

Sport Health

Incorporating The Bulletin



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Wrestling the Heat Demon

By Gary Moorhead

Over the last couple of months, the Australian media have been full of horror stories involving adverse outcomes from playing sport and exercising in hot weather. Recent headlines have included:

- “Six runners hospitalized and 60 others treated for dehydration during the Melbourne Marathon.”
- “Soldier Dies from Heat During Exercises”
- “Man Who Melted: we pulled him out of the grave”.

But at the same time as these “horrors” are occurring, Sports Medicine Australia is changing its “Guidelines for Preventing Heat Illness in Sport” to remove mandatory cancellation recommendations. Does this make sense? From SMA’s perspective it makes complete sense.

With the Heat Guidelines, SMA is being asked to reduce a very complex issue to a series of simple solutions to fit the needs of a very diverse range of interests:

- Sporting organisations want clear direction on when it is safe – and when it is not – to play sport in hot weather.
- Parents want to know that their children will not be in any danger when they play sport.
- Public health promoters (and sporting organisations) want to minimise any disruption to people engaging in sport and physical activity.
- Politicians want to be seen to be acting to solve problems and deal with issues.

At the same time, we have to factor in a mass of variables:

- People are different – physically, physiologically, psychologically, genetically.

- Sport is infinitely variable – both between sports and within different levels of competition of the same sport.
- Weather conditions are one of the great variables of life – especially if you live in Melbourne. “Weather forecast” is probably the world’s greatest lie; “unseasonable weather” is the one thing you can rely on.
- Australia is a continent that has weather conditions ranging from tropical to cool temperate – and sometimes this can be on the same day in the same place!

In 2001, SMA issued revised Guidelines for Preventing Heat Illness in Sport, which were based on new Guidelines issued by the American College of Sports Medicine (ACSM). For the first time, SMA also published a specific cancellation/postponement policy: 28 degrees Wet Bulb Globe Temperature (WBGT) for adults and 34 degrees ambient temperature for children. The year 2001 was at the height of medical indemnity controversy in Australia and the new Guidelines took an ultra safety-first stance. The cancellation recommendations were based on worst case scenarios – responses by athletes in endurance running.

Over the next three years, these Guidelines – and the cancellation recommendation – began to seem an over-reaction to the problem:

- Detailed evidence was produced to show that a literal interpretation of the Guidelines would see no sport played in the northern half of the country for a large part of the year¹.
- A detailed study over 10 years of presentations to Cairns Base Hospital, of recalled events of Cairns doctors and of ambulance

responses for the whole state of Queensland, failed to turn up any cases of heat illness relating to children².

- Medical coverage data and information from the Medical Director of the Alice Springs Masters Games showed no incidences of heat illness experienced by athletes at the other end of the age spectrum³.
- Scientific studies, and research carried out by the Australian Bureau of Meteorology (BOM), began to cast doubt on the reliability and validity of the WBGT readings. In fact, the BOM WBGT is derived not from a single measuring device (a wet bulb globe thermometer) but from an algorithm that takes into account a range of atmospheric variables. Industries where heat is an issue use a measure called the Thermal Work Limit (TWL) and this may give a more accurate reading if adapted for sport⁴.

Fundamentally, the major problem with any guideline is the impossibility of creating a “one size fits all” recommendation.

The greatest fear with heat illness is the condition known as “heat stroke”. Heat stroke is a killer. The mortality rate is 20% to 75% if cooling is not effective and survivors usually have some permanent damage.

While heat stroke occurs most commonly in conditions of high ambient temperature and high humidity (the conditions we try to measure with WBGT), heat stroke can occur in the absence of both⁵. Further, British army medical staff attending the 2004 Australian Conference of Science and Medicine in Sport reported incidences of heat illness in cool weather where the precipitating

factor was apparently exertion and/or gear and clothing related rather than hot weather and hydration⁶.

The task of those charged with the care of the health of athletes is made even harder by problems with diagnosing the seriousness of heat illness and whether or not it is likely to develop into heat stroke. Initial symptoms of both are similar.

The most reliable predictor is core temperature⁷. Following the Heat Symposium at the Australian Conference of Science and Medicine in Sport in Alice Springs in October 2004, the President of the AFL Medical Officers recommended to the AFL that rectal thermometers be added to the "Emergency Management Bag" at AFL games and training⁸.

While the incidence of heat injury is probably much lower than has been accepted anecdotally, especially in the northern parts of Australia, it is obvious that heat illness and heat stroke do exist and steps must be taken to prevent their occurrence. However, SMA believes the way to reduce the incidence is through education of participants and administrators, rather than arbitrary cancellation recommendations.

SMA is in the process of developing new Guidelines and advice that will assist sporting organisations to develop their own heat policies that are appropriate to their type and level of sport. Unfortunately, SMA cannot provide a quick fix, easy answer to the question "when should we cancel?". Ultimately, the final decision regarding cancellation will be up to individual sports on a case by case basis. What we can do is to try and make sure those decisions are well-informed.

The new guidelines will probably take on some of the following points:

1. Recommended fixed cancellation temperatures will be removed or significantly modified.
2. The reliance on WBGT readings may be reduced and an attempt will be made to develop some form of alternative "participant comfort"

indicator. (This will be developed in conjunction with BOM to give readings in a wide range of locations around Australia and displayed on SMA websites)

3. Promoting effective countermeasures. These will include options such as shorter playing periods, longer breaks, moving activity from the hottest parts of the day, being sensitive to needs of players to self-regulate, provision of shaded rest areas and fans for cooling.
4. Reminding people that heat illness is not always about dehydration. Adequate fluids are essential, but heat illness can occur despite adequate hydration.
5. Distinguishing elite sport as a separate category. Most heat illness seems to occur when athletes "push themselves" beyond the body's natural limits. Those in charge of elite athletes must recognise this danger and be prepared for its consequences. The Australian Football League elite level guidelines are a good example for other sports to follow in this area.
6. Warning about specific one-off style events, like fun runs and marathons. This type of event also encourages individuals to push themselves beyond the body's natural warning signs and limits. Similar conditions can occur when people are worked in tightly disciplined groups that prevent opportunities for individual self-regulation – such as with military or other squad-style training.

Sporting organisations need to realise also that heat illness can be an issue for officials, sports trainers, coaches (ask Kevin Sheedy), and even spectators.

Finally, if sports administrators and sports participants remember that sport is supposed to be fun and they "listen to their bodies", they will rarely get into trouble with heat illness. The body is an excellent self regulator and when we feel hot and bothered,

the natural inclination is to stop what we are doing. In many cases, ceasing activity is the first and best step to preventing heat illness occurring.

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A safe and level playing field should be the goal of drugs in sport policy

By Dr J

In case you are sick of the subject, this is another (lengthy) drugs in sport piece. Fortunately it won't fall into either category of clichéd article along the lines of: (1) Guess what, lots of Olympic medal winners are taking drugs and getting away with it? (I wrote one of these in a Dr J. during the 1990s and have read similar articles 100s of times since) or (2) because of (1) this is all too difficult, let's just make drugs open slather and, at the cost of a few athletes dying here and there, at least we can end the hypocrisy of applauding athletes who are only up on the podium because they have beaten the system.

I am a big supporter that sport needed a World Anti-Doping Agency (WADA) because at least we now have a common standard that we can criticise and lobby to have changed, where appropriate. It is unfortunate but realistic that performance-enhancing drug use in professional athletes seems to be heading the same way as paying tax is treated by business – that is, an area where everyone tries to get away with as much as they legally can.

In one way we are developing a more mature attitude to drugs in sport, where it is appreciated by the majority that there is no black and white with respect to performance-enhancing substances. If a performance-enhancing drug is on the banned list, an athlete who takes it or a doctor or conditioner who prescribes it is considered to be a cheat (eg, anabolic steroids). Yet, if a performance-enhancing drug is considered 'legal', an athlete who declines to use it or a doctor who doesn't prescribe it is not on the cutting edge (eg, creatine). The boundaries get blurred more when there are drugs that move back

and forth from the list of prohibited substances (eg, pseudoephedrine). And they become almost impossible to fathom when certain performance-enhancing drugs are approved for some competitors in an event or competition but not for others, to which I will return later.

My personal view on the criteria for permitting drug use is as follows:

- 1) a drug should either be banned or legal in a certain sport, not banned for some athletes and legal for others;
- 2) there is no point banning a drug if it isn't performance enhancing in a particular sport or if you can't enforce the ban (ie, there is no test for detection);
- 3) given that a drug helps performance and can be tested for, the criteria for banning should be based on whether or not the potential for health damage by overuse/abuse outweighs the potential for inadvertent use or need for genuine medical use in some athletes;
- 4) for drugs where detection of the actual drug is problematic but detection of its net effects is easy (and the classic here is EPO and packed red cell volume), it is much more sensible to ban the effect rather than the drug itself (ie, ban excessive blood thickness, which is what presents the health problem anyway, rather than banning EPO). I agree with this section of the argument of Savulescu et al, published recently in BJSM, but not the rest of the open-slather approach¹.

The big advantage of WADA is that there is now a system in place that

can stop rogue countries from failing to enforce doping criteria as well as other countries. The big disadvantages from where I see it at the moment are:

- 1) due to over-officiousness of WADA, excessive resources are now going to be spent complying with Therapeutic Use Exemption (TUE) Guidelines for drugs that shouldn't even be on the banned list (eg, cortisone injections and creams, salbutamol);
- 2) the TUE process may become as much of a rort in certain countries as the previous system, with athletes trying to invent proof of suffering from as many conditions as possible to allow access to as many 'banned' performance-enhancing drugs as possible;
- 3) because of testing limitations we are often shooting small offenders with a cruise missile (ie, stripping Olympic Golds off someone who tests positive for pseudoephedrine) whilst we are firing a paper plane into the big offenders (those who use high doses of EPO and HGH).

Anabolic steroids are the prime category of drugs that should be cited to show why use of certain drugs in sport *should* be illegal.

The stories of East German female athletes who have suffered from infertility in the years after their athletic careers are exhibit A in the argument against the use of anabolic steroids. Like all drug categories, there are grey areas, but at least with steroids we are more united in being hard across the board in this category.

An exception exists in some circles for the so-called 'soft' anabolic steroid precursors, like DHEA

and androstenedione, which are prohibited in most sports, but have been legal recently in US Major League Baseball. Mark McGwire, who broke the MLB season record for most home runs in 1998, admitted to the use of androstenedione as a performance-enhancer, and why wouldn't he when it was legal in that sport at the time he broke the record?

Although MLB has tended to be an exception, most sports have a zero tolerance on anabolic steroid use amongst athletes, which I fully support. The days of doctors making exceptions for athletes recovering from (say) knee reconstructions are past us, and for good reasons. Yes, there is no doubt that, if your quads have wasted after a knee reconstruction, anabolic steroids will help you regain some of the bulk, and this was the reason why some of these drugs were prescribed by respected sports physicians in the late 1980s and early 1990s.

A fairly fortunate side effect might be that your other muscles will hypertrophy as well, as Rodney Howe discovered in 1998. In his rehabilitation from a knee reconstruction he took anabolic steroids (perhaps with a semi-legitimate intent of building his quadriceps strength back up) and, rather than have a mediocre year which tends to follow major knee surgery, he temporarily became the best forward in the NRL competition. When he failed a drug test for anabolic steroids, he was given a hefty suspension, which I feel was the correct decision, despite the fact that he cited his knee problems as being the rationale for using steroids.

It still angers other countries that the USA track and field medical officials, until only a year or two ago, apparently turned a blind eye to positive anabolic steroid samples if the athlete could cite a 'legitimate reason' for using the drugs.

Stimulants are harder to cast in the same light as anabolic steroids, as there are and always will be 'soft' stimulants that the majority of people

use. Caffeine is almost ubiquitous, and is a good drug to think about if anyone tells you that stimulants don't have addictive properties. Caffeine makes you do your job better, perform better in IQ tests, probably run faster and, fortunately, if you can manage to keep your heart beating in sinus rhythm, doesn't have too many side effects. Pseudoephedrine has been studied quite extensively in recent years and none of the published papers has shown any great performance effects from a standard dose.

However, the way that so many football players seem to love gobbling them down before games suggests to me that there may be a slight performance effect from higher-than-standard doses. The fact that so much money can be made from buying Sudafed and melting it down to form heavier speed to resell at nightclubs also casts this drug in a bad light. Even despite my suspicions, the fact that every second over-the-counter cold medication contains pseudoephedrine means that I would support keeping it off the 'banned' list.

The risk that a heavy user might be gaining a performance advantage and/or will suffer health problems is outweighed by the injustice that occurs if an athlete is disqualified after inadvertent use (which is unfortunately what happened with Andrea Raducan, who lost her Gold in the gymnastics at the Sydney Olympics).

The stimulant which seems to give rise to the most flagellation in WADA circles is salbutamol, which is an important (and potentially life-saving) drug for the 10%-20% of athletes who are asthmatics. There is some evidence that salbutamol has performance-enhancing effects², and history has shown that more Olympic medallists have had salbutamol in their system than there should be asthmatic athletes, which has led to the suspicion that some athletes may have been taking salbutamol for reasons other than asthma attacks.

The new WADA guidelines want athletes to show 'proof' of asthmatic

status in order to be able to take salbutamol, but why not just make the drug legal? Even if salbutamol is a major performance-enhancer (and I am not convinced it is), would it be fair that only asthmatics could access these properties of the drug? It definitely wouldn't be fair to ban all asthmatic athletes from competition for using salbutamol and, since excessive use isn't likely to lead to any major harm (because salbutamol has minimal cardiac effects, a bit like caffeine), why not just make salbutamol a legal drug? Does anyone seriously believe that non-asthmatic Olympics athletes who are inspired to cheat, and who apparently have no problems finding doctors and physiologists who can get them EPO and HGH on the quiet, would have any problem finding doctors and physiologists who can help them fudge the results of an exercise challenge test so they can be declared asthmatic?

The over-officiousness of the authorities to regulate an important and pretty harmless drug like salbutamol arises, in my opinion, from their impotence in being unable to regulate the heavy drugs that are commonly being abused, such as HGH and EPO. Make salbutamol and cortisone puffers completely legal, make insulin legal, make anti-epileptics legal etc, etc, as these drugs have a much greater therapeutic importance than potential to lead to athlete death through abuse.

If you accept the arguments that 'soft' stimulants such as caffeine, salbutamol and pseudoephedrine should all be legal, then what about the amphetamine-type drugs?

A line has to be drawn somewhere, because these stimulants are definitely very performance-enhancing in most sports. The heavier you travel up the stimulant pathway, the more likely that cardiac arrhythmias and even arrest can occur, and of course the more potential performance-enhancement you can get. Horses, greyhounds and humans all run faster and have more endurance after using amphetamines, but there have

probably been quite a few deaths in the past (particularly in cyclists) from their use.

I don't have any problem with inclusion of amphetamines on 'banned' lists of drugs, but then I do have a big problem with these drugs being banned and then exceptions made for certain athletes.

The common and now-obvious loophole for being granted 'approval' to use amphetamines is the use of Ritalin for the condition known as ADD (Attention Deficit Disorder). Even though other experts are particularly cynical about the use of Ritalin for ADD, I am happy to listen to expert psychiatrists who claim (with plenty of experience) that Ritalin is very helpful in a clinical setting for ADD patients.

