. When the teams are not active, we then operate out of our private practice in Durban.

Functions as a Physiotherapist for home and away games

As the physiotherapist, it is very important to be aware of the activities of the players both around the country as well as abroad. It is imperative that you are informed of, or enquire about injuries sustained prior to a camp as well as having a knowledge of fitness levels of all squad members.

The dietary education of the players is vitally important. It is our responsibility prior to the camp to ensure all fluid and food requirements are taken care of. The food types and quantity thereof are worked out in accordance with the fixtures as well as the training schedule for the week. The selection of these food types needs careful attention as they must include food groups that players are used to and at the same time being nutritional in content and not too high in fat. Interestingly enough, we discovered that some junior team members complain of cramps and diarrhoea when exposed to food groups which are not normally in their daily dietary regime. What we now do is give the players a questionnaire thereby avoiding any problems.

They say "old habits die hard". Well, this certainly pertains to the attitudes of some players and coaches alike when it comes to the pre-match meals. Clive Barker, coach of the Bafana Bafana, will be the first to admit that the favourite "steak, eggs and chips" recipe still would top his list of old habits had he not been told better by the Sports Science Institute of South Africa recently.

On arrival, all players who have "minor knocks and bruises" are medically screened. At senior level, players are weighed and records from camp to camp are monitored. Once the musculoskeletal screening has been completed, the day to day routine is as follows:

7.30 - 8.30	Breakfast
8.30 - 9.30	Treatment/massage/strapping
10.00 - 12.00	Training (We are responsible for the warm-up and stretching of the players)
12.00 - 1.30	Lunch
1.45 - 3.30	Treatment/massage
4.00 - 5.30	Training (The senior team usually utilises one of the Health & Racquet Clubs for their 2nd training session of the day).
7.00 - 8.00	Dinner
8.30 - 11.00	Treatment/massage

On match day, the pre-match meal is arranged 4 hours prior to the kick-off. Before and after the meal, players filter in and out of the physio room looking for "touch-ups", massages and strapping amongst others.

Generally, we have learnt from travelling into Africa, that prior knowledge of medical services available at the stadium must be acquired. This will include ambulance services, stretchers, medical evacuation and the distance to the nearest trauma outpatient unit. It is not uncommon in some African countries to find none of the above mentioned amenities available.

During the game, we are involved with field injury management and here it is important that one's practical knowledge of emergency first aid is of a very high standard. We have learnt not to "ball watch" during a game as off-the-ball tackles and mechanisms of injury might be missed. When the senior team has played in front of 80 000 ecstatic fans, trying to get information out of a player on the field is almost impossible due to the noise levels.

Once the game is completed we are involved with post-match injury management which will include diagnosis and immediate treatment. Communication with club management and medical personnel is important once the player returns to his club.

AFRICA CUP OF NATIONS 1996

Winning the Africa Cup of Nations (ACON) in January 1996 was certainly the proudest moment for SA football. Interestingly, there were few injuries in a competition that was extremely physically demanding. At the time, Steve Flesher was involved in the ACON Medical Committee in co-ordinating the physiotherapy services

at all the venues.

During the tournament, it became quite a difficult task to keep players and technical teams stimulated through 4 weeks of competition. The Health & Racquet Club provided a good outlet as well as indoor soccer/basketball/volleyball etc. The hotel also provided pool tables, darts, table tennis as well as board games to keep players occupied at night.

It was also our role to educate players in the month preceding the tournament on banned substances. Lists were provided to players and they were told to consult the medical team before taking medicines.

CURRENT STATUS OF MEDICAL/PHYSIOTHERAPY SERVICES IN SA FOOTBALL

The formation of the South African Football Medical Association (SAFMA) a few years ago as the official Sports Medicine Body controlling activities in SA football has not proved to be a great practical success. When formed, no physiotherapists or emergency first aid personnel were included. Consequently, medical structures that would benefit SA football remain to be developed fully.

