

# Sport Health

Incorporating The Bulletin



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Cover photograph: Australian Sports Commission

# Obesity Fog

Gary Moorhead

**Definition of a liar: “someone who says they have the answer to the obesity crisis.”**

**Definition of a stupid liar: “someone who says they have the answer to the obesity crisis and only mentions nutrition.”**

Concerns with rising rates of obesity are moving from the health pages and programs of the media to more general news reporting. The crisis is providing opportunities for countless “Eddie (or Gary) the Experts” to get a run in the media. For the cleverer, there is the possibility of cashing in, as increasingly concerned individuals and governments start to reach into their pockets in search of a solution.

In early September, Australia hosted the 10th International Congress on Obesity. I did not attend the Congress but, from the observations of some who did attend, there were many at that Congress at risk of falling into the second definition above. A satellite meeting in Brisbane on “Physical Activity and Obesity”, which I

did attend, preceded the Congress. The Brisbane Conference was big on the role of nutrition in obesity, but inactivity was mentioned only in passing. The heading on the Handbook for this Conference had “Physical Activity” in 16 point and “Obesity” in 36 point - and this was an accurate reflection of the weighting of the program and speakers. (Have I tipped my hand yet?)

Regardless of the weighting, there were some interesting and valuable pieces of information from the Brisbane Conference, such as:

- According to Canadian researcher Jean-Pierre Despres, in assessing health risk in obese patients, health professionals should abandon BMI in favour of a simple tape measure. Abdominal obesity, especially if characterised by an excess of visceral adipose tissue, is the mark of those at increased risk<sup>1</sup>. (Which probably means liposuction is of value only for cosmetic reasons, as it removes subcutaneous, as opposed to visceral

fat). Despres also pointed out that the contribution of lack of physical activity and a poor cardiorespiratory fitness to the health problems experienced by many obese people “has often been ignored”<sup>2</sup>.

- Claude Bouchard, another Canadian researcher and a godfather in the field, listed average life years lost from lifestyle risk factors as:
  - smoking 10.5 years,
  - obesity 8 years,
  - sedentary lifestyle 3.5 years<sup>3</sup>.

It occurred to me later that I should have asked if this loss was cumulative? Does an obese, inactive smoker face a potential loss from the lifespan of 22 years?

- Bouchard also advanced the interesting statistic that, historically, the ratio between calorie intake and energy expenditure for humans had been 3:1; with changes to our lifestyle, Bouchard estimated that today it is 7:1.

## First Announcement



acsms 13 - 16 October

# be active '07

Adelaide Convention Centre

SPORTS MEDICINE AUSTRALIA

AUSTRALIAN ASSOCIATION FOR EXERCISE AND SPORTS SCIENCE

AAPSM *publicists for sporting life*

AUSTRALIAN COLLEGE OF SPORTS PHYSIOTHERAPY

APA AUSTRALIAN PHYSIOTHERAPY ASSOCIATION *Sports, Physiotherapy Australia*

SportsDietitians AUSTRALIA

sda

- Steven Blair, an American and passionate advocate of always considering both sides of the energy balance equation when discussing solutions to the obesity problem, railed against the confusion caused by the issuing of different “activity guidelines”. The American College of Sports Medicine guideline is 30 minutes a day, the US Dietary Guideline is 60 minutes a day, the World Health Organisation guideline is for a Physical Activity Level of 1.75 (which Blair said was about equivalent to the work output of a subsistence farmer<sup>4</sup>). Clearly, there is a need for some consistency of direction.
- Jim Hill, from the University of Colorado, took the issue of guidelines a stage further and made the observation that exercise and physical activity guidelines have traditionally been developed for cardiovascular health and not specifically for weight management. Hill earned himself a life membership of the Australian Association of Exercise and Sports Science by saying that exercise recommendations and prescriptions that are relevant for weight management will differ depending on the weight management strategies used and for different populations and individuals. “When it comes to exercise and physical activity recommendations for weight management, one size does not fit all.” Hill also favoured a strategy that focussed on preventing weight gain, as this would make fewer demands on the individual<sup>5</sup>.
- Stephan Rössner from the Karolinska Institute in Sweden (and a keynote speaker at this year’s SMA National Conference) gave some insights from his country’s battle with the bulge, including the fact that European Economic Community standard communication laws may mean that Sweden will have to drop its ban on junk food ads during children’s television programs.
- Wendy Brown from The University of Queensland pointed out that it is difficult to relate changes in obesity levels in Australia to any changes in physical activity because we do not have regular national surveillance of physical activity levels. There had been some success with Australian programs (notably 10,000 Steps Rockhampton) in increasing activity rates among women, mainly through increased walking<sup>6</sup>.
- Singapore is often held up as a country that has held the line against weight gain by using fairly draconian measures. One of the room attendants was a PhD student from Singapore who told the meeting that one example of these measures involved compulsory military service. Conscripts are inducted into the

army, but their term of service only starts when they have achieved an acceptable BMI. Thus the term of compulsory service is extended by the time it takes the recruits to lose weight!

Apart from the information about women walking more in Rockhampton and the Singapore example, there were not a lot of success stories coming out of the Conference. There is no doubt we are learning more about the science of the exercise/health/weight nexus, but still not a great deal about how to make the behaviour changes to reverse the obesity trends and mixed and confusing messages to the public may play a large part in that.

From a sports medicine perspective it is encouraging that more recognition is being given to the importance of tailoring exercise programs to the needs of the individual. SMA is working with organisations in the fitness industry to try and educate workers in that industry of the importance of appropriate referral of clients with health problems to the appropriate health professionals. Fitness Australia and the Australian Institute of Personal Trainers have actively supported this process, distributing the SMA Screening Guidelines to their members and organising “how to use” workshops.

That said, there is still a lot of positive health mileage to be gained by simply

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## be active '07

4 concurrent events



Incorporating

Australian Conference of Science and Medicine in Sport, 13 - 16 October '07

Sixth National Physical Activity Conference, 13 - 16 October '07

Fifth National Sports Injury Prevention Conference, 14 - 16 October '07

2007 Recreation and Sport Development Conference, 14 - 15 October '07

*Trade Exhibition, 13 - 15 October '07*

Conference Secretariat: Sports Medicine Australia  
PO Box 237, DICKSON ACT 2602  
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# The ferret in the back pocket

Dr J

**An amusing film which is worth a look at this spring is the portrait of a smoking-lobby advocate entitled *Thank you for smoking*. It is one of those films which makes you think pretty hard, the most intriguing question being whether the film itself is anti-smoking or not. Many of the jokes are at the expense of the smoking lobby or other related 'nasty' groups (eg, the gun lobby) making you think that this is a small 'I' liberal film.**

On the other hand, there is a definite message that the mass media today are a bit like the Western judicial system, working most efficiently when both sides of every argument have a voice. Just as every accused murderer deserves a defence lawyer, the smoking companies (and tobacco farmers, etc, etc) deserve advocates. If we censored the pro-smoking lobby out of existence (or so the film would have you believe) we may as well be living in China (where the government decides which topics the citizens are allowed to search for on Google).

The film *Thank you for smoking* only looks at the world from the warped viewpoint of the pro-smoking advocate. It doesn't touch on the issue that this is an unequal war, with the smoking companies being filthy rich and able to spend millions on advocacy and, of course, bribes. The anti-smoking lobby exists off the smell of an oily rag, mainly in the form of paltry government handouts. Why would private industry (and the government) cannibalise itself by heavily funding a body that seeks to tear down a segment of private industry which pays lots of taxes?

Many of us in the sports medicine industry live off the same oily rag. As a sports physician, I am luckier than some in riding on the smallest carriage at the back of the Medicare gravy train, but

our industry as a whole is ridiculously underfunded.

Step 1 to a redress of the problem is that every second newspaper you read has an article telling you that obesity now causes more health problems than smoking. However, Step 2 – which is proper financing of bodies like Sports Medicine Australia to help tackle the problem – seems light years away. We are like the anti-smoking lobby, except about 30 years behind them.

The anti-smoking lobby, I would say, has managed to get to a point where it is at least in a decent arm wrestle with the cigarette companies. The pro-exercise lobby is considered by our current Government to be redundant (think of Tony Abbott saying that it's up to individuals to make their own choices about good diet and exercise, rather than for governments or other bodies to legislate or force these choices). Like the war on terrorism, the pro-exercise lobby is not fighting an easily-targeted enemy. On the other side of the obesity coin – diet – the junk food companies like Coca-Cola and McDonalds can be considered the enemy. The major enemy of exercise is inertia, but it is an enemy that is currently overwhelming much of society.

In sports medicine and physical activity promotion, how do we go in the lobbying stakes? The answer is unfortunately rather bleak. Let's examine some of the old chestnuts that I have been whingeing about for years, which I unfortunately can continue to complain about because our lobbying has been so ineffectual.

## 1) Recognition of sports medicine as a medical specialty in Australia.

First discussed in the mid 1980s and first applied for in the early 1990s after the ACSP set up an infrastructure

comparable to all of the traditional medical specialist colleges (entry and exit exams, 4 year full-time supervised training program, etc.)

The current status of this application, 15 years after it was submitted, is that it is *still* under review. In the meantime almost every other Western country has officially accepted sports medicine as a specialty.