The three big questions I have over Ritalin are:

- 1) Is denying an ADD patient his/her Ritalin more similar to denying a diabetic his/her insulin or more similar to denying the post-knee reconstruction patient the anabolic steroids to regain quadriceps strength?
- 2) How much performance-enhancement does Ritalin really give in strength and power sports and, whatever it is, is it fair that only ADD-sufferers get this advantage?
- 3) Most importantly, since there is no objective test for how much Attention Deficit one really has, how the hell do you stop an athlete 'faking' the symptoms and signs of ADD in order to steal a march on the field by getting access to a strong stimulant?

As far as I am aware, there is only one trial showing the effects of Ritalin in ADD patients³ (which showed it helped some aspects of performance, and of course doesn't answer the question of whether it helped by 'curing' the condition or whether it just helped performance, because stimulants just 'help'). I'm sure Ritalin helps you stay concentrating for

longer and I'm equally sure that it helps you run faster. Is it fair that some athletes are given this privilege but others are not?

ADD, whether or not you believe it is overdiagnosed, is a disease of context. So, for example, is 'low sex drive'. If a couple is happily married and both partners want sex once or twice a fortnight, then they are both considered 'normal'. If people who only want to have sex once or twice a fortnight are unfortunate enough to be married to partners who want sex once or twice a day, they might genuinely be diagnosed as having an arousal disorder. Of interest, a psychiatrist might prescribe someone testosterone in this context, to treat the arousal disorder (and believe me, if TUEs keep going the way they are, some athletes will come up with this as a reason for wanting anabolic steroids).

If you have a job of a certain type, such as a rock musician, actor, artist, chef, advertising executive, opinion journalist, stand-up comic etc, etc, you may only ever rarely be required to sit at attention listening to a person who you consider boring, and therefore it would be highly unlikely that you might be diagnosed with ADD (just as someone who was married to a partner who wanted sex once a fortnight would be unlikely ever to be diagnosed with an arousal disorder). If you are a schoolkid, your life is all about sitting at a desk and listening to someone give instructions, and you might be much more likely to be considered to have ADD if you don't like listening.

A professional football player a few decades ago would never have been told he had ADD, partially because the condition wasn't recognised and partially because the average team preparation meeting went for 10 minutes rather than three hours. It is quite legitimate to diagnose a player with having a mild variety of a psychiatric condition (ADD) if he (the player) always snaps at the coach when he tries to explain a complicated play for the fifteenth time and, in the context of modern

football, long team meetings are now necessary.

There isn't a blood test or a scan that you can have which diagnoses ADD – it is all about context, and whether you can behave in a manner that is considered appropriate by those around you during your everyday duties.

Unfortunately, due to the combined failings of our school system and our pharmaceutical industry, we have reached a situation where a large proportion of our male schoolkids need to be treated for ADD in order to fit in with the system in which they find themselves.

As the worst behaved kid in the class gets put on Ritalin for ADD, the pressure then falls on the next worst behaved kid to take the same drug. Apparently he can usually buy it from his mate sitting next to him in the back row of the class for the going rate of \$1 per tablet. In the truck driving industry, the fact that many of your competitor truck drivers are taking amphetamines and can therefore do the Sydney to Melbourne drive in seven and a half hours puts pressure on other truck drivers to do the same. The expectation that badly-behaved boys will take Ritalin is now as ingrained as the expectation that long-haul truck drivers will take it (or something similar) to stay awake longer.

Although Ritalin is a banned drug, there is a perceived need for medical authorities to grant 'exemptions' for athletes to take it under the TUE system, based on medical need. I don't have any experience with these panels, but apparently it is not uncommon for TUEs to be granted for Ritalin for ADD, based on the opinion of two independent psychiatrists (who are diagnosing this condition entirely on symptoms and signs rather than any investigations).

In the USA, Mark McGwire inadvertently opened up the debate on androstenedione in MLB by being one of the very top players in the sport who had his use of the drug made public. In Australia we now have a similar case with Willie

Mason, who is one of the very best players in the NRL and who it has been widely reported has been given a TUE to take Ritalin. I don't want to comment on the appropriateness of the diagnosis (as some media commentators in Sydney have at length) other than to say that Willie is being looked after by an excellent sports physician Hugh Hazard, who has the respect of the sports medicine community.

I am fully prepared to accept that, if this diagnosis (ADD) has been made by expert psychiatrists, it is correct. I do however think that we should question whether an expert panel should be granting approval for any particularly players, with ADD or anything else to take amphetamine-type medications (which are strong enough to be on the banned list for other players).

Willie Mason, for those in the southern states who haven't caught up in the soap operas surrounding his Rugby League career, is a bit like your Shane Warne or Jason Akermanis figure of the NRL. He is a bloody good player and a character who (when not on media ban) speaks candidly and, some would say, sometimes without thinking enough before pressing the play button on his mouth (a bit like this writer, so I have some sympathy towards him).

His ADD details were made public during a relentless barrage of criticism that was aimed at Willie's direction in the Rugby League silly season, and I would like to refrain from commenting on any of the controversies in which he was involved earlier this year other than the TUE issue. Despite that Willie has copped more than his share of criticism, he is, unfortunately from the viewpoint of not wanting to single him out, the only NRL player whose Ritalin use is in the public domain (apparently there are others but we don't know who they are due to medical confidentiality).

What should be debated in medical circles (not hysterically à la Sydney

talkback radio), is whether or not Ritalin should be a drug for which ADD-athletes can get TUEs. Actually that shouldn't just be ADD – Ritalin is also approved for the condition of narcolepsy so, if you have enough late nights and keep falling asleep during team meetings (as opposed to getting up and wandering around the room), there would be an opportunity for Ritalin to help you in this situation as well.

The 'recommended' uses for amphetamine-type drugs don't end just there – it is a popular class of weight loss drug. How are we to say that a javelin thrower who has a prescription for Duromine for weight loss deserves it any less than a javelin thrower in the same competition who got a Ritalin prescription for ADD from the same psychiatrist? How do we draw the line here and not allow another javelin thrower in the same competition an anabolic steroid prescription for sexual arousal disorder, as long as there are two respected psychiatrists who write that the athlete definitely has the condition?

Willie Mason's performance history for the year in 2004 (broken into pre- and post- Ritalin periods, according to the time the Daily Telegraph reported that he gained a TUE for the use of Ritalin⁴) is detailed in Figure 1. It shows an apparently impressive rise in metres gained per match once he gained the TUE. It is notable that this rise was not statistically significant (so it could have been due to chance that his performance was better towards the end of the year).

There is very little evidence to fall back on to work out if Ritalin is going to be a performance-enhancing stimulant in football players or sprinters, with or without ADD or narcolepsy. I know we need a double-blind crossover trial to see whether you can sprint faster on speed versus placebo, but I think I already know the answer. Football players think that pseudo-speed (Sudafed) makes them go faster, so they wouldn't need convincing about the real stuff. They won't be any less

convinced that stimulants help you after they have watched Willie Mason win the man-of-the-match award two weeks in a row in the 2004 NRL Preliminary and Grand Finals.

It shouldn't surprise us that, when drug authorities made a soft-stimulant like salbutamol 'banned' in sport, except for asthmatics, suddenly there were a whole lot more asthmatics cropping up at the Olympics. What worries me is that if we keep the current status quo going on TUEs for Ritalin, football players might become like truck drivers or, I hate to say it, eight-year-old boys in Australian schools. Are classrooms less disruptive now and the trucking industry safer because large percentages of people in them are taking stimulants?

Some psychiatrists may argue that, if we give Ritalin to a quarter of the population of disruptive NRL and AFL players, we will have a better-behaved group of professional footballers. The problem is that, if keeping up with the competition in sport means getting diagnosed with ADD by a psychiatrist, players are going to have an incentive to behave badly in order to get the ADD-diagnosis to be given the legal imprimatur to take speed.

If speed infests professional football like it has the schoolyard and the trucking industry, then the battle to stop football players from behaving badly is going to be a losing one, not to mention the battle to create a level playing field in sport.

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Figure 1 – Willie Mason's metres gained per game in 2004, grouped to periods for which, as reported in the Daily Telegraph [4] were prior to or after he had been given a TUE for Ritalin [source of statistics, NRL stats].

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Investigating Doping in Sport

Federal Government proposes new “independent and transparent” process

Senator Kemp, the Federal Minister for the Arts and Sport, issued a discussion paper on 18 November on options for independent investigation of sport doping allegations.

Recent allegations concerning elite Australian cyclists, he said, highlighted the need for an “independent and transparent process” to investigate such allegations.

Senator Kemp urged that key stakeholders and other interested people provide comment on the discussion paper, titled Discussion paper about proposed legislation affecting Australian arrangements for the investigation and hearing of sports doping allegations.

Sport Health presents this edited version of the paper for interested members of Sports Medicine Australia.

Recent cases of suspected prohibited activities and doping allegations made in relation to elite Australian athletes have highlighted the need for an independent and transparent process to investigate doping in sport, the discussion paper says.

The credibility and legitimacy of Australia’s anti-doping efforts is closely linked to the level of confidence athletes, sport officials and the Australian public have in processes undertaken to investigate and hear all doping allegations so that correct decisions are made, including any decision not to proceed with a case.

There are three broad options to address these concerns: leave it entirely to the sports bodies to conduct investigations and hearings into alleged doping violations; provide funding to sports bodies to employ accredited investigators to conduct investigations and to present the case at subsequent hearings; or establish an independent doping investigation board to perform these functions.

The discussion paper sets out a possible legislative proposal to implement the latter option. Comments are sought on the broad options outlined above, as well as on the issues raised in the attached legislative proposal.

Current arrangements

Australian sport is presently managed on a ‘sport runs sport’ basis, with government involvement occurring largely through sports funding. The Australian Government, through the Australian Sports Commission (ASC), provides national leadership, professional services and advice to the sports industry and recognition and/or funding to national sporting organisations (NSOs), subject to certain conditions which are intended to promote the development of those sports in the interest of the community at large and members of the sporting organisations themselves.

Each sport receiving Australian Government funding through the ASC must satisfy a number of funding criteria including having an approved anti-doping policy that is consistent with the World Anti-doping Code (the Code), ASC Core Anti-Doping provisions and, if applicable, its International Sporting Federation.

Through the Australian Sports Drug Agency (ASDA), the Australian Government provides an independent, accountable, high-standard drug testing regime on which sports can rely. ASDA is also responsible for examining possible anti-doping rule violations that relate to the testing

process, including failure to comply with a request to provide a sample, tampering in relation to a sample, evading the testing process and failure to meet whereabouts notification requirements.

The Code provides for other anti-doping rule violations including use of, possession of and trafficking in a prohibited substance or method. In Australia allegations relating to those violations are presently dealt with on a case-by-case basis. Normally, an allegation is investigated by an independent investigator appointed by the sporting organisation concerned, sometimes jointly with the ASC, for example where an AIS scholarship holder is involved. There is no Australian Government body with the overall responsibility for the investigation of such allegations.

Reasons for government involvement

Australia is currently seen as an example of good practice in the world anti-doping community. The Australian public also needs to be confident that proper processes are undertaken to investigate and hear all doping allegations and that correct decisions are made, including any decision not to proceed with a case.

Investigation of a doping allegation and taking a case to hearing can be difficult and expensive. Some sports may not be in a position to obtain legal expertise to assist them. There is also a risk that individuals or organisations may be sued by people being investigated.

There is a potential for real or perceived conflict of interest for sports in investigating possible breaches of codes and allegations of wrongdoing. A real or perceived conflict of interest can arise in respect of athletes at all levels but may present particular issues in relation to high profile athletes, whose presence is important to a sport's ability to attract sponsorship, spectator support and other participants. In addition, the reputation of a sport may, to a large degree, depend on the reputation of its outstanding performers.

Doping allegations of evidence of prohibited practices are rare and office holders of individual sporting bodies may change frequently. In these circumstances it is likely to be difficult for individuals within a particular sport to be able to build up expertise in handling such matters or to take advantage of experience gained by other sports.

Australian Government involvement in the investigation of allegations of use, possession and trafficking in prohibited substances or methods could help sports to manage conflicts of interest and ensure that the tribunal hearing a case had all the relevant information to enable it to make a fair decision. In the same manner that ASDA provides its independent testing program, a body to investigate such allegations would provide an independent, fair and impartial service to sports.

One option is to establish a Sports Doping Investigation Board (Board) by legislation, with members appointed by the Commonwealth Minister with responsibility for sport.

Conduct of hearings

Arrangements for the hearing of doping cases vary. The Australian Olympic Committee (AOC) anti-doping by-laws require all Olympic sports (and those seeking to become Olympic sports) to use CAS as the hearing body for doping cases.

Some sports, notably the National Rugby League and Australian Football League, have established independent tribunals to deal with a wide range of issues, including doping cases. Other sports have no specific arrangements in place. If a doping case were to arise in one of these sports, the governing body would deal with the matter in accordance with its anti-doping policy.

The World Anti-doping Code contains basic principles to ensure a fair hearing for people alleged to have violated anti-doping rules. The Code requires all appeals for 'international' athletes to be heard by CAS (Article 13.2.1) but it does not set out any requirements or procedures for other hearings.

The Australian Government does not propose, at the present time, to establish a government-run tribunal or hearing body as many sports are required to use CAS and others have well established arrangements in place. However, the ASC will

continue to work with sports to ensure the Code provisions in regard to hearing and appeals mechanisms are identified in a sport's anti-doping policy.

It is proposed that sports will be required, under their funding agreement with the ASC, to include in their approved anti-doping policy either agreement to use CAS or provision for an independent tribunal mechanism. The ASC would, as part of approving a sport's anti-doping policy, approve a fully independent tribunal arrangement (for example, ARL and NRL), or require a sport that under its anti-doping policy elects not to use CAS to establish sport specific arrangements, which should include the use of accredited arbitrators.

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Sports Doping Investigation Board

Government's proposed model

Functions

The functions of the Board would be to:

a) investigate:

(i) the possible use, possession, trafficking or administration by a 'relevant person'¹ of a scheduled drug or doping method (as defined in the *Australian Sport Drug Agency Act 1990* (ASDA Act)²

(ii) a 'relevant person' tampering with a sports drug matter (as defined in the ASDA Act³)

(iii) a 'relevant person' attempting to engage in the conduct referred to in paragraphs (i) and (ii) above

(iv) a 'relevant person' aiding, abetting, covering up, or being otherwise complicit in the conduct referred to in paragraphs (i), (ii) and (iii) above

b) provide any evidence obtained in the course of such an investigation to a sporting organisation, sporting tribunal, committee or other hearing body

c) where it considered it desirable to do so, present a case to a sporting tribunal, committee or other hearing body against:

(i) a person who has been investigated by the Board

or

(ii) a competitor whose name has been entered on the Register of Notifiable Events by ASDA

d) advise the Minister on matters falling within the above functions and any related matters.

The Board would operate independently and would not be subject to Ministerial direction in relation to the handling of specific cases.

It is intended that the Board, in investigating, providing evidence or presenting a case, could make use of information obtained from other sources, such as information supplied by the Australian Customs Service (Customs), sporting organisations, ASDA or the ASC.

It is intended that if prima-facie evidence of criminal activity were uncovered by the Board, the matter would be referred to the police. Police and Board investigations may be able to occur concurrently. However, this would depend upon any arrangements agreed between the Board and police to ensure the integrity of evidence gathering processes. Similarly, Customs may undertake an investigation and prosecution under its legislation at the same time as a Board investigation, and with arrangements agreed between the Board and Customs to ensure the integrity of the processes.

When should investigations occur?

The legislation would allow a person to make a written complaint to the Board about the use, possession, trafficking or administration by a 'relevant person' of a prohibited substance or method, or other matters referred to in paragraph (a) of the Board's functions above.