The current medical/physiotherapy set-up in the Professional Soccer League (PSL) of SA football is almost non-existent. Only a few PSL clubs have part-time physiotherapists and doctors. The rest of the clubs have no medical personnel at all. The set-up in the amateur ranks and junior ranks is even worse. This is of great concern as players at all levels will be affected by injury at some stage. South African players, coaches and administrators need to be educated on injuries, fitness, nutrition and many other aspects relating to their physical well being.

SPORTS SCIENCE INSTITUTE OF SOUTH AFRICA

The senior national team and the U20 team have recently been tested at the Sports Institute. The testing of these squads has been instrumental in making coaches as well as players aware of the importance of both the mental and physical components needed to be a top class footballer. Testing like this should provide us with valuable data and certainly with the junior teams being tested, help us develop our footballing youth into world champions. The two days at the Sports Institute was a great learning experience for all concerned.

In conclusion, we are both privileged to be part of the national team set-up. Working in front of 100 000 ecstatic SA supporters has to be the thrill of a lifetime. Let's hope the next thrill will be in France in the 1998 World Cup. □

Nutritional challenges for olympic athletes
A Review Article

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INTRODUCTION

South Africa has shown that its recent re-emergence into world sporting events has not gone unnoticed and our athletes are proving to be highly competitive. With exercise science and research playing a major role, our athletes should be assured of the best training and preparation needed to optimise performance. Athletes are continually seeking to gain a competitive edge either through scientific or other means, one of which is nutrition. Because eating habits take a lifetime to develop, it takes dedication and determination to continue with the dietary changes necessary to ensure optimal performance. Many athletes prefer the tablet form of nutritional advantages rather than having to manipulate daily food choices in order to follow a proper well balanced meal plan.

Goal setting

Achieving this well balanced meal plan is not as easy as is seems. Elite athletes can no longer follow a standard high carbohydrate (CHO), low fat diet. Instead each sport now has specific guidelines and recommendations for nutritional practices that need to be considered and it is up to the athlete to follow these through. Every elite athlete should have his/her own individual nutritional goals that he/she is working towards. This can only be established once an appropriate performance body composition goal has been set.

Body composition when interpreted correctly, is an effective tool for performance appraisal. It is well known that there is a positive correlation between; i) absolute fat free mass and performance in object projection sports; ii) relative fat free mass and performance in body projection sports; and a negative correlation between fat mass and performance in body projection sports. But there is the mistaken belief that if performance improves with a slight weight loss then there will automatically be more improvement with further weight loss.[1] This can lead to athletes striving for unrealistic body fat levels particularly when event selection depends on body composition. It should be noted that fatigue, reduction in performance and menstrual irregularities could all be consequences of keeping body fat levels too low[1] particularly when there is associated loss of muscle mass.

The most appropriate and practical method for determining body composition is the use of skinfold measurements. Unlike body weight or the Body Mass Index (BMI) (wt/ht2) which do not take changes in the relative contributions of muscle and adipose tissue into account[2], skinfold measurements can be used on their own without any predictions of body fat levels being made. According to Johnson,[3] the sum of skinfolds should be taken as an absolute measurement and not converted into percentage body fat using various equations as there are too many inaccuracies and individual variations in non-fat tissue density are not taken into consideration. A key factor for Olympic athletes is to be aware of measurements taken by inexperienced personal particularly if they are being followed longitudinally. Human error and differences between individuals can occur making interpretation of minor changes in readings inappropriate. It is also important for athletes not to set a particular skinfold sum as a goal but rather to set a 'range' which would then be more achievable.[4] One method presently being adopted by sports scientists in South Africa is the measuring of 7 skinfold sites for females and 8 sites for males and comparing them to the norms for age and sex and is based on the 0-scale physique assessment system. Further information on sport specific skinfold measurements can be obtained from Telford.[4]

Energy balance

One of the most difficult challenges facing any elite athlete is getting enough kilojoules in each day. With so many hours of the day taken up in training or other preparation, athletes have to be particular with their food selection and timing. They cannot rely on take away foods, but should plan ahead and arrange their own portable food and drink so as to be able to eat whilst travelling or resting, thereby utilising their time efficiently. In weight class sports, athletes have to be a lot more particular about food choices. They need to establish a balance between meeting the energy demands of training and meeting their correct body weight and body composition goals. Very often too little energy is consumed which results in fatigue, lethargy and reduced performance during training and competition.