Sports medicine in Australia is uniquely confined to an alternate realm of officially sanctioned areas of medicine which are neither general practice nor a specialty. A real world equivalent of this would be being on your 'P' plates for 15 years with the RTA not giving any indication of whether or not you will ever be granted an unrestricted licence.

The lobbying of the ACSP has been characterised by a very conservative approach, presumably based on the presumption that any radical or attention-grabbing moves would upset the Government (who ultimately could grant specialty recognition) and penalise our cause. I don't want to belittle the enormous work done by the various College executives and I hope that no one feels misrepresented by this characterisation of our lobbying.

Specific more radical moves that have not been used include that top athletes and football players have not been enlisted to request to our Government that sports medicine should be recognised as a specialty; no threats were made to disrupt the Olympic or Commonwealth Games unless the doctors looking after athletes received recognition; the training program has not been shut down in Australia and moved to New Zealand where it is recognised as a legitimate training program and graduates guaranteed right to practice; no legal action has been countenanced or threatened, and no College President has ever put out a press release (eg,



during Olympic and Commonwealth Games) to say that we are falling behind the rest of the world in the recognition of sports medicine as a medical specialty.

Just as the ACSP has been conservative in its approach to the Government, we have been very soft on the AMA as well. The AMA also believes that sports physicians should be some sort of GP without the 'General' and, for a so-called representative group for doctors, their refusal to push for our recognition is particularly reprehensible. It (the AMA) sets recommended fees for sports physicians which are limited to practice in a single area, but which denies that we can specialise in that area. We apparently choose to work in a field in which you can't specialise, because its importance is of such little consequence.

Again, the ACSP has never threatened the AMA with a mass resignation of its members, never put out a press release saying that the AMA is discouraging physical activity, never published an alternate set of recommended fees denouncing those of the AMA. After all, we wouldn't want to upset them!

In conclusion, despite huge hours which have been spent banging heads against the brick wall of the official channels, the ACSP has not yielded to the temptation of the radical approach and after 15 years we are still on the waiting list. In that short time, the rate of obese individuals in Australia has almost doubled, so it's not like nothing has been happening over that decade and a half.

But, as with a football team which has lost 15 matches in a row, the commentators will say that this only means you are closer to your first win.

## 2) University Sport and VSU

What of the lobbying last year by the university sports associations to stop the Government from making it illegal for them to tax their students?

This lobbying was carried out with moderate financial backing from the sports unions themselves, including national newspaper advertising. The message was that, if sports associations could not raise compulsory funds from their students, facilities and sports clubs would suffer. This lobbying was effective in getting its message across but

apparently failed due to typical political game-playing.

Many moderate Coalition MPs wanted the sports associations (and perhaps some other vital university services) to be quarantined from the VSU legislation. The hardline legislation was expected to be a starting point and it was planned that concessions would be made to sports in the negotiation stage. The ALP however stuffed up the government plan by not supporting compulsory student unionism in full and merely arguing that essential services like sports should be quarantined from the VSU legislation. Once it took this middle ground viewpoint, the Government could not alter its hardline stance, and the sports facilities baby went out with the bathwater. The next round of lobbying, to have part of this legislation reversed, will sadly occur when physical activity levels and sports team memberships at university have dropped and cricket ovals and swimming pools are forced to close from lack of funding. I suppose it goes to show that you can spend a lot of money lobbying and still fail.

## 3) Remuneration for services by professional sports teams

By comparison, this is an area where sports medicine has been a raging success.

There are team doctors and physios in the AFL and rugby union in particular who are earning more than \$100,000 per year, yet the highest-paid team doctor or physio in 1990 might have been working for \$25-30K per year. Of course, player salaries have skyrocketed at a similar rate, but it is nice to know that the professional sports industry is prepared to spend up for medical and associated services. Has this been due to lobbying? The answer is partly yes, although this has not necessarily been deliberate.

The big factor working in our favour is the enormous media exposure that medical and injury issues receive. Even though this may be unpleasant at times, its net effect is the mentality that injury and medical management are crucial in professional sport (and that any sports administrator who wants to cut corners in this field is going to get burnt). Sadly, we haven't been able to move from this to having sports medicine similarly valued in the community.

## 4) A national sports participation and injury insurance scheme

This is the next holy grail for sports medicine and therefore I hope that SMA could make lobbying for this official policy over the next few years and develop a strategy to achieve it.

New Zealand has shown that a national sports injury insurance scheme can work, although its system has its flaws and could be improved.

One major flaw is that since there are no premiums to pay, it removes an incentive for sports to become safer. The other is that because the exposure population can only be roughly estimated, it is also impossible to measure accurately whether sports are becoming safer or not. If there is a drop in ACC rugby union claims in 2006, it won't know whether the sport has become safer to play or there are simply fewer people playing rugby union (or fewer matches).

The perfect system would be one where exposure and injury incidence were known and then you could really start working on risk factors and prevention (just like is done in most areas of injury prevention and general medicine).

I would suggest that the Government could offer to pay a fixed premium contribution for every Australian towards his or her sports injury insurance per year (say \$100). This is not a pie in the sky figure given what the Government is willing to spend to make you take up private health insurance or have a baby.

No premium would need to be paid for a person if no organised sport was undertaken. If the person participated in a safe sport like swimming (and compliance checks could be made to stop inactive members from signing up), the club could become wealthy pocketing the difference between the real premium (lower) and the government contribution. For a football player, the contribution might not make up the full premium for the compulsory insurance, but it would make it more affordable. Perhaps the scheme could be generous enough to fund 50% of any premium over \$100 per annum. This model would guarantee the support of the scheme by the existing sports injury

insurers, who would not be displaced but who would be getting a lot of government support for their clients' premiums (in return, of course, for handing over their injury data).

A lesson to be learnt from the failure of the ACSP to win over the AMA is that, in order to lobby for a national sports participation and injury insurance scheme, SMA would need to win over key players. Hopefully, a blueprint for a scheme in the fashion above would allow us to get the sports insurers on side. Hopefully, most of the peak sports bodies in Australia would also love the idea. Hopefully, a Labor opposition, if it decided to break with recent trend and take policies to the next election, might also love it. It would need to start to love ideas like this if it wants to have any chance to wrest control back from the incumbent Government, as it needs to work on areas where the Government is failing (like physical activity).

Finally, a lesson on how to lobby that we can bear in mind for 10-20 years down the track when we are actually more than a blip on the radar.

I have a few friends who are in the anti-cancer lobby (be that for funding for research or for, say, smoking cessation). One of them close to my heart, personality-wise, is Simon Chapman from the Public Health faculty of Sydney University. He first joined the anti-smoking lobby in the 1970s as a member of BUGA-UP (Billboard Utilising Graffiti Artists against Unhealthy Products), in the days when this was actually the best way for the anti-cancer lobbyists to have any voice.

How I would love to deface a poster of John Howard in his silly Wallabies tracksuit on his morning walk with a caption like "I'm not walking to the Western suburbs – they don't even have footpaths there!"

For the anti-smoking and anti-gun lobbies, Simon has been a magnificent voice to raise awareness on these issues (and in fact he is just finishing a book on advocacy).

A different approach is taken by another friend of mine, Alan Coates, recently retired CEO of the Cancer Council of Australia. He is far more into diplomacy

and hence he has probably been more suited to head a major organisation. His strategies have seen a huge growth in government funding for cancer research in Australia, but his lobbying has been neither aggressive nor soft. His advice is that what you need to offer is a win-win outcome for the Government. It is useful to have your radical types at arm's length to use as a bargaining tool, the so-called "feral alternative"; along the lines of "we really think it would be terrific for your Government to announce that it will fund a national sports participation and injury insurance scheme, and we'd love to offer our total support for what a great job your Government is doing in encouraging people to exercise. What we don't want is for this thing to break down and to allow the cynics to get airtime, saying that this Government doesn't give a damn about physical activity levels and has a secret plan for half the population to die of diabetes. After all, that's not the case, is it?"

Oh for the day when sports medicine is in such a strong position that we can bargain on the front foot and keep the feral alternative in the back pocket!

>> from Page 3

getting people to do more walking. SMA, with the financial support of pharmaceutical company Pfizer, recently carried out the first national survey of adult physical activity in Australia since 2000. The survey showed that around 60% of the Australian adult population do not do the minimum 30 minutes a day of moderate intensity exercise required for health benefit. Coincidentally, around 60% of Australian adults are overweight or obese.

The survey also revealed that around half the adult population believe the statement "no pain; no gain" when applied to exercise. This flies in the face of accepted wisdom among health promotion experts, which has it that everyone understands the basic "30 minutes a day" message. Perhaps this is another example of the fog of confusion that surrounds the whole obesity issue. It is also a fog that the SMA screening guidelines might help dissipate by

encouraging greater public trust in the fitness industry and its capacity to interact with health professionals to ensure that increasing exercise does them no harm.