The Board would be empowered to investigate such a complaint. It should have a discretion to not investigate, or cease to investigate, a complaint if it

is of the opinion that:

- the complaint is frivolous, vexatious or not made in good faith,
- the subject matter of the complaint is trivial,
- the complaint does not relate to a 'relevant person',
- the complaint does not relate to a matter referred to in paragraph (a) of the Board's functions,
- the subject matter of the complaint could be more conveniently or effectively dealt with by ASDA, or
- an investigation of the complaint is not warranted having regard to all the circumstances.

The criterion relating to matters that could be more conveniently or effectively dealt with by ASDA is proposed because there is some potential overlap between the functions of ASDA and the Board; for example where there is a complaint by a person that an athlete is providing false whereabouts information. It is expected that the Board and ASDA would have agreed protocols about the circumstances in which each agency would deal with a particular matter or refer it to the other agency.

The Board should also have the power to investigate a doping allegation of its own motion to deal with circumstances where there has been no formal complaint, but relevant information has been referred to it by another source, such as the Australian Customs Service, the ASC, ASDA, the Minister or a member of the public.

As a condition of receiving Australian Government funding and/or ASC recognition, sports and the ASC

would be required to agree that the Board would investigate all allegations of use, possession or trafficking of prohibited substances or methods. In some cases, a particular NSO may have its own well established independent investigations procedures.

Who should be subject to investigation?

For the purposes of the Board's powers, a 'relevant person' would be a 'competitor', as defined in section 2A of the ASDA Act, that is:

- an Australian citizen or permanent resident competing in international sporting competition,
- an Australian citizen or permanent resident assessed by a NSO as having the potential to represent Australia in international sporting competition,
- a member of a team in an international sporting competition in which teams representing Australia or teams representing Australian organisations that contain members assessed by a NSO as potential Australian representatives take part,
- a sporting competitor who receives Commonwealth or ASC support or whose sporting organisation is recognised and or funded by the ASC,
- a competitor in international sporting competition in Australia,
- a competitor in sporting competition at a level assessed by a NSO as being a level at which Australian representatives would be expected to compete,
- a person assessed by a foreign sporting organisation to be international standard and whom ASDA is required to obtain a sample for testing,
- a non-Australian in respect of whom ASDA is requested, permitted or required under a contract with a foreign sporting

organisation or international sporting federation to obtain a sample for testing,

- a person whose name is entered on the Register of Notifiable Events, or any coach, trainer, manager, agent, team staff, official, medical or para-medical personnel working with or treating a competitor, as defined in an applicable anti-doping policy or under the Code.

The last category is 'athlete support personnel' as defined in Appendix 1 to the World Anti-doping Code. Article 2.6.2 of the World Anti-doping Code makes it an anti-doping rule violation for athlete support personnel to possess prohibited substances and methods. It also appears appropriate to subject athlete support personnel to investigation in relation to at least the anti-doping rule violations referred to in Articles 2.5, 2.7 and 2.8 of the Code which deal with tampering, trafficking and administration of prohibited drugs.

Investigation process

The Board would be required, before beginning an investigation of a matter, to notify the person being investigated of the investigation.

However, it would have a discretion to not notify the person being investigated if it had reasonable grounds to suspect that such a notification could result in the loss of, or tampering with, potential evidence or where there were ongoing investigations by other Agencies.

It would have discretion to notify the ASC, ADSA and any relevant NSO or sporting organisation of the investigation. In some cases, a complaint may amount to nothing more than an unsubstantiated allegation. In such cases, it is probably inappropriate to notify other organisations of the investigation. However, at some point in the investigation it may become necessary; for example, if the investigator will need to seek documentary information from or

ask questions of employees of those organisations. As the circumstances will differ from case to case, it is proposed to allow the Board to determine at what point, if any, those other organisations should be notified of the investigation.

However, where those organisations were notified, the legislation would require them not to further disclose that information, except for the purposes of taking any action in accordance with the anti-doping policy of the organisation.

The Board would have the power to conduct the investigation in such manner as it thinks fit. It could for the purposes of the investigation obtain information from such persons, and make such inquiries, as it thinks fit.

If it decides not to investigate or to stop investigating a matter, it would be required to inform the person being investigated, the complainant (if there has been a complaint) and (if another organisation has been notified of the investigation) that organisation of the reasons for the decision.

Its investigations would be conducted by its delegates, who would make a formal report to the Board. It would be required, if it is to make a finding that is adverse to any person as a result of the investigation, to give the person an opportunity to make submissions about the matter.

If the Board approves the report and the report finds that the person under investigation has no case to answer, a copy of the report would be provided to the person under investigation, the complainant (if there has been a complaint) and -- if another organisation has been notified of the investigation -- that organisation.

If the Board approves the report and the report finds that the person under investigation has a case to answer, a copy of the report would be provided to the person under investigation, the complainant (if there has been a complaint) and the relevant sporting organisation(s), the ASC, ASDA and WADA.

Provision of the reports once completed to these people or organisations is in line with the Code.

Occasionally there are calls for public release of details about doping allegations and investigations conducted into those allegations. This can include calls for release of information before an investigation is completed. However, public disclosure of information about investigations raises difficult questions of balancing the need to protect the privacy and reputation of individuals in the face of unsubstantiated allegations and the need for transparency to maintain public confidence in the investigations system. It is proposed to give the Board some discretion to release information publicly.

Disclosure of Customs information between bodies

There are many cases each year where prohibited substances or methods are either sent to people in Australia through the mail from overseas or where people are in possession of such material on arrival in Australia. Current information disclosure provisions enable Customs information to be passed to the ASC, which, in certain circumstances can then pass that information to sporting organisations (Part VIIA of the Australian Sports Commission Act 1989). Customs information can also be passed to ASDA for the purpose of deciding who to request to provide a sample (section 67AA of the ASDA Act). This process is separate from any decision by Customs to prosecute a person.

Information received from Customs is important in the fight against doping in sport as it may be evidence of anti-doping rule violations. However, the information of itself is often not enough to establish a violation; for example, a parcel from overseas addressed to an athlete does not prove that the athlete knows of the contents of the parcel. Further

inquiries would normally be necessary to establish whether a person had a case to answer.

Accordingly, it is proposed that Customs information would be passed initially to the Board, which would have discretion as to whether to pass that information on to the ASC or a sporting organisation.

In some cases, the Board may decide to investigate the matter first and decide to only pass on information in the event that the competitor is found to have a case to answer. This procedure would be designed to ensure that raw Customs information, which can cause substantial damage to a person's reputation, is not released while inquiries are undertaken.

Relevant Customs information would still be supplied to ASDA to assist it in deciding who to request to provide a sample.

Board powers

It is proposed that the Board would have some powers to compel witnesses to attend and answer questions or produce documents where there are reasonable grounds to believe that information will assist in the investigation. These could include the power to give a notice summoning a person to attend before a delegate to produce documents or to answer questions; and examine the person on oath or affirmation.

It would be an offence with a maximum penalty of one year's imprisonment for a person required to answer a question or to produce documents to refuse or fail to take an oath or make an affirmation, answer a question that the person is required to answer or produce a document that the person is required to produce.

The offence would not apply if the person has a reasonable excuse; for example if the answer to the question or the production of the document would tend to incriminate the person.

The examination of a person would be required to be conducted in

private, but the person would be entitled to have an adviser present at the examination.

A record would be required to be kept of any examination and the person would be entitled to be given a written copy of the record.

The legislation would also provide that civil proceedings do not lie against a person in respect of loss, damage or injury of any kind suffered by another person because of any such acts done in good faith as the making of a complaint or the making of a statement to, or the giving of a document or information to, the Board in connection with an investigation.

Under section 137.1 of the Criminal Code Act 1995, penalties (including imprisonment) would apply to the provision of false or misleading information to the Board.

Delegates

The Board could act through delegates, who could be its members, its staff or accredited investigators who have been contracted by the Board.

It would manage an accreditation process for investigators, including the development and publication of guidelines and rules for investigation of doping allegations and criteria for accreditation. Potential investigators would be required to demonstrate their skills and qualifications to achieve accreditation and maintain them in order to maintain accreditation. Further details are set out below.

Accreditation

The Board would be required to formulate an accreditation scheme for the accreditation of investigators.

The accreditation scheme would empower the Board to make decisions accrediting and varying or cancelling the accreditation of investigators. The accreditation scheme would make provision for an investigator to surrender the accreditation. It would

make provision for the keeping of a register of investigators accredited under the scheme. In particular, it would make provision for:

- the register to be kept in such form and manner as the Board directs
- persons to inspect the register
- persons to obtain information contained in the register
- fees to be charged by the Board for such an inspection or for providing such information.

The accreditation scheme would be a disallowable instrument subject to tabling in, and disallowance by, each House of the Parliament.

It would empower the Board to accredit an investigator, subject to one or more conditions specified in the instrument of accreditation. It would also empower the Board to impose further conditions to which the accreditation is subject and revoke or vary any condition.

A condition of an accreditation could make provision for or in relation to a matter by conferring a power on the Board. For example, a condition could require that an investigator comply with certain protocols approved by the Board.

The Board would be required to formulate rules of conduct relating to investigations and the legislation would provide that compliance with the rules of conduct is a condition of accreditation. The rules of conduct would be a disallowable instrument subject to tabling and disallowance by each House of the Parliament.

Enforcement

The current system in relation to enforcement and hearings would be retained. After the sporting organisation receives a Board report which finds that a person has a case to answer, the organisation would act to issue an infraction notice and the person could either accept the infraction or seek to proceed to hearing.

If the person decided to proceed to hearing, the Board would be responsible for presenting the case to the hearing body and ensuring that all relevant evidence was made available to the panel, including obtaining further evidence if that became necessary during the hearing process.

Fresh allegations against the person in question or others arising in the course of the hearing would be subject to separate investigation by the Board.

Decisions of the Board would be subject to judicial review under the *Administrative Decisions (Judicial Review) Act 1977* in the same way as decisions made under any Commonwealth legislation.

Doping infraction notices in the cases of positive tests or failure to comply violations are currently issued by the relevant sporting organisation, once ASDA has listed the violation on the Register of Notifiable Events (RNE). The Australian Government does not propose to change these arrangements.

However, it is proposed that the Board would take forward to hearing all cases where a doping infraction notice has been issued, including RNE cases. This would ensure that all doping hearings are handled consistently and remove the need for sports to bring evidence against their athletes in any doping hearings.

Footnotes

- 1 Broadly, a competitor or any coach, trainer, manager, agent, team staff, official, medical or para-medical personnel working with or treating a competitor. For further detail see 'Who should be subject to investigation?' in this paper.
- 2 Under subsection 2(1) of the ASDA Act, a 'scheduled drug or doping method' means a drug, or a doping method, included in a schedule set out in a drug testing scheme. Details of the drug testing schemes are set out in the Australian Sports Drug Agency Regulations 1999. A 'doping method' is defined in subsection 2(1) of the ASDA Act as the manipulation or substitution of any human biological fluid or tissue or breath or the use of a substance in a manner that is capable of concealing the use of a drug by the person concerned.
- 3 Tampering with a sports drug matter is defined in section 4A of the ASDA Act. A sports drug matter includes the requesting, collection or handling of samples or information under drug testing schemes and arrangements.

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Alcohol and sport: Same again?

by Maurie O'Connor

When it comes to dealing with issues relating to alcohol and sport, we seem to just keep going for the same old things over and over again. The only thing that changes is the price - the price of our inability to make some significant and sustainable changes that may contribute to culture change and have enough meaning and relevance for sportspeople to initiate any behaviour change. This article examines the connection between alcohol and sport, its implications and some of the latest responses, including a new initiative by Sports Medicine Australia.

Fermentation

Alcohol is part of Australian history and culture. It is an established part of our socialisation and an indicator of our rites of passage. For nearly every social occasion or celebration, alcohol is an important ingredient. It is not surprising then that alcohol is also a major part of our sporting culture and sporting heritage. Having a beer and watching the footy or cricket is an established Australian pastime. Alcohol has always had a close association with sport in Australia at all levels — spectator, player, administration and promotion. Alcohol features heavily in post-sport celebrations and has particularly strong links to team sports.

Breweries and distillers have always been major sponsors of teams and significant sporting events. A whole range of products are now available that promote various forms of alcohol and brand names along with sporting teams, codes and events. Billions of dollars are tied up in this connection, which is usually regarded as having a mutual benefit for both sport and the

alcohol industry. Alcohol promotes sport and sport promotes alcohol.

“Drugs” and Sport

Much of the research and focus on drugs in sport has concentrated on the use and problems of performance enhancing drugs. There is no doubt that this issue captures the headlines, stirs emotions and creates righteous indignation. This is particularly so leading up to and during Olympic Games and the last Games in Athens were a good example. In fact, however most of the problems and much of the adverse publicity surrounding athletes that has continued to occur over the years has been with the use of recreational drugs, mainly alcohol.

There is a long history chronicled in our press of embarrassing, illegal and abusive behaviours by sportspeople relating to excessive alcohol use.

Despite that history we still continue to have footballers of all codes behaving badly, cricketers making bad calls and individual athletes being “tired and emotional” on a regular basis. Not much has changed.

The party goes on

Alcohol advertising in sport is still going strong and there are few governments that are considering any limitations. The industry would argue that the use of their logos and brands is not intended to recruit new customers, especially young ones, but on the other hand their opponents would argue that sponsorship is all about making people associate alcohol with fitness and success.

The implications for this association

between sport and alcohol have never really been fully debated in the same way that they were for the connection between sport and tobacco. As we know, the debate with tobacco and sport resulted in the banning of tobacco advertising in sport and similarly the call to do likewise with alcohol has come from many sources, particularly those within the public health area.

However, the case against alcohol advertising in sport is much more equivocal. The reasons for this have to do with exactly those strong sporting and cultural traditions relating to alcohol that we have been talking about. Also there is a difference in the health effects, which makes alcohol consumption low risk at certain levels low risk, compared to tobacco smoking, which presents significant risk at any level. These and other factors give alcohol that much more acceptability.

Alcohol advertising has always been able to hit some receptive chords in a population that is only too willing to believe that “they’ve earned a thirst”. The use of alcohol as a social lubricant, a “bonding agent” and a facilitator of engagement with the opposite sex are some of the aspects of alcohol use that advertisers use to tap prime psychological needs. When portrayed in an amusing way, these ‘aspects’ of alcohol use, along with a sporting link, have many of the ingredients that appeal to young Australians — a winning formula.

Consequently the main debate around alcohol advertising is occurring with under-age drinking and new forms of alcohol that are more appealing to young people. The important issue here is that many of those young

people also play sport. The effects of alcohol on sporting performance have never become part of that debate, but are crucial in initiating behaviour change with young people who do play sport.

Here's to the game

Unfortunately there has not been a lot of research dealing with the use of alcohol by athletes in Australia and its effects on their sporting performance. Some of the research from the United States has found higher levels of alcohol consumption among American college athletes than their non-athlete peers. At least two studies in Australia in the 1990s with AFL and Rugby League footballers have found binge drinking rates of up to 30 standard drinks in a session.

The evidence seems to suggest that, while being involved in sport may promote healthier behaviours and attitudes in early adolescence, it may not necessarily provide an environment for developing responsible drinking practices in late adolescence and young adulthood. The surveys with athletes have indicated that their knowledge regarding the effects of alcohol on the body was poor and that their consumption of alcohol in winning celebrations tends to be risky.

A recent study by Shelly Rowe at the Australian National University found that 60% of male and 50% of female athletes reported binge drinking on at least one of their last two drinking occasions. She also found that 96% of females competing at national and state representative levels reported binge drinking on either of their last two drinking occasions.