Establishing the optimum amount of energy needed for an individual is not easy. Requirements vary from day to day depending on overall training and intensity, therefore precise figures are impossible. Predictions can be made using tables and equations based on resting metabolic rate, growth and amount of work done. The Schofield equation[6], see Table 1, when used in combination with estimates of energy costs of activities (kilojoules/minute) is sufficiently accurate for everyday use.[7] There are also numerous computer packages available that estimate the energy needs of athletes using similar techniques. Close monitoring of body composition and body weight will determine whether energy balance is being achieved.

The right combination

Gaining that winning edge also depends on ensuring the correct nutrient proportions of the total energy intake. The NH&MRC (National Health and Medical Research Council) recommendations that a healthy diet consists of 50-60% carbohydrate, 15-20% protein and 30% fat cannot be used in all high performance sports. There are now numerous studies available illustrating the importance of a high CHO diet in muscle glycogen metabolism in endurance sports.[9,10] Recent

evidence suggests that the high strength, explosive sports also require glycogen as the primary energy source.

But it is not appropriate for all athletes to simply strive for a diet containing 60% CHO. It is more important to ascertain the absolute amount of CHO intake in grams per day. This is best illustrated by the following example. A light-weight runner of 42kg may be taking a diet containing 60% CHO which is only 225g CHO, insufficient to replenish glycogen stores. Costill recommends 7 - 10gCHO/kg/d, depending on the intensity and duration of exercise.[9]

This recommendation dictates an intake of 500 - 800g/d which is an enormous dietary challenge in itself. Because of this, some of the required CHO (about 30%) should come from foods or fluids with a high glycaemic index, allowing less bulk and faster absorption.

In the case of athletes trying to 'make weight' or on weight control programs, their CHO intakes need not be compromised. It is the total energy that needs to be reduced through protein and fats. This is because the CHO taken in is almost entirely used in glycogen synthesis or is oxidised. Only if the CHO intake is so excessive that glycogen saturation occurs and if CHO cannot be oxidized for energy generation will the excess be converted into fat.[12] This de novo lipogenesis prevents the increase of body fat stores despite the high CHO intakes (500g) of some individuals. What is sometimes misunderstood by athletes when changing to a high CHO diet is that there is increased glycogen storage and a concurrent increase in the uptake of water. Glycogen is stored with about 2-4 times its weight in water.[13] The use of skinfold measurements can reassure the athlete that fat mass is not being gained.

The role that protein has played in various sports has also been studied. According to Lemon, there are increased protein needs particularly during strength training but only up to 1.2 - 1.7g/kg/d.[8] Table 2 summarises the recommended protein requirements of various athletes.[11] In practice it is not always necessary or appropriate to 'protein count' every day. The protein requirements of most sports will usually be met by an increase in the total food intake.

Table 1
SCHOFIELD EQUATION for estimating metabolic rate in MJ/d in adults and children over 10 years of age.