*Definition of an opportunist: "someone who says they have the answer to the obesity crisis."*

*Definition of a focused opportunist: "someone who says they have the answer to the obesity crisis and only mentions nutrition."*

1. Jean-Pierre Despres. "Physical activity to achieve cardiometabolic health – metabolic fitness", *presentation at Physical Activity and Obesity Conference*, Brisbane, 1 September 2006.
2. Jean-Pierre Despres. "Physical activity to achieve cardiometabolic health – metabolic fitness", *presentation at Physical Activity and Obesity Conference*, Abstract, Conference Handbook.
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4. Steven Blair. "Longitudinal data on physical activity, obesity and health data from the USA", *presentation at Physical Activity and Obesity Conference*, Brisbane, 1 September 2006.
5. James O Hill. "Differences in exercise prescriptions between populations and individuals", *Abstract, Physical Activity and Obesity Conference*, Brisbane, 1 September 2006.
6. Wendy Brown. "Physical Activity Trends in Australia 1999-2004", *presentation at Physical Activity and Obesity Conference*, Brisbane, 1 September 2006.

# Letter to the Editor

Dr. Rebecca Schipper, Dr. Susan Cartwright, Dr. Callum Durward (dentists, AUT School of Oral Health), Associate Professor Patria Hume (sport injury biomechanist, ISRRNZ), Conrad Inskip (research technician, ISRRNZ), Kelly Sheerin (physiotherapist and research officer, ISRRNZ), Jordan McIntyre (research assistant, ISRRNZ), Simon Gianotti (Sports Injury Prevention Manager, NZ Accident Compensation Corporation), Belinda Allan (research writer, Consumers' Institute of New Zealand)

## Boil-n-bite Mouthguards

Re: "Mouthguards in Sport. Protecting your teeth: The boil-n-bite mouthguard may be cheaper but is it better?" in *Sport Health* (24/1, Winter 2006).

The *Consumer* article to which dental surgeon John Banky refers to is based on a recent *in vitro* study carried out at the Institute of Sport and Recreation Research New Zealand, AUT University in Auckland (ISRRNZ). While we agree with many of Banky's statements on the suggested superiority of custom-made mouthguards in terms of comfort and fit, and expressed this view in our report to the *Consumer* magazine, it was our responsibility to report objectively the results from our study on impacts to mouthguards. Our study showed that in general the 16 stock mouthguards performed better in impact testing than the two custom-made mouthguards.

Our *in vitro* testing methods were similar to those described by Greasley (in 1998) for mouthguard testing. The methodology is commonly used in biomechanics research and has been used for impact testing of shoes (Kinoshita and Bates 1996), surfaces, soccer (Bir, Cassata et al 1995; Francisco, Nightingale et al 2000) and hockey shinguards (Hume, Pearson et al 2005), and mouthguards (Warnet and Greasley 2001; Westerman, Stringfellow et al 2002; Westerman, Stringfellow et al 2002; Westerman, Stringfellow et al 2002; Takeda, Ishigami et al 2005).

The impact methodology involved measuring impacts from contact with a conical projectile to simulate hard object collision. We investigated the cushioning effects of mouthguards on frontal impacts by use of a drop tester on a fixed typodont dental model. Impact data were determined from the output signal of an accelerometer mounted on the 'drop heel' of the drop tester. The drop heel was released from a height of 5 cm above the mouthguard,

resulting in impact energy of 12 J. The height was used to match the impact force generated in previous work which indicated that 10 J-12 J of energy was an appropriate force to assess the performance of mouthguards (Greasley and Karet 1997).

The mouthguards were not left to cool on the model as suggested by Banky; each mouthguard was moulded to fit the model according to the manufacturer's instructions in terms of temperature of water and time in the water, and time to mould to the teeth. Further details on the methods used and the results are available in the four-page paper in the conference proceedings of the 2006 Society of Biomechanics in Sports Conference in Salzburg in June 2006 (Hume, Schipper et al 2006) which should help address Banky's criticism ("Without knowing the Institute's testing method, it is impossible to compare its results directly with published impact test studies on mouthguard material."). It was indeed the aim of the ISRRNZ's analysis to provide "a direct comparison of only those items which it tested".

The study results reflect an *in vitro* situation, as it measured only frontal impacts to a rigid model. The real life situation is somewhat different, as a range of forces can be applied from different directions, the objects can be variable in size, shape and consistency and the oral tissues are not rigid. In addition, it is likely that the stock mouthguards used in the study were more accurately adapted to the teeth than would often be the norm in real life. The rank given to the mouthguards in the *Consumer* article (ie, "most protective," "moderate protection" and "least protection") applied to our *in vitro* impact testing scores.

Prior to testing we expected that the custom-made mouthguards would perform better in the impact tests than the boil-and-bite mouthguards, but they did not. The impact tests were

conducted independently by non-dentists, and the mouthguards were allocated a testing number of 1-18, to ensure there was no bias in the interpretation of the results. The analysed results were then provided to the dentists for their feedback.

Although the study focused on the cushioning effect (or resilience) and costs of different types of mouthguard, it was acknowledged that the fit, comfort and construction of the mouthguard are also important factors. A mouthguard should not be chosen purely on the results of impact studies and cost considerations; as stated in our conclusion to Consumers' Institute: "Previous studies have demonstrated that custom mouthguards fit better and have better retention; their superior comfort assures wearability." The *Consumer* article clearly states that comfort and fit are important considerations when buying a mouthguard.

While we would recommend all at-risk sports participants wear custom-made mouthguards, the reality is that many are unable or unwilling to pay the price for a customised mouthguard. In contrast to Banky, Newsome (2001) concluded: "Equally it is clear that although custom-made mouthguards are seen to offer better protection than the 'boil-and-bite' type, many people do not use them because they are perceived to be expensive and necessitate a visit to the dentist. Further research is required to assess the relative protection afforded by the various types of mouthguards currently available." Finch (2005) has also stated "However, baseline assessment and previous published research indicated that players generally do not choose to use custom-fitted mouthguards."

We feel that a "boil-and-bite" mouthguard is better than no mouthguard at all. By educating the public on the best way to mould and use an over-the-counter mouthguard,



the Consumer article provides the public with useful advice.

According to ACC claim statistics, there has been a 47% reduction in dental claims from rugby players in the period 1997 to 2004, when it became compulsory for all rugby players to wear mouthguards during matches. From 1997 to 2005 sport dental claims have also decreased for children aged five to 14. While the exact ratio of custom-fitted to boil-and-bites sold is unknown, anecdotal evidence suggests that the majority of New Zealanders are buying boil-and-bites.

Banky states that "In fact, published research shows the vastly superior protection provided by custom-fitted mouthguards versus boil-and-bite or self-made mouthguards". We disagree with Banky in that the literature in our view is NOT clear that there is "vastly superior protection" provided by custom-fitted mouthguards. (We have started a meta-analysis to assess quantitatively the strength of evidence for the benefits or harm of both types of mouthguard to help address these claims). Not all of the four studies Banky listed (De Young, Robinson et al 1994; Guevara, Hondrum et al 2001; Newsome, Tran et al 2001; Finch, Braham et al 2005) provided evidence to support his statement.

In a review of previous studies, Newsome (2001) stated that "only a small number of studies have compared both types (custom versus stock) directly" and that "Conclusions regarding the level of protection offered were more guarded because of the short duration of the studies and relatively small sample numbers".

Guevara et al (2001) reported that "Results revealed that all three commercially available mouthguards exhibited greater rebound than the custom mouthguard. Rebound was related directly to the thickness of the mouthguard in the incisor region. The thickness of a mouthguard may be critical to avoiding injury to the teeth and surrounding structures".

Finch et al (2005) noted that "Another problem with the study was the nature of the control arm. For ethical reasons, we could not prohibit control players from wearing their usual mouthguards, if any. This has led to a likely dilution of the differences between the two study arms, as the control arm was not a true control."

De Young (1994) commented "Several studies have shown that mouthguards can reduce orofacial injuries among athletes. Comfort and wearability factors were compared among 40 high-school athletes for custom-made and self-adapted mouthguards. Both offered adequate protection, but overall the participants preferred the custom-made mouthguard".

We feel that Banky has been overcritical of the *Consumer* article. There is still room for debate and further *in vivo* and *in vitro* studies are needed to determine the effectiveness of the various types of mouthguards available to sports participants. The results of our study add to the body of knowledge around mouthguards from a biomechanical perspective; ie, the impact absorption characteristics of two custom-made, and 16 boil and bite mouthguards available in New Zealand. The better impact absorption results of the boil-and-bite mouthguard should not be taken to mean that "boil-and-bite" mouthguards are preferable to custom-made mouthguards given that other factors such as comfort and fit may impact upon injury prevention effectiveness. On that we and Banky agree and the *Consumer* article made this clear. For consumers who do not wish for a variety of reasons to get a custom-fitted mouthguard, information on what boil-and-bite mouthguards are likely to provide the best protection in terms of impact absorption is useful – and hence the advice provided by the *Consumer* article.

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## Dr Banky responds.....

My article was written after consulting peer review publications which were cited to provide a practical view about the types of mouthguards available today. The discussion provided relevant information about two different types of mouthguards and their limitations based on the full scope of evidence available rather than a single laboratory study.

Contrary to the opinion of the New Zealand researchers, the published articles which I quoted support the proposition that custom-fitted mouthguards provide most protection. The summary section of the article by Newsome<sup>1</sup> which reviewed the role of the mouthguard in sports-related dental injuries states that "It is also clear that the custom-fabricated mouthguard, in particular the pressure-laminated variety, is seen to afford most protection".