The only thing that seems to have changed in the last 10 years is the form of alcohol that many young people are now drinking. The consumption levels and patterns, the lack of knowledge and awareness, and the behaviours that often make the papers are still there.

One More?

Many of the responses to this problem have tended to be reactionary to say the least. They have often tended to simply place all the responsibility with individual athletes, rather than accepting that cultural change is also the responsibility of sporting bodies, coaches and administrators.

Those responses have mainly lacked a more comprehensive approach that targets the concerns of sportspeople as well as their behaviours in social settings. Providing alcohol and drug information to athletes is simply not enough unless it is presented in a sporting context with meaning for their personal situations. If education is supported by a policy process and administrative endorsement in sport, then change is possible.

A comprehensive approach should involve a prevention element including policies, codes of conduct or contracts, as well as a multi-level educational approach using both formal and informal methods. It should also involve an element of early intervention, which trains coaches and administrators to recognise and respond appropriately to warning signs and relate problems before they result in crises.

Something Different?

Some recent initiatives have sought to take a different approach. All are aimed at different sporting groups and have different intervention approaches.

The Good Sports Program

conducted through the Australian Drug Foundation has been working with community sporting clubs which serve alcohol. The program, conducted mainly in Victoria, uses a 'responsible service of alcohol' and policy approach within the licensed sporting clubs. It also seeks to raise awareness of the issues relating to alcohol and sport.

"What's the Score" is the Australian Institute of Sport's alcohol and drug education program for elite athletes. The program targets both athletes and coaches and is supported by a booklet aimed at the athletes and a manual for presenters.

Tip The Balance - Alcohol Management in Sport is a new initiative by Sports Medicine Australia which is aimed at athletes at the sub-elite level. It includes an education program for sportspeople as well as training for coaches and administrators. The education is supported by a Tip The Balance brochure. A training manual, CD-ROM and other web-based material are now in development.

Last Drinks

Despite these recent developments there is still a long way home and very few designated drivers. Comprehensive approaches still need champions at all levels. SMA can now be said to have taken on that mantle with Tip The Balance, and its development will be worth watching. Cultural change is a slow process but the groundwork has been laid in 10 previous years of work with athletes that has informed the Tip The Balance development.

What we have learnt in those years is a few simple facts. For sportspeople to be interested in messages about alcohol they must be in a context that relates to their own experiences and which relates to their sporting performance. It's not rocket science, but it could be rocket fuel.

Maurie O'Connor is Senior Project Officer, Alcohol Management Project, Commonwealth Department of Veterans' Affairs

Uncovering the secrets of The Don

Bradman reassessed

By Paul Glazier, Keith Davids, Ian Renshaw and & Chris Button

Across the world, sport science support programmes have been set up to help world-class sportsmen and women develop their skills and surpass the performances of their peers. But how did athletes of bygone generations cope without this support? What can modern-day athletes, and their coaches, learn from the early experiences and activities of past greats? In this article, we consider whether or not sport science can provide some answers to these questions by examining the factors underpinning the unique batting ability of one of the truly great performers of relatively modern times, Sir Donald Bradman. We also consider some of the training equipment and practice strategies used by today's leading cricketers, and question whether they are more advantageous than those of Bradman's era. In attempting to piece together understanding of the iconic Australian's cricketing development, we blend a mix of theoretical principles, experimental data and anecdotal evidence from the sport science and coaching literatures.

Contextualising Bradman's record-breaking career

Bradman finished his international career with a batting average of 99.94 runs per innings, a record that is still at least 40-50% better than any other batsman in the history of the game. Comparing player performances across eras, however, is fraught with difficulty and answering questions like: 'How do current Test batsmen measure up to the legends of yesteryear?' and 'Can there ever be another Don Bradman?' provides science with a complex challenge.

Recently, statisticians have attempted cross-generational performance comparisons of legendary sportsmen and women and, in cricket, Dickson et al(1) undertook a statistical analysis of all Test batsmen over a 120-year period between 1877-1997. By plotting the coefficient of variation of batting averages across eras (eg, pre-World War I, pre-World War II, 1946-65, 1965-1979, the 1980s and the 1990s), Dickson et al¹ showed that variability had decreased over time and that a modern player would need to average approximately 77 runs per innings to match Bradman's career batting average statistically. An analysis of modern players, however, shows that no current Test batsman is able to boast this figure, with the highest averages currently belonging to Matthew Hayden (Australia) 58.14, Rahul Dravid (India) 58.09 and Sachin Tendulkar (India) 57.39.

Dickson et al(1) invoked the ideas of the eminent evolutionary biologist, Stephen Jay Gould, for interpreting their modelling work. Gould(2) developed the evolutionary theory of punctuated equilibrium to describe how long periods of evolutionary stability for biological organisms are broken by sudden, shorter spurts of dramatic evolutionary change, the latter resulting from external perturbing forces. Gould's² theory contrasts with Darwin's traditional perspective that portrays evolution as a slow, steady process occurring at a relatively constant rate and, as we note below, is precisely the sort of framework that may be able to explain sudden jumps of 40-50% in cricket batting performance. Indeed, Gould(2) alluded to the baseball hitting average of 0.400 to exemplify these theoretical ideas and sport is

littered with examples of punctuated equilibrium from Fosbury's flop technique in the high jump, to Bjorn Borg's heavy top-spin forehand drive and the double-hitch kick long jump.

In the context of this article, these ideas lead to key questions such as: Why was Bradman so much more successful than anyone else? What was his secret? Was he simply a 'one-off genius' or is it possible that a cricketer of a future generation could emulate his amazing achievements?

The modelling of Dickson et al¹ raises the question whether or not another Bradman will ever emerge in the modern era, but reference to the theory of punctuated equilibrium suggests that this possibility is likely to occur as a result of sudden technical innovations produced by an individual performer. For this reason, it may be useful to gain an insight into Bradman's own technical development and practice strategies to ascertain what innovative, perturbing forces were at work.

What made Bradman great?

Since his retirement from the game, many explanations for the Don's expert batting and vast statistical superiority have been posited in the 'popular' press, media and coaching literature, but science is revealing that many of these claims are erroneous or unsubstantiated. For example, it has often been suggested that Bradman had better eyesight and faster reactions than his nearest rivals. However, he was discharged prematurely from the Australian Army during World War II for having defective eyesight – according to

Hutchins³, his release was due to fibrositis – and when he submitted himself for psychophysical tests at the University of Adelaide, it was found that he had a slightly slower reaction time than the average University student⁴. These facts are unsurprising given the well-documented findings that top-class athletes do not have exceptional perceptual systems and visual reaction times compared to their less accomplished counterparts⁵. Moreover, it has been reported that high-calibre athletes have the same incidence of visual defects as the normal population; about 10% suffer from problems of short- and long-sightedness and other weaknesses⁶. Other psychological factors have been implicated in Bradman's success, such as his supreme powers of concentration and mental toughness, but, although clearly important, these factors alone are unlikely to explain the large gulf between him and other batsmen.

Bradman's 'rotary' technique

Perhaps a more likely explanation for Bradman's success, gaining favour with top coaches, resides in his 'unorthodox' batting technique – a possible disequilibrating perturbation in the sport. Indeed, on the basis of the insights of Bradman himself and eyewitness accounts of keen observers, combined with original film and video footage, and a study conducted by sport scientists at Liverpool John Moores University in the UK, Shillinglaw⁷ concluded that the single most important factor underlying Bradman's outstanding run scoring record was his unique 'rotary' technique.

Most coaches emphasise the importance of grip, stance and back-lift as being the foundations for successful batting. Traditional coaching emphasises that the standard grip is one where the bat handle is held with the hands together, with the firmer top hand about 25 mm from the top of the handle. The hands are positioned so that the 'vees'

formed by the thumb and forefinger of each hand are in line with each other, pointing between the splice and the outside edge of the bat. During the stance, the bat should be placed just behind the back foot. The conventional back-lift should enable the bat to be taken back in a line from wicket to wicket with the top hand taking control. The front arm should be extended backwards to give a wide sweep with minimum flex of the elbow⁸.

Bradman adopted a grip that was not consistent with the coaching manual, having the 'vee' of his left hand in line with the splice of the bat.

In comparison, the key differences between these basics and Bradman's batting technique are highlighted by Bradman in his coaching book, *The Art of Cricket*(4). Bradman adopted a grip that was not consistent with the coaching manual, having the 'vee' of his left hand in line with the splice of the bat. Bradman's stance was also unconventional, involving closure of the face of the bat and positioning it between his feet. Similar differences were observed in his back-lift as he levered the bat up by pushing down with the top hand, whilst using the bottom hand as a fulcrum. As it neared the top of the back-lift, Bradman manoeuvred the bat through a continuous arc and back towards the plane of the ball during the downswing in preparation for impact.

According to Shillinglaw(7), this technique, which was putatively developed through long hours practicing his childhood game of striking a fast-moving golf ball with a cricket stump, afforded Bradman superior balance, shorter movement times and enhanced bat speed through the striking zone than more conventional batting techniques.

It is also interesting to note that Sir Jack Hobbs, arguably the greatest English batsman ever, extensively

practiced a similar game during his formative years⁷. Thus, although the old adage 'practice makes perfect' carries some weight in the quest to acquire skill, it seems that what you do during practice counts for far more than merely time serving the long hours needed.

Why did this type of unorthodox practice regime lead to such outstanding success and can talent development programs across the world learn anything from these experiences in developing the future world-class stars of sports? It seems that creating the right type of practice environment is important for developing the Bradmans of the future. What does the scientific sub-discipline of motor learning tell us about how to structure and organise practice environments for efficient and effective learning?

It seems that dynamical systems theory, allied to the insights of the Russian physiologist and biomechanist, Nicolai Bernstein, whose research accounts and stimulating ideas were translated into English in 1967, are proving invaluable⁹. His ideas, combined with powerful theoretical paradigms in science such as chaos theory and the sciences of complexity, have been integrated with concepts and tools from dynamical systems theory to re-shape our understanding of movement behaviour¹⁰.

Dynamical systems are examples of nonlinear systems operating in regions of state space far from equilibrium, providing them with an appropriate amount of metastability. Dynamical systems theory has been successfully applied to the study of coordination in nervous systems and movement control^{11,12}, movement development^{13,14} and skill acquisition¹⁵. In particular, the dynamical systems framework has influenced the way that movement scientists view inter- and intra-individual variability in motor performance, as a function of learning and development across the lifespan. Bernstein⁹ focused attention on processes of movement coordination and also noted the incredible

amount of variability exhibited over performance repetitions as individuals engaged in even the most repetitive of tasks such as hammering a nail.

The role of constraints in structuring technique variability

Traditionally, the study of motor behaviour has seen a tendency to operationalise variability with measures of variance in motor output (eg, standard deviation around the distribution mean of a dependent variable measured over repeated trials). From a cognitive science perspective, scientists seeking support for the concept of motor invariance provided a narrow interpretation of variability in movement as evidence of noise or random fluctuations at different levels of the movement system (eg, anatomical, mechanical, physiological).

This traditional emphasis led to the idealising of the notion of 'common optimal movement patterns' towards which all athletes should aspire, typically a performance model provided by a leading performer of the day. For example, the search for motor invariance implies that all cricketers should adopt a single optimal batting stance and technique, with the distinct possibility that the precious individualised practice solution of Bradman would have been 'coached out' of his repertoire at an early age.

Rather than being undesirable, variability of technique can be viewed as exemplifying functional adaptive behaviours of athletes, since a consistent outcome can be achieved by different patterns of joint relations owing to the dynamics of the joint biomechanical degrees of freedom.

Ideas from chaos theory indicate that a defining feature of a chaotic system is that deterministic processes can drive fluctuations in system output that apparently seems random. With such a view, noise may have a positive role in preventing a system from becoming too stable in complex

environments so that functional movement solutions may be found.

For example, Bradman has reported adapting his technique when playing defensive strokes from outside the line of ball flight to lessen the chances of edging the ball to the slips against swing and seam bowlers⁴. Furthermore, there is growing evidence that the nature of movement variability is driven by the interaction of the various sources of constraint on action, and this leads to the uniqueness of system dynamics for a particular performer under a specific set of task constraints. This task-specific view may provide a better framework for understanding the role of inter- and intra-individual variability in the provision of feedback, diagnoses and treatment interventions in human movement by sport medicine specialists¹⁶.

Both Bradman and Tendulkar shared two important commonalities that may account for their tremendous achievements.

Movement scientists have also revealed the important role of perception in shaping and guiding sports techniques. In achieving successful coordination solutions, it is clear that various sources of perceptual information can act as degrees of constraint on the many motor system degrees of freedom. Obviously, the relationship between perceptual degrees of constraint and the motor system degrees of freedom can change quite dramatically in dynamic sports environments, emphasising how the coupling of information and movement needs to vary functionally during performance.

Owing to the mutually dependent relationship between the perceptual and motor sub-systems, unambiguous task-specific perceptual variables such as time-to-contact and place-of-contact can act as degrees of constraint and can be used to make fine-grained

adjustments; for example, as required during cricket batting strokes¹⁷. Even under the most severe spatio-temporal constraints, the formation of perception-movement couplings enables batsmen to get the bat in the right place at the right time to intercept the flight path of the ball. Acquiring these functional perception-movement couplings also enables grip forces to be modulated right up to the point of bat-ball impact, thus ensuring that the ball is struck at the right speed into gaps in the field¹⁸.

Past vs. present: Bradman v. Tendulkar

From this theoretical backdrop, it becomes clear that the specific constraints of his childhood game encouraged Bradman to adopt a technique that enabled the bat to remain highly manoeuvrable, therefore minimising lags in the way that his perceptual-motor system dealt with rapid environmental changes and ensuring that the ball could be played as late as possible.

With this in mind, it may be more useful to compare the technique and style of Bradman with those of modern players. Bradman himself identified Tendulkar as the batsman who resembled him most in technique (ie, his compactness, technique, stroke production). Bradman was renowned for his efficiency of play and was said to pay particular attention to the balance of risk and reward in his shot selection. Given the perceived similarities in the play of Bradman and Tendulkar, it would be of interest to examine the cricketing development of these two so-called 'child prodigies'.

Despite the generally-held view that both players were great players due to 'natural talent', a common feature of both players' development is their extraordinary emphasis on practice. Although great store is given to the fact that Bradman developed his hand-eye coordination by famously practising with a golf ball and cricket stump against a water tank, he also undertook much realistic cricket practice.

Although he is said to have received no 'formal' coaching, Bradman was brought up in a family and community that loved cricket. For example, his parents, particularly his mother, bowled at him from about the age of 9 or 10. Bradman also engaged in other makeshift games as a child, such as playing tennis or soccer against the garage door. He scored his first 100 in a school match aged 12. Interestingly, from age 15 to 17 Bradman played almost no cricket, concentrating on tennis¹⁹. At 17, he became a regular player in the local Bowral Cricket Club, and his first full season was notable for the 300 he scored in the last game of the season. At 18, the final stage and perhaps the most critical(3) of Bradman's initial development was completed when he joined St. Georges Cricket Club in Sydney and began to play in a high standard of cricket on turf pitches.

Similar to Bradman, Tendulkar was steeped in cricket from a very early age. At two-and-a-half years of age, he insisted that his nanny throw a plastic ball at him, which he attempted to strike with a dhoka or washing stick²⁰. Interestingly, during these early years Tendulkar only played cricket with a hard rubber ball.