	AGE	EQUATION
MEN	10 - 18	(0.074 x wt) + 2.754 = BMR
	18 - 30	(0.063 x wt) + 2.896
	30 - 60	(0.048 x wt) + 3.653
	over 60	(0.049 x wt) + 2.459
WOMEN	10 - 18	(0.056 x wt) + 2.898
	18 - 30	(0.062 x wt) + 2.036
	30 - 60	(0.034 x wt) + 3.538
	over 60	(0.038 x wt) + 2.755

New developments

Fats as an energy source

Because of the important role carbohydrates have played in enhancing muscle glycogen stores, the intake of fats have always been kept to a minimum. Excess fat intake increases adipose tissue and can take up valuable dietary kilojoule allowance that would otherwise be used for carbohydrates. In contrast to this there is now some interesting work being done on the effect of dietary fat on endurance exercise. It is thought that just as depleted muscle glycogen stores can reduce performance, so can depleted muscle triglyceride(TG) stores. These muscle TG stores maintain the muscle free fatty acid (FFA) pool that can be used as an energy substrate during endurance exercise particularly in a trained athlete. Training enhances the utilisation of fats during exercise through increased muscle lipid oxidation.[14,15] According to Newsholme[16], both carbohydrates and fats are available as fuel sources simultaneously, with CHO being more important initially and fat metabolism becoming important as glycogen stores are reduced.

It is not only the presence but also the type of fat in the diet that is receiving attention. Studies have examined the effect of medium chain triglycerides (MCT) on exercise as they are believed to metabolise into the FFA pool more efficiently, thereby enhancing endurance performance in trained individuals. The greatest improvements have been found when MCT's are used in combination with CHO.[17]

Table 2
Suggested Protein Requirements of Various Groups of Athletes

General sports activity	1 g protein /kg body weight
Strength-training athletes (aim for the high end of the range during muscle gain periods)	1.2 - 1.5 g protein /kg body weight
Endurance training athletes (aim for the high end of the range for very prolonged strenuous training)	1.2 - 1.6 g protein /kg body weight
Adolescent and growing athletes	2.0 g protein /kg body weight
Pregnant athletes	Extra 10 g protein per day in trimester two and three
Breast-feeding athletes	Extra 20 g protein /day

Nutritional Supplements

One of the more controversial challenges for Olympic athletes is the use of nutritional enhancers or supplements. Almost every South African athlete is taking some supplement or another and in the experience of the author, most take far in excess of the Recommended Dietary Allowances (RDA). There is increasing evidence that antioxidant vitamins and minerals may offer protection against the potentially damaging free radicals that are generated during exercise.[18] Consequently, athletes are taking these nutrients as a precautionary measure. However, they should be encouraged to take foods that are nutrient dense and well balanced instead of general vitamin and mineral supplementation. It should be noted that indiscriminate use of mineral supplementation can have adverse health effects such as gastro-intestinal disturbances.[19] Because of the high demands of exercise on the body, it is becoming more apparent that high performance athletes should be recognised as a nutritionally 'at risk' group.

Another controversial nutritional enhancer receiving much attention is creatine, especially as it is not on the International Olympic Committee (IOC) list of banned substances. It plays a role in skeletal muscle metabolism particularly in high intensity, intermittent exercise. Creatine can be obtained from foods (meat,fish) or produced endogenously in the liver, kidney and pancreas.[20] In the muscle it is found with a high energy phosphate bond - phospho creatine(PCr), or in its free form. In brief, high intensity exercise such as sprints in swimming, cycling or running, the availability of PCr within the muscle may be the limiting factor in performance. It is thought that depletion in PCr may cause a reduction in the rate of adenosine triphosphate (ATP) resynthesis at the required rate. Supplementation with oral creatine may thus increase the available PCr.[21] It is also a pH buffer and resists the acidosis consequence of high intensity exercise.

Creatine supplementation is being used by some of our Olympic athletes and its efficacy has recently been established in the field. (Carter R, "personal communications"). There are however, too few conclusive studies available demonstrating significant increases in performance to warrant recommendation.

SUMMARY

An Olympic athlete faces many challenges in his/her quest for success. Deciding on what, when and how much to eat is just one of them. Athletes are constantly faced with new dietary products, new food recommendations and conflicting advice. Sorting through the information is a difficult task. There is no substitute for hard work, scientific preparation and a well balanced eating plan.

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