An evaluation of mouthguard material by Tran<sup>2</sup> discussing tensile and hardness test for mouthguard material states that "Although mouthguards should be small for patient comfort they should be of a certain minimum thickness for impact protection". The authors continue: "The results have implications in the fabrication of different types of mouthguards, for example, in the professionally made (custom-made) mouthguards where the thickness can be monitored and controlled throughout the fabrication process so that optimisation can be achieved without compromising the effectiveness of the mouthguard. In the self-adapted (boil and bite) mouthguards, however, there is no



such control over the final thickness of the mouthguard, especially over such critical areas as the occlusal table (biting surface). This may lead to occlusal thinning of the mouthguard during usage, which may then compromise the protectiveness of the mouthguard."

The investigation conducted for the New Zealand Consumers' Institute measured impact force on several different mouthguards which were made to be fitted onto a rigid model of teeth for testing. The recorded measured force is affected by several factors including stiffness of mouthguard material (determined by the material manufacturer) and thickness of mouthguard material (directly influenced by the process used to make the guard<sup>2</sup>). A "thicker" (bulky) mouthguard interferes with speech, breathing, swallowing and reduces comfort of the guard when worn.

An effective mouthguard must be comfortable, ensuring that a pre-determined thickness of guard material covers particular areas of the teeth and mouth. These conditions are satisfied during fabrication of the guard and by any minor adjustments at final fitting. Making a suitable guard is a time-consuming process and extremely technique-sensitive which can be challenging for an experienced, skilled individual.

A "boil and bite" mouthguard is formed directly by wearers placing and then sucking hot mouthguard material against their teeth in their mouth. A "custom-fitted" mouthguard requires an impression to be taken enabling a model of the player's mouth to be produced upon which the mouthguard is made by a technician or dentist. A clear, unhindered view of the area on which the guard is to sit (as provided by a model made from an impression of the wearer's mouth) would logically make all aspects of producing an effective mouthguard easier.

The New Zealand group acknowledge in their letter that the "boil and bite" mouthguards tested were in fact formed on a model and would be a better fit than in real life. Its tested "boil and bite" guards were made on models by individuals who are familiar with the technique, the characteristics of material they were handling and far less reliant on the provided instructions than the public. Could the public confidently

produce "boil and bite" guards comparable to the "boil and bite" guards tested by the New Zealand group?

Imagine moulding your "boil and bite" guard at home in the kitchen the night before or just prior to the game in the change room with no assistance nor access to any professional help, relying on the printed instructions provided. How *effective* would that guard be? How *comfortable* would that guard be? The poorer the fit of the guard the less likely it will be worn or tolerated and the more likely it will be dislodged during impact. "Boil and bite" guards are bulky. Reducing the bulk improves comfort (wearability) but reducing material thickness (often due to ignorance) in certain crucial areas such as biting surfaces and the back of the guard compromises any protection which it may provide according to Lieger<sup>3</sup>.

Some mistakenly believe that a "mouthguard" eliminates any dental injury due to sports participation. Mouthguards can reduce severity of dental injury according to Jolly et al<sup>4</sup>. Despite a mouthguard being worn, dental injury may still occur at alarmingly high rates between 25% (Johnston<sup>5</sup>) to 40% (Jolly et al<sup>4</sup>) of cases.

The protection provided by any mouthguard is significantly reduced:

- by less than the minimum material thickness covering vulnerable areas, particularly when the guard is new;
- by poor design of the guard not covering adequate areas of the mouth and posterior teeth;
- by a gradual reduction in the guard's material thickness covering the biting surfaces of the teeth which occurs with use;
- when there are any splits or cracks or signs of wear in the guard material particularly following a heavy blow to the face.

Neither the standard instructions packaged with "boil and bite" guards or the instructions offered by the New Zealand Consumer article deal with these important issues.

Currently an array of products labelled "mouthguards" are available ranging from "boil & bite" to "custom fit". It's not surprising that the public, clubs and sports participants are confused about their use and suitability. Many ill-informed decisions are unduly

influenced by cost including the selection of a mouthguard. Unfortunately some still believe the additional cost of a custom-fitted mouthguard cannot be justified because a "boil and bite" mouthguard is quite adequate. This is not only alarming but conflicts with the recommendations of national and international dental and sports medicine organisations.

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## ...and a word from the Australian Dental Association

The Australian Dental Association (ADA) has long promoted the use of custom-fitted mouthguards. The views expressed in the article by Dr John Banky are consistent with ADA policy.

The ADA's policy on mouthguards is based on research that has been reviewed by the sports, dental, medical and scientific community, and the responsibility of individual dental practitioners to provide patients with evidence-based advice to prevent sport-related dental injury.

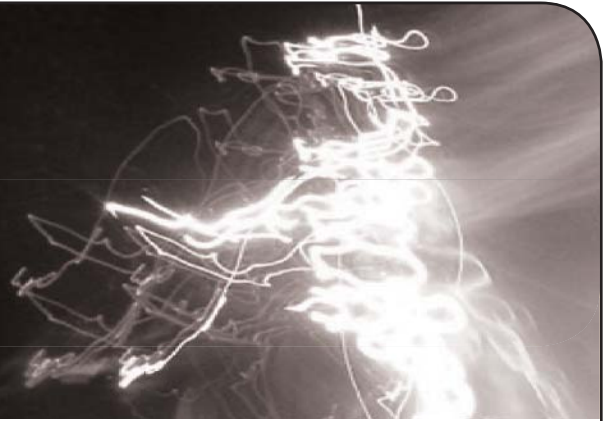
Sports participants largely have a positive attitude to wearing mouthguards, yet the bulk, lack of proper retention, discomfort and interference with breathing and speaking associated with alternatives such as boil and bite mouthguards are cited as reasons for not wearing a mouthguard<sup>1,2,3</sup>. By contrast, custom-fitted mouthguards offer comfort and wearability and reduce speaking and breathing difficulties, increasing the likelihood that a mouthguard will be worn<sup>1</sup>. Most importantly, custom-fitted mouthguards are better placed to reduce injury compared to boil and bite mouthguards<sup>4,5</sup>.

Although custom-fitted mouthguards are more expensive than boil and bite mouthguards, sport-related dental injury is both common and costly<sup>6,2</sup>.

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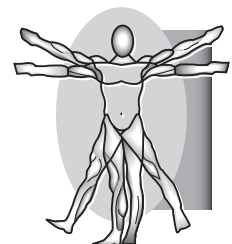
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# ABOUT TIME!

## Women in sport and recreation

A Senate committee report has recommended a multimillion-dollar support package to break down the barriers facing women and girls who want to take part in sport and recreation.

The Committee was the Environment, Communications, IT and the Arts Environment Reference Committee and its report – About Time! Women in sport and recreation in Australia – was tabled in the Senate in September after four months of inquiry, including three days of public hearings and studying more than 100 submissions and other documents.

It had inquired into :

- the health benefits of women's participation in sport and recreation,
- the level of accessibility for women to take part in organised sport, fitness and recreation,
- the portrayal of women's sport in the media, and
- the situation of women in leadership roles in sport and recreation.

SportHealth covers – from SMA's viewpoint – some of the more interesting findings in the report and submissions to the Committee.

Major challenges must be overcome before gender equity in sport, recreation and physical activity can be achieved, according to the Senate Committee report.

"To understand and address the complex influences on female involvement in sport, recreation and physical activity, issues such as the broader social, economic, cultural and physical context of the lives of women and girls and the impact of the current infrastructure of sport and recreation must be considered, it said.

Numerous studies and submissions to the committee had indicated that the factors directly responsible for the low participation rate of women and girls in sport, recreation and physical activity included:

- lack of information about what programs are available;
- lack of access to appropriate, accessible, affordable and acceptable facilities and services; and
- lack of culturally appropriate facilities/programs;
- social stereotyping;
- lack of time or perceived lack of time;
- lack of childcare and lack of awareness of childcare options;
- fewer opportunities available for participation;
- reduced leisure time owing to family responsibilities;
- lack of skills or perceived lack of skills;
- lack of financial resources;
- harassment;
- lack of confidence in approaching activities alone; and
- cultural and social pressures.

Women continued to be under-represented in the decision-making structures of sports organisations, the committee reported. Women also continued to be under-represented in coaching, officiating and administrative roles

The committee suggested that governments and sporting and recreation providers develop strategies to increase the numbers of women in leadership roles, such as:

- examining recruitment procedures to ensure that they provided equal opportunities for women, were accessible and were non-discriminatory;

- promoting the structures, career pathways and opportunities available in administration, coaching and officiating for women;
- acknowledging individual achievements and the contribution of women;
- providing an inclusive, safe and flexible work environment;
- providing a mentoring and/or apprenticeship program for women administrators, coaches and officials;
- encouraging and actively targeting women to take on decision-making roles on administration, coaching or officiating committees;
- encouraging sporting organisations to target or talent ID potential women coaches/officials;
- ensuring that organisations strategically planned and provided financial and human resources to develop female coaches and officials; and
- exploring the potential of sub-elite athletes who do not make it to the top of their sport to pursue other avenues such as coaching or administration.