At age 11, probably the most notable difference in the development of Bradman and Tendulkar took place: Tendulkar was provided with quality coaching from a well-respected coach. The great strength of his coach was that equal emphasis was placed on net practice and match play. Under his guidance Tendulkar was exposed to a quite remarkable level of intensity in his cricketing activities. On a daily basis Tendulkar undertook net practice between 7.30 am and 10 am. The rest of the day was spent in playing up to 13 different games across Mumbai, as the coach shifted him to the adjacent pitch as soon as he got out in one game³. Even this was not enough and on the occasions when Tendulkar was not playing in an organised match, he could often be seen practicing his strokes inside his house with a ball hung from a small net.

This level of commitment could explain why Tendulkar's relative development was much faster than that of Bradman. Although they both scored their first centuries at 12 years, Tendulkar scored his initial first-class century at 14²¹ and his first Test century at 17. By the age of 21, Tendulkar had scored seven Test centuries, compared with two from Bradman at the same age.

Chappell expressed little enthusiasm for the contribution of sport science to the development of the next generation of Australian cricketers and suggested that a "mafia" of academics and sport scientists with little playing experience had over-complicated training, creating regimented coaching structures, leading to the development of cricketers with little understanding of the game.

Both Bradman and Tendulkar shared two important commonalities that may account for their tremendous achievements. First, both players gripped their bat in an unorthodox manner. In Bradman's case, there was no coach to interfere or change his preferred style. In Tendulkar's case, his coach was sensible enough to follow the old adage: "If it ain't broke, don't try to fix it!" The very low grip of Tendulkar enabled him to select as his first bat one that his coach considered far too heavy (he still uses a 3lb 2 oz bat when most players use approximately 2lb 8oz-2lb 10oz). Second, and possibly the most important common factor, is the importance attached to demanding practice by both men. They both support the view that natural talent alone is not enough, but that you need to work incredibly hard to fulfil any inherent potential^{4,22}.

Implications for practice a nonlinear pedagogical approach

The qualitative data on personal experiences of skill acquisition and development in world-class cricketers, allied to recent theoretical developments in science, have strong implications for sports pedagogists and coaches, providing a new approach steeped in 'nonlinear pedagogy'.

Nonlinear pedagogy advocates that a key aim is to provide practice environments that enable individual athletes to couple together key sub-systems of the movement system (perceptual and motor sub-systems) during functional, goal-directed practice. Nonlinear pedagogical approaches encourage discovery learning, a more positive view of movement variability, and an emphasis on varying the task constraints of practice.

Such an approach may signal bad news for any strategy that attempts to focus on the practice and acquisition of a 'common optimal movement pattern'. For example, ball projection machines or bowling machines are often used to perfect an ideal batting technique in highly replicable conditions since coaches can control the speed, trajectory and direction of deliveries projected at batsmen. However, the use of bowling machines prevents learners from picking up relevant information during the bowler's run-up, bound and delivery stride, and therefore the timing of their introduction needs to be carefully considered.

A recent study²³ showed that using a bowling machine results in batsmen adopting different timing and coordination patterns for deliveries bowled by a real bowler of comparative speed.

Against a bowling machine projecting cricket balls at 26.76 m.s-1, batsmen attempted to couple the backswing to the moment the ball emerged from

the projection mechanism (0.02 ± 0.10 s) whereas, against the real bowler, the backswing started later (0.12 ± 0.04 s). Even though the timing of backswing initiation was different, results from other research on bi-phasic striking activities²⁴ suggests that the batsmen may have attempted to standardize the initiation of the downswing effectively to control the temporal duration of this phase of technique. However, the downswing commenced earlier when facing the bowling machine (0.32 ± 0.04 s) compared to the bowler (0.41 ± 0.03 s) showing that bat speed differed in the two conditions.

These differences led to a different ratio of time spent during the backswing and downswing when batting against the bowling machine (47:53 %) compared to the real bowler (54:46 %). Moreover, initiation of the front foot movement occurred 0.16 ± 0.04 s after ball release from the bowling machine and 0.14 ± 0.03 s after ball release by the bowler. Finally, the timing of the placement of

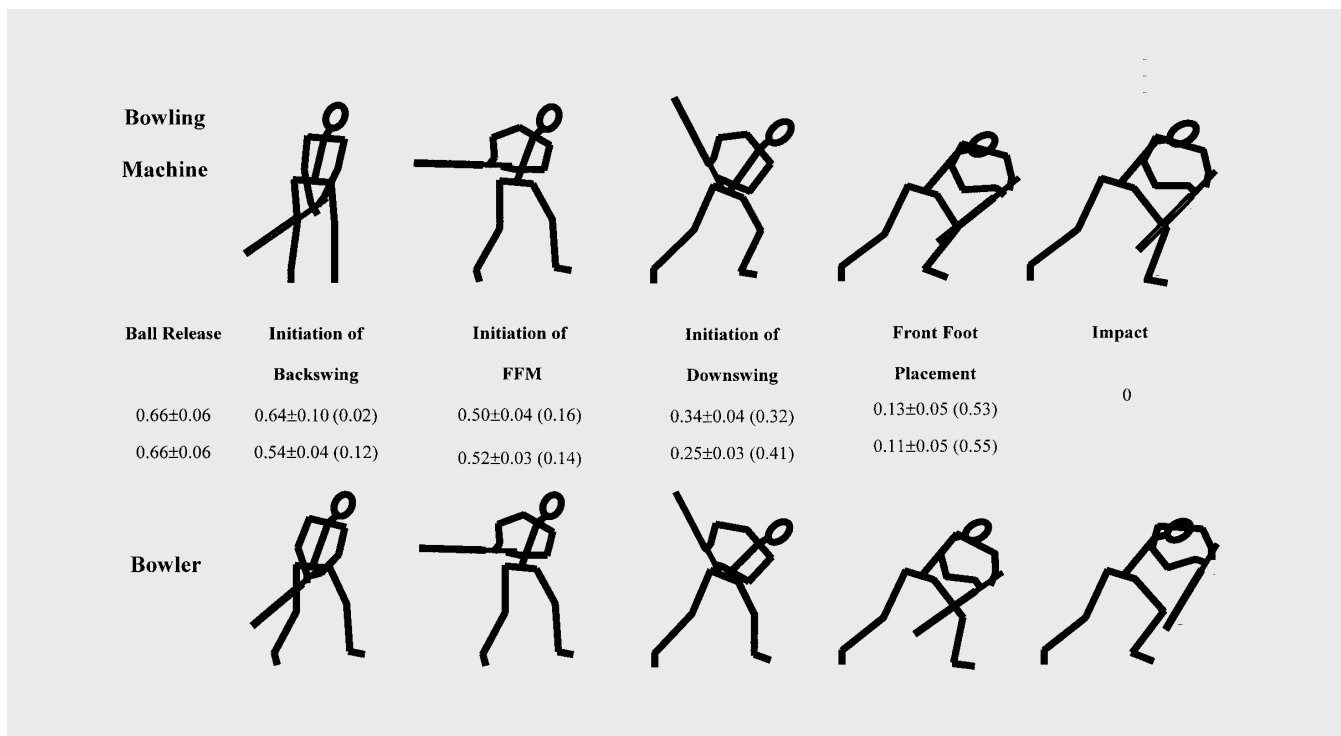
the front foot for the bowling machine (0.53 ± 0.05 s) was similar to the real bowler (0.55 ± 0.05 s).

When these differences are combined to the finding that the stride length was longer when facing the bowler (0.59 ± 0.06 m vs. 0.55 ± 0.07 m), it is clear that speed of foot movement is also affected by batting against bowling machines. It is important for batters to co-ordinate the bat swing movements to their footwork and coaching advice for batters suggests that backswing should be coupled to the movement of the front foot. However, these data revealed a greater correlation between initiation of backswing and front foot movement when batting against the bowler ($r = 0.88$) than the bowling machine ($r = 0.65$). In summary, these results suggest that coaches should think very carefully before using bowling machines in practice with expert players who gain a perceptual advantage from being able to utilise important information from bowling actions.

Interestingly, these ideas are being promoted from within high-level sport, too. Greg Chappell, one of the greatest cricketers of all time and now a highly respected coach, has criticised the use of bowling machines during practice. When interviewed by the Trinidad & Tobago Express and subsequently reported on cricinfo.com (22 June 2004), Chappell expressed little enthusiasm for the contribution of sport science to the development of the next generation of Australian cricketers and suggested that a “mafia” of academics and sport scientists with little playing experience had over-complicated training, creating regimented coaching structures,

Bradman showed that the best players are those who can overcome problems by coming up with specific solutions, often “breaking” conventional, technical rules.

Figure 1: Differences in timing and coordination of the phases of the forward defensive shot when batting against a bowler and bowling machine from the point of ball release to bat-ball impact. When batting against the bowling machine, the backswing was initiated virtually at ball release, with the front foot movement being initiated later. Against the bowler, the initiation of backswing and front foot movement occurred synchronously. Initiation of the downswing against the bowling machine was earlier and the downswing was slower than against the bowler. Front foot placement was temporally similar in the two conditions, but the stride was shorter and faster for the bowling machine condition. Smaller elbow angles when batting against the bowling machine led to different bat angles at impact. (NB. Figures are not to scale).



leading to the development of cricketers with little understanding of the game. He was particularly critical of the role of bowling machines during cricket batting practice, emphasising the importance of the batter adapting movements to key task information sources from bowlers. He argued that giving players too much technical information may only confuse them and cited a number of West Indian greats of the past, who could not explain “how” they played great shots, but were able to just “do” them.

On teaching players, he said: “To try to explain to them the biomechanics of it all would just confuse them. The more structure you get at an early age, the more it messes you up.” Chappell concluded thus: “We should not lose sight of the old fashioned methods of learning to play cricket by dismissing them out of hand, to replace them with unproven approaches like biomechanics that are not yet proven to be workable and that, in other sports like swimming and athletics, have been tried and discarded”.

Over-structured coaching to provide off-the-shelf coordination solutions may have limited value, since Bradman showed that the best players are those who can overcome problems by coming up with specific solutions, often “breaking” conventional, technical rules. In developing practice programs, sport scientists need to understand that variability is not error or noise to be eradicated but can be functional to successful performance.

The underlying science suggests that the feats of the Don are likely to be approximated, perhaps by an individual like Tendulkar, as long as coaches learn to respect individual differences by providing plenty of opportunities for young learners to discover their own fitting coordination solutions. Inter-individual variability needs to be better understood and player development programs should focus on manipulating the key constraints on each athlete, since each athlete should be considered as a unique individual.

In sport, it seems that the saying ‘nothing is more practical than a good theory’ warrants greater attention from scientists attempting to understand how to support the development of the highly skilled performers of the future. The sciences of chaos, complexity and dynamical systems theory may well hold the key to understanding the secrets of the Don in providing the theoretical rationale for structuring sports practice programs and using artificial aids such as ball projection machines to good effect.

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Sport Safety

Sports injury, sports safety 1997 to 2002 Department of Health and Ageing report

The Commonwealth Department of Health and Ageing has released *Sport Safety in Australia: an update – July 2003*, its update of sports safety activities and related issues from 1997 to 2002.

The report was prepared by Professor Caroline Finch, Director of the NSW Injury Risk Management Research Centre at the University of New South Wales.

It contains 11 chapters (and a large number of tables) dealing with a range of factors: from an overview of policy developments since 1997, through descriptions of the incidence and costs of injuries, to discussion of prevention and risk management strategies. Its appendices include a valuable bibliography of published sports injury prevention resources.

Sport Health presents this overview of the Report into an issue of deep interest to SMA members. The full version of the report is available from the Department of Health and Ageing's website at <http://www.health.gov.au/internet/wcms/publishing.nsf/Content/phd-pub-injury-sportssafety-cnt.htm>.

Injury prevention and control is recognised as one of Australia's six national health priority areas in 1994, the report says, and sports injuries are one of the particular contexts recommended for the targeting of prevention and control strategies.

"Since the mid to late 1990s, sports injuries have increasingly been recognised as a significant public health issue and one that needs a strong preventive approach. Accordingly, sports injury prevention has become an issue of concern to many government agencies.

"Since the early 1990s, there has been increasing attention given to the problem of sports injuries in Australia. Such injuries occur across a range of participation settings including formal sport, informal sport, school sport, active recreation, fitness activities and general physical activity. Sports injuries have now been clearly identified as a public health priority in Australia, though limitations of the available data have been well documented."

In 1995, the then Minister for Human Services and Health and the Minister for Environment, Sport and Territories established the Australian Sports Injury Prevention Taskforce (ASIPT) to promote a national perspective on sports injury prevention. In 1997,

ASIPT released SportSafe Australia: A National Sports Safety Framework.

Sport safety in Australia "provides an overview of the sports injury prevention initiatives that have occurred in Australia since the release of the National Sports Safety Framework. It focuses only on research into sports injuries and their prevention published since 1997, on the premise that earlier work informed the development of the National Sports Safety Framework."

Its focus is on broad-based community-level participation in sport in either formal (ie, organised sport) or informal (ie, social sport) settings, it says, because "this context is where the major public health burden of sports injuries, and the vast amount of participation, occurs". It brings together the findings of recent published research and other information on injuries sustained by non-elite participants in sport activity and the evidence for measures introduced to prevent or minimise injuries in this context.

As the focus was only on information that was directly related, or potentially related, to sports injury prevention or an understanding of the mechanisms of injury to inform the development of prevention strategies, projects related to the treatment or management of

sports injuries were not included in the report.

Similarly, information relating to recreational beach and water safety (for example, surf life saving or diving) or playground falls had also been excluded because they were related to the water safety or child fall prevention strategies, rather than prevention in the context of organised sport.

No federally-funded national lead agency

The report says that there was no federally funded national lead agency in Australia to guide sports safety policy and to consider provision of infrastructure.

"This means that there is no national group with the authority or representativeness to enable sustained action at this level.

"Many of the efforts to guide or direct sports primary prevention actions at the grass roots level of sports participation have largely come from, or been coordinated by, the health sector."

The ASC (through the AIS's Sports Science and Sports Medicine departments) had made a significant

contribution to understanding and addressing sports injury prevention and treatment issues at the higher and more competitive levels of participation through its support for the SportSafe program and funding of research projects.

National sporting organisations (through funding from the ASC) and national, state and territory departments of sport and recreation recognised and played a key role in addressing sport safety issues. Partnerships between health and sport agencies had shown that they were successful ways to address some sports safety issues. Some states had developed infrastructure to support local level sports safety initiatives, and some research activities, but a full impact assessment of these schemes had not been undertaken, the report said.

“Dissemination of injury prevention information and other health education strategies has become a popular strategy in Australia. There is no doubt that health and safety education is important.

“However, the effectiveness of sports-related injury prevention education strategies, either alone or in conjunction with other activities, in this country is largely unknown.”

SmartPlay

The SmartPlay message, delivered through the SMA’s networks, had been adopted by most States and territories and appeared to have some brand recognition. A key factor in prioritising injury areas was the existence or identification of key injury indicators. Such indicators were needed to demonstrate that policy and other changes had actually led to changes in health status over time.

“The sports injury area is seriously hindered in this aspect, as the quality of the data sources leading to key indicators is very poor.

“The major injury surveillance initiative since 1997 has been the establishment of the Australian Sports Injury Data Working Party to draw up guidelines for sports injury surveillance, the report says. This

work had resulted in the release of a working data dictionary, which had helped to inform coding schemes for ICD-10 AM and had assisted with a number of other surveillance projects.