The Committee made a number of other recommendations, including:

- that, in light of the pressure on available sporting facilities, state and territory education authorities should work with sporting clubs and organisations, and local communities, to improve access to facilities for children's sporting activities, particularly schools;
- that the Commonwealth, state, territories and local government recognise the importance of occasional child care in facilitating women's participation in sport and recreation; and
- that the Sports Leadership Grants for Women be continued and that the Commonwealth increase funding for the scheme.

**For the full report and submissions, go to [www.apph.gov.au/senate/committee/ecita\\_ctte/index.htm](http://www.apph.gov.au/senate/committee/ecita_ctte/index.htm).**

## ACTSPORT, representing state sporting associations in the ACT

The issue of women in leadership roles in sport has been researched for many years, yet the situation appears to have changed very little. Women often perform the administrative roles, but the number of females in decision making roles diminishes significantly. A simple study of 49 state sporting organisations in the ACT highlighted in Table 1:

Even though women in executive officer positions sits at 40%, many of those positions are not actual decision-making roles; they are administrative roles and the individuals in them must refer to the President for any decisions. It is understood that this local picture is

mirrored across Australia. In fact according to statistics from 1998 (which are the most recent accessible) the national representation picture was even lower with women making up only 25% of executive officer positions and 13% of presidents.

An examination at the University of Canberra Sports Studies programs over the last 10 years presents some interesting statistics. In the three sports streams of coaching, administration and media the graduate statistics are shown in Table 2:

There is definitely dominance of males graduating with coaching degrees, but the number of graduates in the other two streams of media and management

appear a bit more evenly balanced. This is not surprising as there are more coaching positions available for males than for females. It could also be that coaching still remains a more attractive and viable option for males as a full time profession rather than females.

Another interesting observation is the coaching situation at the ACT Academy of Sport, which some would see as one of the highest available coaching opportunities in the ACT (see Table 3).

**Coach ratio, ACT Academy of Sport, 2006**

**Table 1**

POSITION	NUMBER	MALES #	MALES %	FEMALES #	FEMALES %
President	49	39	80%	10	20%
Executive Director	35	21	60%	14	40%
Overall	84	60	71%	24	29%

**Table 2**

STREAM	MALE #	MALE %	FEMALE #	FEMALE %
Coaching	106	65%	57	35%
Media	89	55%	83	45%
Management	201	58%	146	42%

**Table 3**

ROLE	MALE #	MALE %	FEMALE #	FEMALE %
Head Coach	20	95%	1	5%
Asst Coach	1	20%	4	80%

## THE VIEW FROM THE COUNTRY

### Wimmera Regional Sports Assembly

A 2005 survey by the Wimmera Regional Sports Assembly (WRSA) indicated that:

- girls were interested in sport but could not get into teams due to a lack of ability;
- girls who came from a family of participants were more likely to be involved in sport and continue this for longer;
- in school sport, the main focus was on competition meaning those with lesser ability were excluded/or feel excluded and gave up;
- body image/peer pressure meant that girls who felt they 'did not fit the mould' self excluded from sport;
- there were not the numbers of girls participating in the upper teen age groups, meaning that representation at higher sporting levels was often denied them;
- more numbers could participate in male-dominated sports (football vs. netball);
- more girls than boys said they were not 'into sport' or 'don't like it'. In the main, the reason for non participation from girls was the competitive nature and the 'body image' needed to be involved in the sport (eg. lycra suits for netball);

- girls preferred the recreational physical activity as compared to the competitive.

In the general community, comments from women cited the following reasons as to why women were under represented in local sporting teams as players, coaches and officials:

- If they worked in paid part time jobs, it on weekends when most sport was played;
- if they had full time work, the weekends were for house duties rather than recreational activities;
- they followed sports played by their families rather than participated themselves;
- limited budgets meant they reduced or stopped their own participation in favour of participation by their families;
- limited budgets and high fuel costs also contributed to their cutting down or stopping participation;
- they had child care responsibilities if their partner was participating;
- the cost of child care if a woman wants to participate;
- lack of child care facilities; and

- lack of time and money to pursue coaching or officiating qualifications

Other factors, including:

- the ABC's decision to drop Anne Sergeant from netball commentary was perceived as a reflection of her 'age';
- lack of coverage of women's sport on television (eg. netball shown for one hour only on Saturday afternoon when most participants are out playing);
- 'money drives the coverage': female athletes and the Australian Women's football (soccer) team having to promote themselves as calendar 'pin ups' not only to raise money for their participation but also to raise the awareness of their achievements because they had not received the 'free' media coverage of their male counterparts;
- 'sponsorship equals coverage': female participants at the highest level in their sport (netball) having almost to strike to get an increase in their minimal playing fee.

**The WRSA Youth in Action Survey 2005 was conducted by Paul Goudie**

## THE TOP 12 THINGS TO DO

### Janice Crosswhite

This is a sports issue not a women's sports issue. When sport meets the needs of boys and girls, men and women, then we will have a healthier and stronger sports industry for everyone.

How to achieve this? The top 12 things to do!

1. The ASC to link gender equity outcomes to its funding of NSOs;
2. Improved collection of data on NSOs so that an accurate picture is known of gender breakdown in all areas of operations;
3. The ASC to develop a national women's sport policy;
4. The ASC to continue with its Sports Leadership Grants for Women with increased funding to \$1 million (now it averages per \$2500 per person or organisation, totalling \$400,000);
5. The ASC to increase its research into issues relating to women's sport (eg. female athlete triad);
6. The ASC or the Office for Women to support current data collection relevant to media coverage of women's sport;
7. The ASC or other federal agency to support the development and production of a quality half hour national television program on women's sport;
8. the ASC to host an annual meeting of government and non-government womensport agencies;
9. The Australian Communications and Media Authority should have power to direct the broadcasting media to cover women's sport, similar to the 20% stipulation that drama content on television is Australian. This standard should be capable of clear understanding, implementation and monitoring by ACMA.
10. Federal Government financial support to the Australian Womensport and Recreation Association, similar to the Canadian Government's \$350,000 annual support for the Canadian Association for the Advancement for Women in Sport.
11. Federal Government financial support for the 2010 World Conference on Women's Sport in Sydney;
12. A national task force to implement the strategies from the Senate Inquiry.

Plus Lucky 13 - Develop a role model for all women but particularly older women. Encourage Mrs Janet Howard to join her husband on his daily walks!

**Janice Crosswhite is President of Australian Womensport and Recreation Association Inc.**

## FRUSTRATION AND DISCOURAGEMENT

Heather Reid

Many people, including sport leaders, bureaucrats and academics have attempted to effect change within the sport industry and they have become frustrated and discouraged at the slow degree of progress for women and girls, Heather Reid, Executive Member of AWRA, says in a submission to the Committee.

“Australian government policies on women in sport have come and gone over the past twenty-five years ago,” she said. “So too has the amount of resources and funding provided for women’s sport units at state and federal levels.”

This had led to the demise of many successful participation programs (such as the Active Girls campaign), leadership programs (eg, the Focus on Marketing and Media seminars), coaching and referee programs that provided specific measures to increase women’s involvement and participation in these areas.

“The situation may be different if the government had legislated to implement gender equity policies as a condition of funding, as it has done with anti-doping policies.”

So the federal government had been largely ineffective in dealing with gender inequities and discrimination against women in sport, Ms Reid said. Most initiatives had not been sustained and governments had failed to implement measures to ensure a commitment by organisations to improve the status and representation of women in those sports.

“The ability to effect change should not rest with just a few women’s sport agencies or individual activists. The authority to increase women’s

participation and status in sport rests largely with the people who control the national and state organisations as well as the clubs.”

Where there had been autonomous women’s groups, the government had forced them to integrate with men’s sporting organisation as a condition of funding and economic rationalism. In some cases, such as in football (soccer), women-specific programs had been mainstreamed or cut altogether. Similarly, once useful government women’s sport units had either been dismantled or restrained, leading to cutbacks in effectiveness and productivity.

“Government decisions have also led to the demise of many non-government women’s sport organisations,” Ms Reid said.

For example, Womensport Australia was established as a *women’s* organization and received funding under the National Women’s Grants program through the Department of Prime Minister and Cabinet. But in 1996 the Federal Coalition determined that funding to non-government women’s organisations would be ‘mainstreamed’. This meant that it needed to obtain funding from the ASC. Though it was guaranteed some funding, it was unable to maintain its impetus and was disbanded in the late 1990s.

“A new national organisation – the Australian Women’s Sport and Recreation Association – has recently been established with seed funding from the Federal Government and it’s expected that it will play a key role in providing leadership and advocacy for women and girls in sport and recreation. Ongoing government funding will be vital to sustain the work of the Association.

“The situation for women in sport will not improve unless we introduce programs that overhaul the intricate social and cultural features of sports that are dominated by people who are resistant to change and who are apprehensive about the rights and roles of women in sport,” Ms Reid said.

The Government must make a commitment to:

- promote awareness of the many issues around women’s participation in sport and physical activity;
- build motivation through critical mass support to create change;
- educate sport leaders on how to plan for creating a culture of respect so as to meet the needs of women and girls;
- conduct annual reviews of equity action plans and particularly examine whether or not NSOs complied with IOC quotas of women in leadership roles;
- regulate to implement equity policies as a criterion for funding, as outlined in “Towards Gender Equity in Sport; and
- implement sanctions against organisations that fail to correct the gender imbalance among players, leaders, coaches and referees.