Collecting information: little incentive, little coordination

“However, its value beyond these contexts is unknown. At present, there is little incentive to collect sports injury information and no specific body has the responsibility for doing so, or for coordinating such activity. This adversely affects both the quality of the data collected and its analysis.

“The large number of local level projects with their own data collection forms and unstandardised methodologies compounds the problem.

“Limited time data collection exercises are being promoted as injury surveillance activities but they rarely include an ongoing monitoring and recording function. It is laudable that sports bodies and community groups now see the collection of sports injury data as an important activity (and this is a major change since 1997) but ad-hoc data collections add little to our knowledge about sports injuries, except for at the local level.

“There is currently no lead agency to oversee or guide the future development of an Australia-wide approach to sports injury surveillance.

“Until such a body is established, injury surveillance activities in this country are likely to remain ad-hoc,” the report says.

It was not possible with the current available data, to compare sports injury rates across different States or other regions of Australia, nor was it generally possible to compare injury risk across sports. This limited the ability to rank sporting activities for priority setting. Furthermore, there was no baseline against which injury prevention gains could be monitored.

The Western Australian Sports Injury Study (WASIS) was the first prospective cohort study of sports participants

in Australia and had demonstrated a gradation of injury risk from highest in Australian football to lowest in netball (field hockey and basketball have intermediary rates of injury). Different patterns of injury, in terms of body region and nature of injury distributions, were evident when data from different sources were combined. Data collected in hospital settings corresponded to more severe injuries than information collected through general population surveys.

Generally, soft tissue injuries such as sprains and strains and injuries to the lower limb were the most common. Sports injury risk appeared to be higher in males and younger persons, which was likely to be related to participation levels and the types of activities that males undertook (eg, competitive football) compared to females.

Epidemiological studies had started to provide evidence for potential sports injury risk factors.

The WASIS had provided the best information about risk factors for sports injury in community participants of four sports. Identified risk factors included previous injury, particularly a back injury, and certain psychological profiles. Protective factors were being adequately prepared for the game by participating in formal training, having experience in a sport, being generally healthy and having high physical endurance.

Injury history was consistently identified as an injury risk factor, suggesting that poor/inadequate rehabilitation or injury susceptibility (for reasons unknown) needed to be addressed. It had been suggested that lower limb injuries, particularly in elite football, were related to ground conditions and surfaces or the pace of the game. However, specific examination of these factors in community-level sport had yet to be undertaken.

“There is a need to combine epidemiological, biomechanical and medical approaches to take sports injury prevention forward,” the report says.

The available estimates of the costs of sports injury were only, at best, very general indicators of the size of the problem.

“The figures are not comparable because of the different factors they consider and the different costs they include and exclude.

“They are not accurate because of the limitations of the existing data sources used to derive the figures but they do nevertheless indicate the size of the problem and the potential cost benefits to be gained from reducing it.”

The estimate by Egger in 1990¹ remained the only available figure for the cost of sports injuries in Australia, the report said.

“The lack of a more accurate and up-to-date estimate of the cost of sports injuries hampers efforts to determine cost-benefit ratios for the introduction of sports injury prevention measures.

“Furthermore, it limits the leverage that can be applied to government and other organisations to address the significant sports injury problem in this country.”

Prevention

The recognition of longer-term injury effects had implications for both injury prevention and promoting physical activity. There had been very few studies evaluating sports injury countermeasures both nationally and internationally. The report points out that this was one of the major gaps in current sports injury knowledge.

“This lack of information seriously limits the provision of evidence-based injury prevention guidelines for sports bodies, participants and parents.

“Considerable effort will need to be given towards addressing this major information gap if significant gains in sports injury prevention are to be reached over the next decade.”

International studies were beginning to provide strong evidence for the effectiveness of ankle supports and balance board training for preventing ankle injuries. Protective equipment was a popular strategy but its effectiveness had largely not been demonstrated in the field. Some major trials of the effectiveness of protective equipment were now taking place in Australia.

Safety strategies

Sport safety plans at the sports club, organisation and facility level had received attention over the past five years. There was also quite a considerable amount of descriptive information, with recommendations on personnel, training and education for several sports at this level.

But sporting clubs in Australia varied considerably in the extent to which they considered or implemented risk management policies, even in the few sports in which this had been formally investigated.

“Furthermore, the proportion of clubs applying risk management policies, as compared to emergency action policies or head injury management policies, is low.”

There were various barriers to the development, implementation and monitoring of these plans.

The collaborative, volunteer nature of sports clubs management had several associated barriers to risk management policies in these clubs. The issue of volunteers was even more of a problem in rural areas. Many clubs also lacked the knowledge and abilities to be able to perform the duties that a risk management policy would demand. Committees and personnel had designated roles in a specific sporting organisation, and at most clubs no personnel is assigned to ‘risk management’ duties.

On the question of protective equipment, the report points out that the use of, and factors relating to the use of protective equipment in most Australian sports was not known.

“Furthermore, whether the equipment being used in sports is suitably protective, fits accordingly, and maintained properly is largely unknown. Before efforts to promote protective eyewear, for example, can be effectively developed, it is important to determine players’ current behaviours, knowledge and attitudes associated with protective equipment and injury risk. Negative attitudes and beliefs towards the use of protective equipment need to be addressed.

Summing up, the report provides an update of sports safety initiatives that have been conducted in Australia since the launch of the National Sports Safety Framework in 1997.

“Because of the recent activities in the sports injury area, we now have a much better understanding of some aspects of sports injury and sports safety than at the time of National Health Goals and Targets Initiative in 1994 and the setting of this national Framework.”

The report said that there were still many aspects of sports safety where knowledge is still quite limited and other areas where it was practically non-existent.

It provided in table form a summary of the current status of sports injury knowledge, as at the end of 2002, comparing it to the earlier assessment of the National Injury Prevention Advisory Committee (NIPAC) in 1999. The table shows that, since the late 1990s, “there has been an increase in knowledge about:

- the burden/cost of sports injuries,
- some potential risk factors(though this knowledge is still quite limited),
- implementation of interventions, and
- barriers and motivators associated with the uptake of interventions.

“The only area where there is good evidence available is in the description of the nature of sports injuries.

“There continues to be no evidence about what interventions have been formally trialled, the effectiveness of such interventions or the cost-benefit analyses associated with their implementation.”

1. Egger G. Sports injuries in Australia: causes, cost and prevention. *Health Promotion Journal of Australia*. 1991;1(2):28-33.

Vietnam veterans: effectiveness of the “Heartmoves” exercise program

by Mike Climstein, Janet Currie, Leanne Otter, Mark DeBeliso and Kent J Adams

More than 59,000 Australians served in the Army, Navy or Air Force branches of the Australian military during the Vietnam war (1962 to 1973). Australian Vietnam veterans (VV) cohort health studies conducted in 1996¹ and 1997² involving more than 41,000 Australian VVs found a significantly higher prevalence of hypertension, cancers, diabetes and ischaemic heart disease than in other Australian men of similar age. Recommendations from the findings in these surveys included developing or amending standard operating procedures relating to prevention and management of significant health disorders in VVs. Despite numerous investigations studying post-traumatic stress disorder, suicide and cancer, a review of the literature failed to find a single published article pertaining to either the HeartMoves exercise program or exercise training and Australian VVs.

The HeartMoves program was initially designed as a safe low-to moderate-intensity exercise program for the general community which could also be utilised by individuals with risk factors for cardiovascular disease or type II diabetes. The Australian Vietnam Veterans Counselling Service (VVCS) of the Commonwealth Department of Veterans Affairs contracted the National Heart Foundation (NHF) of Australia (Newcastle branch) to provide the HeartMoves program to Australian Vietnam veterans. HeartMoves is intended to improve the heart health of Australian VVs by improving their cardiac risk factors and exercise capacity. Therefore, the purpose of this study was to evaluate the effectiveness of 10 weeks of participation in the NHF’s HeartMoves

exercise program on primary cardiovascular risk factors, exercise capacity and flexibility in Australian VVs.

Methods

Subjects

Vietnam veterans (n=19; Army, n=17, Navy, n=2) residing in metropolitan Sydney volunteered to participate in this study. Subjects were recruited by advertisements placed by the NHF and the VVCS. Subjects were fully informed of all procedures and inherent risks involved, and provided written informed consent prior to participation. Additionally, subjects were required to provide medical clearance from their general practitioner as stipulated by the HeartMoves program.

Prior to participating in the exercise, subjects completed a pre-exercise assessment form which asked respondents to report on their current level of physical activity and medical history.

Physiological assessments

Height was measured to the 0.1 m using a standard medical scale (model Health O Meter, Bridgeview, IL) with body mass assessed on the same device via the balance scale to the closest 0.1 kg.

The sum of five skinfold thicknesses (biceps, triceps, subscapularis, suprailiac and abdominal) using methods described by Telford et al³ were assessed with a Harpenden calliper to estimate body fat on all subjects. Next, following a five-minute quiescent period, subjects assumed an upright sitting position where

resting systolic (SBP) and diastolic blood pressure (DBP) were assessed via auscultation by an experienced clinical exercise physiologist. Resting heart rate was assessed via palpitation of the radial artery over a 60-second period. Flexibility was assessed by a standard sit and reach test and measured to the nearest 0.5 cm. The subjects were allowed three trials in succession with the best score recorded.

Submaximal exercise capacity

The HeartMoves exercise program stipulated that exercise was limited to submaximal intensities; therefore assessment of exercise capacity was assessed via the steady state submaximal exercise criteria as described by Jones and Campbell⁴. Subjects completed a three-stage continuous exercise test on both a cycle ergometer at 60 rpms (Monark, model 828 E) at 25 W, 50 W, and 75 W and on a LifeFitness (model 9500HR) motorised treadmill at 4.5 km.h-1, 5.5 km.h-1 and 6.5km.h-1. A cycle ergometer and treadmill were utilised, as the cycle ergometer tends to discriminate against leg strength and, for those subjects who suffer from either knee and/or hip disorders that cause problems with gait, the cycle ergometer allowed us the opportunity to investigate changes in their submax exercise capacity. The order in which subjects performed the cycle or treadmill test was randomised. Submaximal heart rate was assessed by telemetry and determined as the steady state heart rate during the last minute of each five-minute stage of exercise. Subjects’ RPE was also determined at that time

using the Borg scale of 0 to 10. At the conclusion of their peak stage of cycle ergometry, subjects were asked to cycle at 50 rpms at an output of 12.5 W for one minute. Recovery heart rate was assessed at the completion of this 60-second period.

Exercise training

The HeartMoves exercise program consisted of four components: warm-up (10 mins), muscular strengthening using light hand weights (20 mins), rhythmic endurance activities (20 mins) and a cool-down (10 mins). Each session lasted 60 mins and was supervised by the same accredited HeartMoves instructor who advised participants to exercise at an intensity of a rating of perceived exertion of three to five (equating to 50% to 70% HRmax). Static flexibility exercises for the calf, quadriceps, hamstrings, lower back and shoulder muscle groups were conducted during both the warm-up and cool-down periods. Group exercise sessions were conducted in an indoor, air-conditioned facility two days per week for 10 weeks. Subjects participated in the HeartMoves exercise two days per week with all subjects requested not to undertake any additional exercise outside of the training program and to maintain their “normal” daily activities. Additionally, there were no make-up exercise sessions available to participants.

Statistical analysis

A two-tailed T-test⁵ was used to determine statistically significant differences over time (Pre vs Post). Alpha was set (a priori) at 0.05 for determination of statistical significance.

Results

In the pre-exercise health assessment, nine subjects (47%) reported inadequate (ie, <3d/wk x <30mins) physical activity on a weekly basis (according to the American College of Sports Medicine recommendations).

However, as a group the VVs reported being physically active (prior to the HeartMoves program) at 3.39d/wk (range 0 to 7d/wk) at an average intensity of 3.1 (RPE scale 1 to 10). The pre-exercise health assessment identified a high percentage of subjects reported suffering from hypercholesterolemia (68%) and hypertension (53%), which are primary risk factors for heart disease. Other common health disorders reported in the survey included arthritis (58%), asthma (47%), general heart problems — ie, heart attack, angina, palpitations, bypass, pacemaker, valves or angioplasty — (26%), diabetes (16%) or kidney/liver condition (16%). The pre-exercise health assessment reported no instances of heart attack or stroke; however, two subjects did report suffering from chest pain/discomfort prior to initiating the HeartMoves exercise program but were allowed to participate by their doctors.

During the HeartMoves exercise program, two subjects had to be withdrawn from the exercise (and study) due to complaints of exertional angina. One has undergone coronary stenting, the other subject is pending further evaluation.

The average subject compliance to the HeartMoves exercise program was 65.0% (range 24% to 86%). Reasons (when provided) for non-compliance included illness (28%), illness requiring hospitalisation (3%), holidays (52%), VVCS programs for PTSD (7%) and “other” (9%). There were no make up exercise sessions available in the HeartMoves program. Table 1 depicts the subjects’ characteristics. Subjects at the completion of the study had a non-significant decrease in mass by 1.5 kilograms (1.7% decrease). Given the decrease in the subjects’ mass, there was a non-significant 2.2% improvement in BMI with the group pre-test average of 30.32 kg-m⁻² (classified as obesity class 1) improving to 29.66 kg-m⁻² (classified as overweight).

Table 2 depicts the resting haemodynamics, sum of 5 skinfolds and flexibility results. Significant improvements ($p<0.05$) over time were found in resting systolic blood pressure (6.9%), resting diastolic blood pressure (7.0%) and mean arterial blood pressure (7.0%). There was however a non-significant improvement (6.5%) in pulse pressure which is an independent risk factor for all cause and cardiovascular mortality. A significant improvement of 12.9% was also found in resting heart rate. The sum of five skinfolds also significantly improved over the 10-week period with the total skinfolds decreasing by 8.2% and the abdominal skinfolds decreasing by 4.8%. Flexibility, assessed via sit-and-reach, also improved significantly by 68.8% (approximately 2.8cm).

Table 3 depicts the changes over time in the submaximal exercise heart rates and rating of perceived exertion. Significant improvements in submaximal heart rates were found with the treadmill evaluations at 4.5km.h⁻¹ (7.5%), 5.5km.h⁻¹ (6.3%) and 6.5km.h⁻¹ (5.4%). However, there were no significant differences in RPE at these stages. Significant differences in submaximal heart rates were found at 25 W, 50 W and 75 W on the cycle ergometer (7.5%, 7.4% and 4.5% respectively), with a significant change in RPE at the 50 W (13.9%) and 75 W (23.7%) power outputs. There was also a significant improvement of 8.5% in the 60-second recovery heart rate.

Discussion

The results of this study demonstrate that 10 weeks of participation in the HeartMoves exercise program improved cardiovascular risk factors, exercise capacity and flexibility in Australian VVs. These results are similar to the results of Morey and colleagues⁶ who found improvements in submaximal heart rate (7%), resting heart rate (8%) and flexibility (11%) following a two-year supervised exercise program in older (65-74yrs) veterans.