**Ms Reid, who has been involved in women’s sport for nearly 30 years, was winner in 2006 of the Ausport Award for her contribution to women in sport.**

The 2010 conference of the international Working Group on Women in Sport (IWG) is to be held in Sydney.

The four previous conferences were held in Britain (1994), Namibia (1998), Canada (2002) and, this year, in Japan.

The successful bid to have the 2010 conference in Australia was led by UTS academic Johanna Vescio, who will co-chair the IWG from 2006 to 2010.

The four-yearly IWG Conference attracts a wide range of policy- and decision-makers in promoting equality of opportunity at all levels of sport and physical activity, including IOC members, members of national Olympic committees, the UN and international sport federations. More than 700 delegates attended this year’s conference in Kumamoto.



# AFL Injury Report

John Orchard and Hugh Seward

**The fourteenth season of the AFL Injury Survey was completed in 2005, with the AFL commissioning injury surveillance continually since 19921 and publicly releasing the results of the annual injury report since 19962. The AFL injury survey is therefore the world's longest running professional sport injury survey that has been publicly released on an annual basis<sup>3,4</sup> (the NFL in the USA has conducted injury surveillance for a longer period but does not provide an annual public release of data). The injury survey also guides the AFL Research Board to fund projects to study injuries that are common, severe and/or increasing in incidence in AFL players. Since 1997, the injury survey has accounted for every case of senior listed players missing games through injury in the home & away season<sup>3</sup>. In 2001 this was extended to include rookie listed players and finals matches.**

## Methods

The methods of the injury survey are now well established and have been previously described in detail<sup>3</sup>, although minor changes may be made on an annual basis. The definition of an injury is "any injury or other medical condition that prevents a player from participating in a regular season (home and away) or finals match".

This definition has been chosen to promote consistency across the 16 AFL clubs and from season to season. It allows a 'cross-check' of compliance with the injury definition to be performed using player movement monitoring. Player movement monitoring essentially requires that all clubs define the status of each player each round to be either: (1) playing AFL football (2) playing football at a lower level (3) not playing football

due to injury or (4) not playing football for another reason.

Since the 1997 season, all teams have been required to notify the AFL of the status of all players in the week after each match. Details of injuries (such as specific diagnosis, onset and mechanism) are not reported to the injury survey coordinator until the season has been completed, in order to minimise any concerns about the passing on of data during the playing season. The injury survey coordinator can cross-check the data provided by each club after the conclusion of the season with the player movement monitoring done in 'realtime' during the season, in order to maximise compliance with the injury survey definition.

Individual player injury details are not revealed in any report of the injury survey, but a mechanism is in place for further study to be conducted on a specific injury type. Thus Player Movement Monitoring has allowed the injury survey to achieve '100% compliance' for all instances of missed player games since 1997.

## Injury rates

The major measurement of the number of injuries occurring is seasonal injury incidence measured in a unit of *new injuries per club per season* (where a club is defined as 40 players and a season is defined as 22 rounds). The major measurement of the amount of playing time missed through injury is *injury prevalence* measured in a unit of *missed games per club per season*, or alternatively *percentage of players unavailable through injury*. The recurrence rate is the number of recurrent injuries expressed as a percentage of the number of new injuries. A recurrent injury is an injury in the same injury category occurring on the same side of the body in a player during the same season. Therefore, by

this definition, an injury of one type that recurred the following season was defined as a new injury in that next season.

All injury rates are adjusted to account for differing player list sizes and number of matches per club in each season, so that the injury rates reported each season represent a hypothetical club with 40 listed players participating in 22 matches. Each year, where changes are made to injury definitions, categories and methods of analysis from year to year, these changes are made *retrospectively* for all previous survey years. Therefore, some of the data presented in this report for previous years varies slightly from what is apparently the same data which has been published before in the reports of previous years.

## Results

### Weekly player status

Table 1 details player status on a weekly basis over the past nine seasons. The 'average' status of a club list of 43 players in any given week for 2005 was: 34 players playing football per week, 6 missing through injury and 3 missing through other reasons (such as suspension, being used as a travelling emergency, team bye in lower grade etc.). The injury prevalence in 2005 of 14.7% was low in terms of the historical average, being the second lowest (to 2003) overall prevalence recorded since 1997.

### Injury incidence

Table 2 details the incidence of the major injury categories. The injury incidence (number of new injuries per team per season) continued in 2005 at a level which was historically low. Hamstring strains have been the most common injury in every year of the survey, with generally 6 of these injuries occurring per club per season, and these injuries

**Table 1 – Average weekly player status by season (home & away season)**

STATUS	1997	1998	1999	2000	2001	2002	2003	2004	2005
Playing AFL	21.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Playing lower grade football	11.8	11.4	11.4	11.3	12.9	12.1	12.0	11.9	12.2
TOTAL playing	32.8	33.4	33.4	33.3	34.9	34.1	34.0	33.9	34.2
Not playing because of injury	7.7	6.7	6.4	6.2	6.7	6.6	5.7	6.4	6.4
Not playing for other reasons	1.9	1.6	1.8	1.8	1.8	2.3	2.5	2.5	2.8
TOTAL not playing	9.6	8.3	8.3	8.0	8.5	8.9	8.2	8.9	9.1
Players in injury survey (per club)	42.3	41.7	41.7	41.4	43.4	43.0	42.2	42.8	43.3
Injury prevalence (%)	18.1%	16.1%	15.4%	15.0%	15.5%	15.3%	13.5%	14.9%	14.7%

**Table 2 - Injury incidence (new injuries per club per season)**

BODY AREA	INJURY TYPE	1997	1998	1999	2000	2001	2002	2003	2004	2005
Head/neck	Concussion	0.6	0.7	0.5	0.6	0.7	0.7	0.3	0.3	0.7
	Facial fractures	0.8	0.7	0.8	0.7	0.4	0.4	0.6	0.8	0.6
	Neck sprains	0.1	0.2	0.2	0.2	0.1	0.0	0.1	0.1	0.2
	Other head and neck injuries	0.2	0.2	0.2	0.1	0.3	0.2	0.3	0.2	0.1
Shoulder/arm/elbow	Shoulder sprains and dislocations	1.0	0.9	0.7	0.7	1.1	0.9	1.3	1.0	1.3
	A/C joint injuries	0.9	0.9	0.6	1.3	0.9	1.1	0.3	1.2	0.7
	Fractured clavicles	0.4	0.4	0.3	0.5	0.3	0.3	0.2	0.6	0.3
	Elbow sprains or joint injuries	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.1
	Other shoulder/arm/elbow injuries	0.6	0.5	0.2	0.5	0.5	0.8	0.5	0.4	0.6
Forearm/wrist/hand	Forearm/wrist/hand fractures	1.1	1.7	1.7	1.4	0.8	1.1	0.8	1.1	1.3
	Other forearm/wrist/hand injuries	0.4	0.4	0.4	0.7	0.3	0.4	0.9	0.4	0.3
Trunk/back	Rib and chest wall injuries	1.1	0.5	0.8	0.7	0.4	0.8	0.7	0.6	0.3
	Lumbar and thoracic spine injuries	1.9	1.6	1.5	2.2	1.6	0.9	1.0	1.7	2.1
	Other trunk/back/buttock injuries	1.0	0.9	1.0	0.5	0.4	0.4	0.4	0.7	0.4
Hip/groin/thigh	Groin strains and osteitis pubis	4.1	3.3	3.1	3.0	3.5	3.9	2.8	3.1	2.8
	Hamstring strains	6.8	6.4	6.8	5.8	6.1	4.5	5.9	6.4	5.2
	Quadriceps strains	2.5	3.0	2.4	2.0	1.6	1.7	2.0	1.9	1.9
	Thigh and hip haematomas	1.3	1.3	1.1	1.1	0.6	1.0	0.3	1.1	1.0
	Other groin/hip/thigh injuries	0.4	0.2	0.3	0.4	0.3	0.3	0.4	0.3	0.2
Knee	Knee ACL	1.2	0.8	0.7	0.5	0.9	0.8	0.6	0.5	0.6
	Knee MCL	0.7	1.3	1.2	0.9	1.2	0.9	1.0	0.7	1.0
	Knee PCL	0.6	0.3	0.7	0.5	1.0	0.4	0.5	0.7	0.4
	Knee cartilage	0.9	1.1	1.1	1.2	1.9	1.3	1.7	1.2	1.3
	Patella injuries	0.2	0.4	0.1	0.2	0.2	0.4	0.1	0.1	0.3
	Knee and patella tendon injuries	0.5	0.6	0.7	0.7	0.5	0.8	0.7	0.4	0.7
	Other knee injuries	1.4	0.4	0.9	1.3	0.8	0.5	0.7	0.7	0.9
Shin/ankle/foot	Ankle sprains or joint injuries	2.7	2.8	2.1	2.7	2.0	2.5	2.6	2.7	2.5
	Calf strains	1.9	2.3	1.4	1.9	1.6	2.2	1.6	0.9	1.9
	Achilles tendon injuries	0.4	0.3	0.5	0.4	0.2	0.4	0.4	0.2	0.3
	Leg and foot fractures	0.5	0.8	1.1	0.6	1.0	0.9	0.5	0.5	0.4
	Leg and foot stress fractures	0.8	0.7	0.8	0.5	0.9	0.7	0.9	0.9	0.9
	Other leg/foot/ankle injuries	1.9	1.7	1.3	1.4	1.7	0.9	1.5	1.7	1.3
Medical illness	Medical illnesses	2.5	2.8	1.6	1.9	1.8	2.3	2.4	2.1	2.2
TOTAL INJURIES PER CLUB		41.9	40.3	36.9	37.4	35.8	34.4	34.1	35.6	35.8

were again very common in 2005, although slightly down on the 2004 incidence.