Table 1. Subjects physical characteristics*

PARAMETER	PRE	POST	P VALUE (T-TEST)
Mass (kg)	87.82 (\pm 13.08)	86.31 (\pm 12.66)	NS
BMI ($\text{kg}\cdot\text{m}^{-2}$)	30.32 (\pm 4.54)	29.66 (\pm 4.39)	NS

Note: *Values expressed as mean \pm S.D., NS = Non significant

Table 2. Subjects haemodynamics, skinfold and flexibility results*

PARAMETER	PRE	POST	P VALUE (T-TEST)
Blood pressure (mmHg)			
Systolic	136.63 (\pm 11.12)	127.11 (\pm 10.09)	< 0.05
Diastolic	87.16 (\pm 7.03)	81.00 (\pm 6.94)	< 0.05
MAP	103.64 (\pm 7.25)	96.37 (\pm 7.16)	< 0.05
Heart Rate _{resting}	80.37 (\pm 9.11)	70.00 (\pm 8.89)	< 0.05
Skinfolds (mm)			
Sum of 5	108.01 (\pm 25.20)	99.14 (\pm 17.91)	< 0.01
Flexibility (cm)	- 4.11 (\pm 6.70)	- 1.28 (\pm 6.66)	< 0.01

Note: *Values expressed as mean \pm S.D., NS = Non significant

Table 3. Subjects submaximal exercise results*

PARAMETER	PRE	POST	P VALUE (T-TEST)
Treadmill .5km.h ⁻¹ heart rate (bpm)			
PE	99.67 (\pm 2.91)	92.17 (\pm 11.58)	< 0.05
	.72 (\pm .32)	1.28 (\pm .57)	NS
Treadmill .5km.h ⁻¹ heart rate (bpm)			
PE	107.06 (\pm 3.21)	100.22 (\pm 12.63)	< 0.05
	2.71 (\pm .72)	1.94 (\pm .90)	NS
Treadmill .5km.h ⁻¹ (n=15)			
heart rate (bpm)	116.27 (\pm 2.88)	110.00 (\pm 13.31)	< 0.05
PE	3.47 (\pm .30)	2.80 (\pm .32)	NS
Cycle ergometer 25W heart rate (bpm)	96.44 (\pm 3.24)	89.12 (\pm 11.63)	< 0.01
PE	.83 (\pm .04)	1.53 (\pm .87)	NS
Cycle ergometer 50W heart rate (bpm)	107.00 (\pm 4.48)	99.00 (\pm 12.33)	< 0.01
PE	2.94 (\pm .00)	.53 (\pm .01)	.05
Cycle ergometer 75W (n=14)			
heart rate (bpm)	113.21 (\pm 6.40)	108.07 (\pm 13.88)	< 0.01
PE	4.21 (\pm .19)	3.21 (\pm .19)	< 0.01
60sec recovery HR (bpm)	101.67 (\pm 2.01)	93.00 (\pm 1.29)	< 0.01

Note: Values expressed as mean \pm S.D., NS = Non significant

Although there are only two studies^{6,7} conducted involving exercise and VVs, the reported compliance of veterans participating in supervised exercise programs is quite poor at 47%⁶, and 53%⁷, which is not dissimilar to our findings (65%). It was surprising that more than 50% of the non-compliance was attributed to holidays, despite the VVs being aware that the HeartMoves program

was of limited duration with no opportunities for make-up sessions. Anecdotal information provided by a number of the subjects pertained to the perception that the HeartMoves program would be continued on a long-term basis and there was no concern of limited opportunity. The remaining studies available pertaining to VVs and compliance involved prescribed medications. Cramer and

colleagues⁸ found a compliance rate of 71% in VVs who were prescribed naltrexone for the treatment of alcoholism while Schectman et al⁹ found a similar compliance rate of 73% in VVs prescribed bile acid sequestrants.

The significant improvements in resting blood pressure (~9mmHg SBP and ~6mmHg DBP) and resting

HR (10bpm) may dramatically affect the risk of these VVs of developing hypertension and related cardiovascular problems. The benefits of improvements in skinfolds (particularly abdominal) is further supported by Yusuf and colleagues¹⁰ who have recently reported in the INTERHEART study that abdominal obesity was found to be a strong risk factor (greater than BMI) as a predictor for acute myocardial infarctions. Our findings suggest that the HeartMoves exercise program offers a cost-effective, non-drug therapy which positively influences the overall cardiovascular risk of VVs.

Additionally, the significant reduction in exercise heart rate, combined with the enhanced recovery time from aerobic exercise, enhances the ability of these VVs to perform activities of daily living (ADLs), work and recreational tasks at a lower cardiovascular risk. Since a majority of these VVs suffer from risk factors for heart disease, lowering the potential for a cardiac event due to stress from ADLs, work or recreational tasks is important.

Qualitative analysis¹¹ of our subjects revealed increased socialisation and reported levels of social support associated with HeartMoves participation. Participants revealed that they had been able to reduce levels of prescribed antidepressant medications and felt better able to deal with experience of post-traumatic stress disorder. These qualitative findings⁽¹¹⁾ support this study's physiologic results. The participants stated that over the course of the HeartMoves program, they felt more energetic, physically fit and less "overweight". Participation in the program was reported as offering the VVs a valuable way to access exercise and be able to relate to and bond with a group of men who shared similar backgrounds.

It is also important to note that these physiological improvements were attained with a moderate-intensity exercise program that can be safely performed by previously sedentary subjects with a variety of co-



morbidities. This is in agreement with other studies that have demonstrated the positive health benefits of moderate activity.

Based upon these preliminary results, we conclude that the HeartMoves program is an appropriate exercise program which is beneficial to the overall heart health of Australian VVs and warrants continued participation despite the long-term benefits yet to be determined.

Acknowledgements

The authors would like to thank the NHF (Newcastle branch) and the Harbord Diggers Memorial Club for their financial support of this project. We would also like to express our gratitude to Melissa Lowe for her assistance with the preparation of this manuscript.

Associate Professor Mike Climstein is with the School of Exercise Science at Australian Catholic University and Director of Rehabilitation at Harbord Diggers Memorial Club in Sydney. Dr Janet Currie is Head of the School of Exercise Science at ACU, where Leanne Otter is an Honours student. Associate Professor Kent Adams is with the Department of Health and Sport Sciences at the University of Louisville (US) and Assistant Professor Mark DeBeliso is with the Department of Kinesiology at Boise State University (US)

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From the President

This is the first time my Committee colleagues and I have had the opportunity to update SDrA members of our activities through the pages of Sports Health. We hope to contribute regularly in this way in future issues.

ACSMS2004

SDrA members contributed quite significantly to the medical component of the recent 2004 Australian Conference of Science and Medicine in Sport that was held in Alice Springs.

Dr Anita Green was the Conference Co-Chair and Dr Neville Blomeley was our representative on the Conference Committee.

SDrA activities centred on the provision of very practical workshops involving team travel, bracing principles and indications, on-field emergency medicine situations, and soft tissue and joint injection techniques where models were available to test and refine skills. The Emergency Medicine workshop, which was fully booked, was quite a highlight. Four groups of five participants rotated through four stations, and each station was set up with life-sized sophisticated interactive models and emergency lifesaving equipment that addressed emergency scenarios and allowed each participant a hands-on approach.

I would like to acknowledge and thank Laerdal Pty Ltd and St Andrews Hospital in Brisbane for providing the necessary components that made this such a spectacular success.

The conference itself was well attended by 270 delegates and the very full program offered something for everyone. The boutique nature of this conference encouraged interdisciplinary involvement so

that constructive practical ideas and information were able to be exchanged, future ongoing connections were able to be made and the value of a multidisciplinary approach in providing the most effective form of advice and treatment could be emphasised. It was also a great opportunity to catch up with colleagues and friends.

The Alice Springs Convention Centre proved to be an excellent venue of international standard and the social side of the conference was equally outstanding. The Conference Committee, SMA Board and SMA staff need to be congratulated for their organisation, implementation and smooth running of such a comprehensive program.

2005 Conference

Planning is well underway for next year's Conference which is to be held in Melbourne from 13 to 16 October 2005 and will incorporate the Third National Physical Activity Conference and the Fourth National Sports Injury Prevention Conference.

There is so much to be gained by attending the National Conference.

It is a once a year conference where there will be interaction with medical colleagues who have wide and varied areas of expertise and experience as well as our discipline group colleagues with whom we work in our practices, where new and practical approaches to injury prevention and management will be discussed, where the most up-to-date research will be presented, where practical skills will be able to be upgraded and where for a concentrated few days there will be access to world authorities in most aspects of science and medicine in sport.

It is an opportunity not to be missed. I urge you to mark this in your diary now and make the effort to attend. You will not be disappointed.

SDrA once again will be very much involved (through Dr Neville Blomeley who is our representative on the 2005 Conference Committee) in the planning of the medical component of the conference and I would take this opportunity to invite you to contact either Neville or myself if there are any topics you would like to see included. We are considering having several three-minute case presentations for interactive discussion. Please advise us if you have suitable cases that you would like to present.

Please note that the members' discussion forum is now accessible through the SDrA website at www.sportsdoctors.com.au to provide easy communication and discussion between members.

Membership of FIMS will be available at no additional cost to all financial members of SDrA from the beginning of 2005.

It is with great sadness that I note the unexpected and sudden death of Dr Bill Webb following his attending the 2004 Conference in Alice Springs.

Bill was a totally committed sports medicine practitioner and a highly respected colleague. Both at home and internationally, he will be remembered for his contributions to many different sporting organisations but more particularly for his outstanding services to rowing.

The team behind the teams at Melbourne 2006

The Melbourne Commonwealth Games don't take place until 2006, but preparing for them has already been well underway. A central part of the largely unsung background to the Games is looking after the athletes taking part. Gary Moorhead, CEO of SMA, talks here with Dr Peter Harcourt, Chief Medical Officer of the 2006 Commonwealth Games, about what the medical coverage of the Games entails.

GM: Can you provide us an overview of Melbourne 2006 Commonwealth Games?

PH: The Melbourne 2006 Commonwealth Games will be the biggest sporting event in Victoria's history. About 4500 elite athletes, representing 71 nations – or about one third of the world's population – will descend on Melbourne for 12 days of sporting competition from 15-26 March 2006.

The athletes will be competing in 16 sports across 24 disciplines across 31 competition venues.

GM: What is the role of the medical services?

PH: The medical services play an important part in the success of the Games. By giving athletes prompt and efficient treatment we will be able to allow them to focus on their competition.

As part of the Commonwealth Games medical services, a Polyclinic will be established at the Games Village in Parkville. This clinic will provide a range of services including general practice, sports medicine, physiotherapy, podiatry, optometry, dental care, imaging, massage, psychology and some specialist medicine: the works – all that is needed to support the athletes in their competition.

Each competition venue will also have an appropriately staffed medical centre to ensure that athletes can get attention when they require it.

GM: Will there be any new or different medical services available at the Melbourne Games?

PH: Based on experience from large sporting events, and the opportunities available, we will be implementing some new initiatives for the Melbourne 2006 Commonwealth Games.

We are also investigating a new element to the sports medicine program that utilises Australian sports medicine staff, especially physiotherapists and masseurs, and places them with visiting teams. This initiative will provide an improved level of service for the athletes and a unique experience for those sports medicine professionals involved.

In Melbourne, sports trainers will be included in our sports medicine volunteer program for the first time. Sports trainers will be an important part of the sports medicine teams at venues and will assist in ensuring initial injury management for all athletes.

You can see we are keen to make the Melbourne Games a worthwhile medical experience – not just participation in a major, high profile sporting event but also professionally stimulating.

GM: What about drug testing? Have we learnt anything from the Athens Olympics?

PH: The Athens Olympics raised the standard of drug testing with the introduction of blood testing and other technological advances. As can be seen by the large number of positive tests, including higher profile athletes and gold medallists, the drug testing programs are gaining strength and are winning the battle against drug cheats. The Melbourne Games will add to this battle with a rigorous drug testing program.

GM: Are there any events or athletes that you are particularly looking forward to seeing in action at the Melbourne Games?

PH: While I am looking forward to a range of events and individual clashes at the Melbourne 2006 Commonwealth Games, I will be particularly keen to see the Opals and Boomers in their first Commonwealth Games. I won't be able to sit on the bench with the Boomers but I will be court-side watching – loudly!

GM: Can the sports medicine community get involved with the Games?

PH: Yes, they can definitely get involved and there will be a variety of opportunities. It is important to understand that a large number and range of medical and health professionals are required to volunteer for the sports medicine program. Details are still being finalised and will be released as part of the Volunteer Program Launch in the first part of 2005.

Those medical professionals from all discipline areas who would like to register their interest in volunteering can do so at the Games website: go to www.melbourne2006.com.au and follow the link – 'Getting Involved'.

The joy of working in a large team should be experienced by all those who are interested and involved in sports medicine – it is great fun and extremely gratifying.

Being a part of the Melbourne Games will be a once in a lifetime experience not to be missed.

JSMS: Major expansion of the Editorial Board

The Editorial Board of the Journal of Science and Medicine in Sport has been expanded with 17 new members to broaden the Journal's coverage of injury epidemiology, physical activity epidemiology, sports physiology, sports psychology, biomechanics, exercise physiology, pulmonary physiology, motor control and skill acquisition.

Their appointment to the Board confirms the Editors' desire to confirm and extend the multidisciplinary and applied nature of the Journal, as well as add to its international representation.

In alphabetical order, the new members are:

Associate Professor Shona Bass of Deakin University

Dr Tim Carroll of The University of New South Wales

Dr Marijke Chin A Paw of the Free University of Amsterdam

Dr Jill Cook of La Trobe University

Dr Aaron Coutts of the University of Technology, Sydney

Dr Peter Eastwood of The University of Western Australia

Dr Damian Farrow of the Australian Institute of Sport

Dr Belinda Gabbe of Monash University

Dr Stephanie Hanrahan of The University of Queensland

Dr Paul Laursen of Edith Cowan University

Dr Anthony Leicht of James Cook University

Associate Professor Frank Marino of Charles Sturt University

Associate Professor Ken Nosaka of Edith Cowan University

Dr Mireille van Poppel of the Free University of Amsterdam

Dr Jo Salmon of Deakin University

Dr Ian Shrier of McGill University

Professor Peter Terry of the University of Southern Queensland

In addition, some long-standing members have decided to retire from the Board.

They are

Professor Bruce Abernethy

Professor Louise Burke

Professor Bruce Elliott

Mr Michael Kinchington

Professor Willem van Mechelen

Professor Lawrence Spriet

Associate Professor Julie Steele.

>> from page 29

Bill shared a vision with the late Dr David Garlick to improve medical practitioner education and skills in sports medicine practice. They produced at the University of NSW the annual two-week course that ultimately resulted in them organising the Graduate Diploma and Masters courses in Sports Medicine. From those courses, SDrA evolved.

Bill's knowledge, experience, practical and commonsense approach to sporting issues will be missed.

* * * * *

The SDrA Annual General Meeting was held on 8 October 2004.

Members of the Committee for the next year are

President

Dr Bill Straughan

Vice President and Secretary:

Dr Neville Blomeley

Treasurer

Dr Trevor Law

Committee Members

Dr Shane Brun, Dr Brendan de

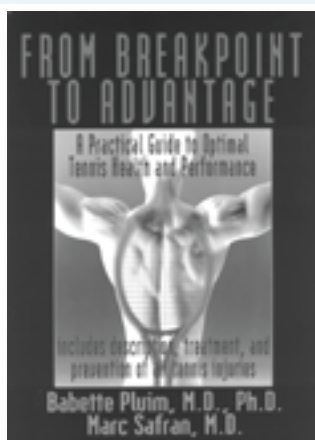
Morton, Dr John Estell,

Dr Maddy Martin, Dr Tom Mittiga.

Bill Straughan

President SDrA

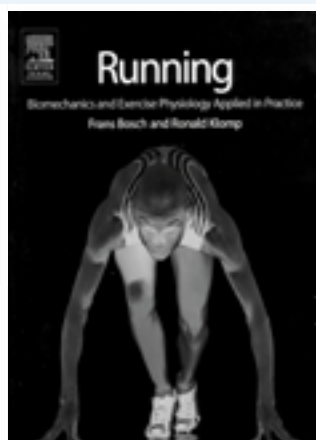
For your Library



From Breakpoint to Advantage: A practical guide to optimal tennis health and performance

Babette Pluim and
Marc Safran
Published by Racquet Tech
Publishing
(www.raquettech.com)
ISBN 0-9722759-1-6

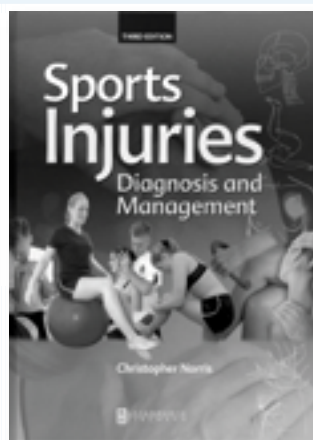
This "ultimate guide to sports medicine and physical training in tennis" (in the words of Todd S Ellenbecker) provides information on description, treatment and prevention of all types of tennis injury for players well as sports medicine professionals and coaches. It has a 6-part structure: Principles of injury prevention and rehabilitation; Complete inventory of tennis injuries; Medical issues; Special issues; Special tennis groups (juniors, wheelchair players, etc); and Managing and delivering tennis medicine programs. Topical subjects covered include heat stress, sports drinks, supplements, over-training, playing surfaces and doping.



Running: Biomechanics and exercise physiology applied in practice

Frans Bosch and
Ronald Klomp
Published by Churchill
Livingstone/Elsevier
Australia
(www.elsevier.com.au)
ISBN 0-443-07441-0

Running presents the latest insights on practical training techniques based on recent research on biomechanics and exercise physiology for runners and their medical support. Chapter subjects go all the way from discussing basic anatomical and biomechanical principles and the physiology of exercise to close analysis of running technique and strength training for athletes. The authors are well known coaches in The Netherlands.



Sports Injuries: Diagnosis and management

Christopher Norris
Published by Butterworth
Heinemann, distributed by
Elsevier Australia
ISBN 0-7506-5223-3

This the third edition of this well-known handbook, completely updated and extended, providing scientific information and clinical guidance for all involved in treating injured sports people. This addition has more than 440 line drawings and 146 photographs and plenty of format changes, the objective being to make it more visually and clinically informative. Its 20 chapters cover the biomechanics of injury, tissue healing, sports massage, taping, exercise therapy, first contact management, gait, and injury to trunk and upper and lower limb.

Year Book of Sports Medicine 2004

Roy J Shephard et al (Eds)
Published by Mosby in
cooperation with ACSM,
distributed by Elsevier
Australia
ISBN 0323020577

This year's selection of abstracts contains the customary huge range of interests. Some tantalising discoveries:

SMA regrets to announce the death of Dr Bill Webb, Secretary and President of the then ASMF in the late 1970s and early 1980s, one of the architects of the development of a full-time secretariat for the federation, and a pioneer with the late Dr David Garlick of ways to improve sports medicine practice by general practitioners.

Sport Health will publish an obituary of Dr Webb in its Autumn issue.

The Alice Springs “friendly” Masters Games

by Amanda Shipway

You will often hear it said “*There’s something different about the Alice Springs Masters Games*”. Perhaps it is the size of the town (27,000), the friendliness of the locals, or the sheer numbers of visitors who converge on Alice Springs for the bi-annual games. My belief is that it is hospitality, friendliness and assistance of more than 500 volunteers at the Games, 60 of whom are sports medicine volunteers.

Sports Medicine Australia NT Branch (SMA NT) under the stewardship of Dr Geoff Thompson, sports physician and Alice Springs Masters Games Medical Director, has been providing sports first aid coverage at the Alice Springs Masters Games for the past 10 games!

The sports medicine coverage model developed over this time, and perfected at other key sporting events such as the Arafura Games, has proven to be extremely successful. The model includes the construction of a 15-bed medical sports clinic constructed in the Traeger Park Swimming Centre and a 2-bed clinic at the netball and basketball stadiums. The clinics are staffed on a 10-hour rotational basis by a range of sports medical professionals.

In 2004, the sports medicine team consisted of a sports physician, Dr Thompson and four sports medicine registrars: Dr Greg Harris, Dr Kylie Sellwood, Dr Sandra Mejak, Dr Karen Soo and Dr Corey Cunningham. In addition, there were nine physiotherapists from across Australia, led by sports physiotherapist co-ordinator Pippa Tessmann.

A further 60 sports medicine-trained sports trainers were involved in the

coverage of the event through the week providing more than 2000 hours of volunteer services to the Games!

The majority of trainers were from Alice Springs which is fantastic and demonstrates a strong commitment to sports medicine in the Centre. A smaller number of trainers traveled to Alice from Darwin, South Australia and Western Australia to participate as volunteers and their assistance was appreciated.

Injury rates

In 2004 more than 4,500 competitors competed in the Games across 33 sports ranging from athletics to volleyball.

An average of 90 patients per day were seen by the sports medicine clinic, with return to competition rate, after treatment, in the range of 65% – 70%!

“The injury rates were exactly as we have come to expect over the past nice games with approximately 650 injuries assessed in the clinic,” Dr Thompson said. “By far the majority of the injuries reported were muscle injuries. In particular there were a high incidence of hamstring and calf muscle tears”.

The whole event from the Sports Medicine perspective was a great success.

This success would not have been possible without all the sports trainer volunteers, sports registrars and physiotherapists who worked tirelessly to provide the competitors with the best possible care.

In particular, I would like to mention Dr Geoff Thompson who has

coordinated the sports coverage at all 10 Masters Games; Pippa Tessmann, Physiotherapy Co-ordinator; Paul Dixon and Cliff Smith, Alice Springs Masters Contacts; Annie Davis, the sports trainer co-ordinator and all the sports trainers who volunteered over the week. Their efforts are greatly appreciated.

SMA NT Branch is currently negotiating with the Northern Territory Government to provide sports first aid coverage at the upcoming Arafura Games (14 – 21 May 2005). To register your interest, or to find out more about the Alice Springs Masters Games or upcoming International Arafura Games ring SMA in the Darwin Office on telephone: 89815362 or email: smant@octa4.net.au.

Amanda Shipway is Executive Officer of SMA NT.

Australian Conference of Science and Medicine in Sport 2004 Conference Awards

Sport Health congratulates the winners of the Australian Sports Medicine Federation Fellows Awards at ACSMS, Alice Springs, 2004

Asics Medal (Best Paper Overall)

Dr Tim Olds

(K. Ridley)

University of South Australia

Activity styles: A cluster analysis of children's activity patterns

Best Paper Awards:

Asics Best Paper (Clinically Relevant Conditions)

Mr Steve Saunders

(M.Coppieters, M.Magarey and P.Hodges)

Saunders Sports and Spinal

The University of Queensland

Low back pain and associated changes in deep abdominal muscle activation during human locomotion

Asics Best Paper (Performance Enhancement and Basic Science)

Mr Aaron Petersen

(K.Murphy, M.McKenna, R.Snow, D.Cameron-Smith, A.Garnham, R.Aughey and G. Leppik)

Victoria University of Technology

Increased Na⁺, K⁺-ATPase Gene Transcription Is Related To Depressed Na⁺, K⁺-ATPase Activity Following Acute Intense Exercise.

Asics Best Paper (Injury Prevention and Health Promotion)

Ms Christine Armit

(W.Brown, C.Ritchie, A.Marshall, S.Trust, A.Green)

School of Human Movement Studies, The University of Queensland

Promoting Physical Activity To Older Adults In General Practice

Asics Best Paper (Lower Limb)

Dr Kate Webster

(R.Siebold, J.Elliott, J.Feller)

Musculoskeletal Research Centre, La Trobe University

Graft Selection For Anterior Cruciate Ligament Reconstruction In The Female Athlete

Young Investigator Awards:

Ken Maguire Award for Best Young Investigator – Clinical

Mr Nick Potter

(P.Brukner, M.Makdissi and K.Crossley)

Centre for Health, Exercise and Sports Medicine, The University of Melbourne

Navicular Stress Fractures: Outcomes Of Conservative And Surgical Management

John Sutton Award for Best Young Investigator – Basic Science

Mr Fang Wang

(G.Murrell, M.Wang)

Orthopaedic Research Institute

Involvement Of C-Jun N-Terminal Kinase (Jnk) In The Oxidative Stress-Induced Tendon Cell Apoptosis And Matrix Degradation

Asics Award for Best Young Investigator – Lower Limb

Mr Adam Bryant

(E.Eiling, A.Murphy, W.Peterson, J.Kelly, E.Hohmann)

Central Queensland University

Effects Of Menstrual-Cycle Hormone Fluctuations On Musculotendinous Stiffness And Knee Joint Laxity:

Implications For Acl Injuries

NSW Sporting Injuries Committee Award – Best Young Investigator – Injury Prevention

Miss Ebony Scase

(J.Cook, M.Makdissi, B.Gabbe)

La Trobe University

Physical training programs reduce injuries in elite junior Australian Rules Football? Evaluation of an injury prevention strategy

ACSMS National Conference Report

by Angela Cox, SMA Conference Manager

On behalf of the 2004 Organising Committee, my thanks to all sponsors, speakers, trade exhibitors and delegates who supported the inaugural "boutique" Australian Conference of Science and Medicine in Sport in Alice Springs last October.

We have had extremely positive feedback, all attendees enjoying an excellent scientific program featuring keynote presentations from Dr Peter Brukner, Professor Mark Hargreaves and Professor Bruce Abernethy. Delegates were able to complement the science with a relaxing social program and a variety of pre and post touring options. Guest speaker Dr Geoff Thompson was one of the bonus highlights of the conference as he entertained diners at the annual Fellows Dinner.

A special thank you to Mark Doherty and ASICS who were once again the Major Conference Sponsor and whose support ensures that 14 prestigious Australian Sports Medicine Federation Fellows Awards valued at more than \$28,000 are available each year to support new research. I would also like to thank John Anderson from the NSW Sporting Injuries Committee and the Australian Sports Commission for their continued support.

The 2005 Organising Committee has been working tirelessly in recent months to ensure that all preliminary details for next year's conference have been finalised earlier than ever.

They are therefore able to announce that ACSMS2005 will be held from 13-16 October at the Melbourne Convention Centre in Melbourne and that for the first time it will be held in conjunction with the Fifth National Physical Activity Conference (13-15 October) and the Fourth National Sports Injury Prevention Conference (15-16 October).

This unique mix of conferences will ensure that the Conference theme "Promoting innovation, measuring success" will be explored across the areas of sports science, sports medicine, physical activity promotion and sports injury prevention. The conferences will provide you with an excellent opportunity to keep abreast of the latest findings and developments in research and interventions across all areas.

An outstanding scientific program will bring together leading international and Australian speakers whose innovative research is helping shape the future of sports medicine and science here in Australia and throughout the world.

Confirmed speakers include Professor Roald Bahr, Oslo Sports Trauma Centre & University of Sport and Physical Education, Dr Shona Bass, Deakin University, Professor Irene Davies, University of Delaware, Dr Billie Giles-Corti, The University of Western Australia, Dr Karim Khan, University of British Columbia, Dr Kevin Kirby, California School of Podiatric Medicine, Dr Willem van Mechelen, VU University Medical Centre, Amsterdam and Dr Jill Cook, Latrobe University delivering the 2005 Refshauge Lecture.

Other 2005 highlights include bringing together more than 700 key stake holders and sports medicine professionals from all sectors of sports science, sports medicine, physical activity promotion and sports injury prevention and the largest trade ever assembled for the Australian Conference of Science and Medicine in Sport.

We are accepting papers and taking registrations for 2005. Please visit the conference website at www.sma.org.au/acsms/2005/ for further information or alternatively contact the Conference Secretariat at acsms@sma.org.au.

Women in Sport Award

Wendy Ey Women in Sport Award

Ms Deirdre McGhee

(B.Power, J.Steele)

University of Wollongong

Bouyancy and breast bounce: Does deep water running reduce exercise-induced breast discomfort?

Poster Awards

Best Poster Clinical

Prof George Murrell

(M.Sein, J.Walton, J.Linklater, R.Appleyard, D.Kuah, B.Kirkbride)

St George Hospital, Sydney

Supraspinatus tendinosis and elite swimming training

AOK Health Best Poster (Performance Enhancement and Basic Science)

Prof Rabindarjeet Singh

(J.Singh, G.Khanna)

Universiti Sains Malaysia

Effects of coconut water ingestion on cycling performance in heat and humidity

Journal of Science and Medicine in Sport Best Poster (Injury Prevention and Health Promotion)

Mr Nathan Johnson

(S.Stannard)

The School of Exercise and Sports Science, The University of Sydney

Insulin resistance, muscle triglyceride and inactivity: From survival to diabetes?

SMA Member Benefits

The SMA Member Benefits team has selected four benefits for September/October that we believe will be of special interest to members.

- Win a free website package
- Reduce your telephone spend with corporate priced plans
- Fleet like discounts and more on purchasing a new vehicle
- Get more rewards out of your credit card

Win a FREE Website for your Business

We are keen to help our small business members to increase their profile and potentially their revenue. If you do not currently have a website presence, why not go into a draw to win a free total website package to get you on line at nil cost. This package will include:

- A 5 page website designed to suit your business
- Your own “.com” domain name
- Hosting of your site for 6 months

To enter this draw, please email your details to us by Friday 29 October. The winning member will be notified on Monday 1 November.

Let us help you reduce your business telecommunication costs

People Telecom will provide you with corporate pricing plans to suit your business needs. Members with small to medium sized businesses will benefit from call plans normally reserved for larger corporates and corporates will benefit from extremely competitive plans. An additional 5% discount has been arranged for all new members.

People Telecom will also provide you with:

- Full suite of voice products (including capped calls)
- Contracted and uncontracted pricing plans
- GSM & CDMA mobile phone offerings

- Full suite of DSL products
- Lease or purchase phone systems
- Dedicated account manager
- Award winning customer service
- Full account analysis
- One convenient account

Take the pain out of buying a new or used vehicle

The Automotive Buying and Finance Service will save you valuable time and money by organising the purchase of your new or used car. All you need to decide on is the make, model and colour. They will also:

- Arrange finance: fleet level discounts available on new vehicles and customised finance at bank rates.
- Take care of your trade in
- Deliver your new car to door to test drive in peace
- Make sure your used car is mechanically checked, detailed, roadworthy and comes with a warranty*
- Not charge you for using this service
- Clearly show your member discount on order forms

Special Offer – September 2004

ABFS Protection Pack[^] included with every new car bought during September/October

- Headlight protectors
- Bonnet protectors
- Mud flaps

* Industry standard warranty periods apply

[^] Offer ends 29th October 2004

Are your credit card rewards still rewarding?

In recent months a number of organisations have reduced the value of their Gold Credit Card Rewards Programs including the value of the Qantas Frequent Flyer points. Through your benefits program you still have access to one of the most rewarding cards in the market - the Citibank Gold Card.

Benefit from:

- \$ for \$ Rewards points
- \$ for \$ Qantas Frequent Flyer points
- Low interest rate of 6.9% p.a.* for the first 9 months
- No annual fee in the first year
- Bonus Rewards points on balance transfers at a low 6.9% p.a.*

* Fees and charges apply. Terms and Conditions apply and are available upon request or see the Citibank brochure for further details. All Citibank standard credit card Annual Percentage Rates are variable and subject to change.

To find out more about these or your many other member benefits, contact your SMA Member Benefits representative on 1300 133 365 or the member benefits link via www.sma.org.au