### Injury recurrence

Table 3 shows the rate of recurrence of the some of the common injury types, particularly muscle strains which have a comparatively high recurrence rate.

Some other injuries, such as fractures, concussion and 'cork' injuries have a low recurrence rate. The issue of recurrence for muscle strains is the subject of ongoing research<sup>5</sup>. The rate of injury recurrence has been showing a steady decline over the last 9 years. Season 2004 had the lowest recurrence rate on record, although season 2005 was still low by historical terms.

### Injury prevalence

Table 4 details the amount of missed playing time attributed to the most notable injury categories. In season 2005, hamstring also continued as the no. 1 injury in the game with respect to missed playing time, surpassing both groin injuries and knee ACL injuries. Based on injury prevalence (missed playing time), knee ACL injuries, hamstring injuries and groin & hip injuries are considered to be the 'big three' injury categories affecting AFL players. The majority of the occurrences of these 'big three' injuries have a non-contact mechanism.

## Analysis & discussion for significant injury categories

### Hamstring injuries

Hamstring strains remain the most common injury in the AFL. Previous analysis of hamstring and other muscle strain data show a high rate of recurrence<sup>5-8</sup>. The current AFL data show that management of these injuries has become more conservative over the last decade in the AFL. The mechanisms

of hamstring injury in football are overstriding when sprinting, bending to pick up the ball while running, or attempting to break out of a tackle<sup>9</sup>. The risk of recurrence is high and persists for three months after return to play because players often return with subtle strength deficits and/or biomechanical compensations<sup>5</sup>. There is research identifying the role of MRI as a predictor for safe return to play (without recurrence) from hamstring strains through the measurement of the size of the lesion<sup>10</sup>.

Table 5 shows that hamstring strains have decreased in incidence, prevalence and recurrence rate over recent seasons, with little change in overall average hamstring injury severity.

### Groin injuries

Groin injuries (including osteitis pubis) have been a major source of concern in AFL clubs over the past decade. These injuries have a high rate of recurrence and of becoming chronic. Fortunately Table 6 reveals that the incidence is certainly not increasing and may be decreasing over the past 9 years. Prevalence has decreased in each of the past three seasons, although it is still higher than in 1998-1999. The recurrence rate for these injuries remains high. Previous study has shown that groin injuries do not affect older or younger players more often, although there is a perception that younger players are susceptible to osteitis pubis (possibly due to the fact that younger players suffer fewer injuries over all, leaving groin injuries to make up a greater percentage of the injuries suffered in younger players). There is still very little consensus on the correct usage of surgery for chronic groin injuries, although it is likely that surgery is used less often in recent years than it was during the 1990s.

### Knee anterior cruciate ligament (ACL) injuries

In the AFL competition over recent years great attention has been given to the role of ground and surface conditions with respect to the prevention of ACL injuries. This has been based on research conducted within the AFL competition. The overall ACL injury prevalence has been consistently higher in the teams based in northern states compared to teams based in Victoria and in games played earlier during the season<sup>11</sup>, a factor which has led to this interest.

Internationally, the focus on prevention of ACL injuries has been completely different, with the vast majority of work concentrating on the use of balance/strengthening training to prevent these injuries. This relative shift in focus has probably been due to the fact that no other international competition has reported geographical differences in ACL injury rates, yet sex differences (with females more likely to be injured) have been noted in many sports.

It has been hypothesised that perhaps grounds are generally harder in the northern AFL venues, which might lead to greater ACL injury rates, although investigation has shown that grounds in the northern venues are generally not harder than Victorian grounds<sup>11-16</sup>. Major AFL venues have taken Penetrometer readings prior to games to attempt to assess the risk of injury and its relationship to ground hardness<sup>4,13</sup>. However, the relationship found between injury and ground hardness to date seems to have been minimal<sup>4,13</sup>. Recent research suggests that the grass types used on stadium fields and thatch depth, more so than ground hardness, may be more likely to be responsible for the 'early-season' and 'warm-season' biases for ACL injuries that have been previously noted<sup>17</sup>.

**Table 3 - Recurrence rates (recurrent injuries as a percentage of new injuries)**

INJURY TYPE	1997	1998	1999	2000	2001	2002	2003	2004	2005
Hamstring strains	37%	36%	30%	39%	25%	30%	27%	22%	27%
Groin strains and osteitis pubis	36%	31%	6%	16%	20%	23%	20%	24%	24%
Ankle sprains or joint injuries	20%	21%	9%	11%	17%	16%	6%	11%	15%
Quadriceps strains	35%	20%	20%	18%	10%	17%	9%	6%	20%
Calf strains	15%	15%	17%	32%	17%	13%	14%	6%	12%
ALL INJURIES	20%	19%	14%	16%	15%	13%	14%	11%	14%



**Table 4 - Injury prevalence (missed games per club per season)**

BODY AREA	INJURY TYPE	1997	1998	1999	2000	2001	2002	2003	2004	2005
Head/neck	Concussion	0.7	0.7	0.5	0.7	1.3	2.0	0.6	0.3	0.8
	Facial fractures	2.5	2.1	2.3	2.0	1.3	1.4	1.0	2.2	1.4
	Neck sprains	0.7	0.7	1.6	0.3	0.2	0.0	0.3	0.6	0.3
	Other head and neck injuries	0.3	0.2	0.4	0.8	1.5	0.2	0.7	0.2	0.2
Shoulder/arm/elbow	Shoulder sprains and dislocations	5.3	5.9	5.6	4.0	5.4	5.9	5.7	5.9	7.7
	A/C joint injuries	2.2	2.1	0.9	3.1	2.1	2.4	0.7	2.5	1.9
	Fractured clavicles	1.4	1.6	1.2	3.0	1.6	2.0	1.0	3.5	1.3
	Elbow sprains or joint injuries	0.7	1.2	0.2	0.1	0.4	0.3	0.4	0.7	0.4
Forearm/wrist/hand	Other shoulder/arm/elbow injuries	2.4	1.9	0.3	1.3	1.3	4.0	1.6	1.6	2.4
	Forearm/wrist/hand fractures	4.1	5.4	5.9	5.6	2.8	3.1	2.6	3.9	3.8
Trunk/back	Other forearm/wrist/hand injuries	0.7	1.3	0.9	1.8	0.3	2.2	3.1	1.2	1.2
	Rib and chest wall injuries	2.5	1.0	1.8	1.0	0.5	1.3	1.5	1.1	0.5
	Lumbar and thoracic spine injuries	12.2	4.6	8.0	8.5	5.8	5.8	2.4	5.9	6.4
Hip/groin/thigh	Other trunk/back/buttock injuries	3.7	1.4	2.0	2.2	1.5	1.7	1.5	2.1	0.7
	Groin strains and osteitis pubis	17.4	13.9	9.4	7.5	13.6	15.8	13.6	13.3	11.2
	Hamstring strains	21.0	21.0	22.6	22.9	21.4	15.7	18.8	21.7	19.1
	Quadriceps strains	8.6	9.5	6.7	5.6	3.8	4.3	6.0	4.2	6.4
	Thigh and hip haematomas	2.4	1.8	1.5	1.8	0.6	1.9	0.5	1.7	1.6
	Other groin/hip/thigh injuries	1.7	0.5	2.3	1.5	1.7	1.2	1.5	2.6	0.5
Knee	Knee ACL	19.8	15.8	10.8	4.8	13.6	16.5	10.8	10.1	9.3
	Knee MCL	3.3	4.3	3.3	3.5	4.8	3.3	2.9	2.9	3.0
	Knee PCL	1.9	2.2	5.2	2.3	5.9	2.3	2.0	6.5	2.7
	Knee cartilage	4.0	5.6	5.3	8.6	12.5	6.0	7.0	6.1	7.8
	Patella injuries	0.9	1.6	0.8	1.8	0.8	2.5	0.6	0.1	0.8
	Knee and patella tendon injuries	2.4	1.6	3.9	3.9	2.5	3.7	2.9	0.9	2.6
	Other knee injuries	3.9	1.2	2.2	3.6	2.5	1.0	2.4	1.3	3.8
Shin/ankle/foot	Ankle sprains or joint injuries	7.2	6.9	3.9	6.8	4.3	5.9	5.3	6.7	9.2
	Calf strains	5.8	6.4	3.4	5.7	3.4	4.4	3.9	1.7	4.5
	Achilles tendon injuries	1.3	1.4	1.3	1.6	0.7	0.9	1.5	0.8	1.9
	Leg and foot fractures	2.6	5.4	8.8	4.6	7.2	7.9	3.0	3.7	2.7
	Leg and foot stress fractures	4.9	4.0	6.7	3.8	4.4	3.9	5.3	6.3	5.1
	Other leg/foot/ankle injuries	6.4	5.1	3.1	4.1	4.2	2.3	3.7	4.3	4.3
Medical illness	Medical illnesses	4.2	3.7	3.3	2.8	2.6	2.9	3.9	4.2	3.6
MISSED GAMES PER CLUB PER SEASON		159.2	141.9	135.9	131.8	136.4	134.7	118.7	131.0	125.4

**Table 5 - Key indicators for hamstring strains over the past nine seasons**

HAMSTRING STRAINS	1997	1998	1999	2000	2001	2002	2003	2004	2005
Incidence	6.8	6.4	6.7	5.6	6.1	4.5	5.8	6.3	5.2
Prevalence	21.0	21.0	22.6	22.9	21.4	15.7	18.8	21.7	22.7
Severity	3.1	3.3	3.4	4.1	3.5	3.5	3.2	3.5	4.4
Recurrence rate	37%	36%	30%	39%	25%	30%	27%	22%	27%

**Table 6 - Key indicators for groin injuries over the past nine seasons**

GROIN	1997	1998	1999	2000	2001	2002	2003	2004	2005
Incidence	4.1	3.3	3.1	3.0	3.5	3.9	2.8	3.1	2.8
Prevalence	17.4	13.9	9.4	7.5	13.6	15.8	13.6	13.3	10.0
Severity	4.3	4.2	3.0	2.5	3.9	4.1	4.8	4.4	3.6
Recurrence rate	36%	31%	6%	16%	20%	23%	20%	24%	24%

It is unlikely that surface hardness (independent of shoe-surface traction) is the most important extrinsic risk factor for ACL injury across a variety of sports. Because the interactions of grass type, player choice of boot and shoe-surface traction are not well understood, it is still premature to make any strong recommendations about acceptable ground conditions with respect to safety in preventing ACL injuries.

ACL injury rates have fallen over the past few years, but there are not enough comparative data to attribute this to either reductions in ground hardness, traction and/or the removal of cricket pitches at this stage. Perhaps some of these interventions have been successful in combination. There may be other confounding factors, such as individual club proprioceptive training programs, that could have contributed to the recent reduction in ACL injury incidence.

### Knee posterior cruciate ligament (PCL) injuries

The rate of knee posterior cruciate ligament (PCL) injuries has varied from year to year. Although the total injury incidence did not particularly increase from 1997 to 2004, it was noted that there was an increase in the number of these injuries occurring at centre bounce

ruck duels. Over this same time period, fewer players appeared to have suffered this injury in falls around the ground, which may reflect the improvement in ground preparation producing softer playing surfaces.

New rules were introduced in 2005 to limit the ruckman's run up, with the introduction of a 10-metre outer circle. The rationale for this change was to reduce the momentum of any knee contact, while maintaining the spectacle of this unique contest, and thereby reducing the severity of any subsequent injury. There were no centre bounce ruck mechanism PCL injuries in 2005, indicating success with this rule change. It is expected that the trend of higher PCL injuries amongst ruckmen will be reversed, reducing the morbidity amongst ruckmen and extending their careers.

### Conclusions

Table 15 shows that from 1997 to 2005, injury incidence and injury recurrence rate have gradually decreased. Injury severity (average number of games missed per new injury) has stayed fairly constant. Because the recurrence rate is also gradually dropping, this indicates that the average new injury is keeping players out for longer, but the longer

new injury recovery time is being counterbalanced by the reduced time missed from recurrent injuries.

Certainly the ongoing trends in the injury rates vindicate the approach the AFL is taking towards injury surveillance and research. The AFL is one of the few professional sports in the world (if not the only one) which can say it has successfully lowered its overall injury rates over a sustained period with the aid of injury surveillance<sup>18</sup>.

Possible variables that may have positively affected injury rates include: (1) the program of ground condition surveillance by all major venues with a resulting greater focus on safety; (2) the specific move by grounds to promote rye grass use as the predominant species; (3) video surveillance and low tolerance to foul or illegal play, showing a continuing influence on reducing concussions; (4) the establishment of a research board with a knowledge increase from the specific projects to have arisen out of this funding; (5) improved management and prevention of injuries at club level; (6) changes to player footwear that have occurred over the past decade; and (7) changes in styles of play that have occurred over the past decade.

**Table 7 - Key indicators for knee ACL injuries over the past nine seasons**

KNEE ACL INJURIES	1997	1998	1999	2000	2001	2002	2003	2004	2005
Incidence	1.2	0.8	0.7	0.5	0.9	0.8	0.6	0.5	0.6
Prevalence	19.8	15.8	10.8	4.8	13.6	16.5	10.8	10.1	9.3
Number of graft ruptures (compared to total ACL injuries)	3/21	2/15	0/8	1/8	1/17	4/15	0/11	2/9	1/10

**Table 7 - Key indicators for PCL injuries over the past nine seasons**

KNEE PCL INJURIES	1997	1998	1999	2000	2001	2002	2003	2004	2005
Incidence	0.6	0.3	0.7	0.5	1.0	0.4	0.5	0.7	0.4
Prevalence	1.9	2.2	5.2	2.3	5.9	2.3	2.0	6.5	2.8
Severity	3.3	7.4	7.2	4.8	5.9	5.9	4.4	9.0	7.3
Number of centre bounce PCL injuries (compared to total)	0/10	2/5	3/12	4/8	4/18	3/7	2/8	5/13	0/9

**Table 8 - Key indicators for all injuries over the past nine seasons**

ALL INJURIES	1997	1998	1999	2000	2001	2002	2003	2004	2005
Incidence	41.9	40.3	36.9	37.4	35.8	34.4	34.1	34.8	34.7
Prevalence	159.2	141.9	135.9	131.8	136.4	134.7	118.6	131.0	125.4
Severity	3.8	3.5	3.7	3.5	3.8	3.9	3.5	3.8	3.6
Recurrence rate	20%	19%	14%	16%	15%	13%	14%	11%	14%

The AFL injury profile continues to be consistently defined and published in both the sports medicine scientific literature and in public media releases<sup>3</sup>. Hamstring injuries, knee ACL injuries and groin injuries (including osteitis pubis) are consistently the most prevalent injuries in AFL players.

The major findings of the 2005 injury survey are that:

1. ongoing rates of injuries remain low in historical terms, and that
2. recent trends in PCL injuries in ruckmen justify the recent centre circle rule change.

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Controlling injury risk through the use of personal protective equipment, such as wearing a custom-fitted mouthguard, is therefore an important step to reduce injury and the associated cost of dental treatment<sup>3</sup>.

The ADA's views are also consistent with the position statements of the Australasian Academy for Paediatric Dentistry, Standards Australia, the International Society for Dentistry Sport and Trauma, the International Academy for Sports Dentistry, the American Academy for Paediatric Dentistry and the International Association for Dental Traumatology, all of whom recommend the use of custom-fitted mouthguards.

**Greg Ford (Research and Policy, Australian Dental Association)**

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# SURFBOARD INJURIES: a study over time

Peter Roger and Brendan Lloyd

**This article looks at injuries sustained during surfboard riding over an eight year period and so provides a much needed update to previous knowledge. Former research into surfing injuries looked at causes and incidence of all injuries in the surf in the Manly–Warringah region of Sydney<sup>1</sup>. This was from the early 1970s and, as well as surf board riders, included surfboat crew and swimmers and divers.**

It is now 30 years old. Hawaiian studies have suffered from incomplete data collection and yet still attempted to estimate injury rates<sup>2</sup>, and others have attempted to present an overview of the topic, even with advice on injury management<sup>3</sup>. A Queensland paper on surfing injuries lacked specificity and even included “Beach umbrella trauma”<sup>4</sup>.

Two significant studies, from Australia in the 1980s by Lowden et al, gained information from specific groups of surfers<sup>5,6</sup>. These were both retrospective studies concerning injuries over the previous 12- and 24-month periods, and thus solely depended upon the reliability of memory. A more recent cross-sequential study over a 12 month period in 1995-96 by Roger<sup>7</sup> recorded the surfing injuries as they presented to a local health facility. Data regarding types of injuries and their severity as well relationship to crowd numbers and estimated surf size were presented. However, that study tells us nothing about the effect of time itself on the presentations of surfing injuries.

Byron Bay has for many years been acknowledged as Australia's surfboard riding capital, and is now also regarded as the nation's “learn-to-surf capital”<sup>8</sup>. Southerden also recognises the large increase in surfing numbers and this trend is confirmed by the town's longest established surfing school, Surfing Byron Bay.

Consequently, surfing conditions have changed greatly in Byron Bay over the last 10 years. The question is to what extent have changes in conditions affected surfing injury presentations?

## Method

Three sets of cross-sequential data were collected from injured surfers who presented for treatment at the Byron Hospital Accident and Emergency Department. The nearest emergency department is 20 kilometres away. Therefore presentations at Byron Hospital are likely to represent the vast majority of surfing injury presentations for the Byron Bay area.

The first set of data is labelled ‘1996’ from 1 July 1995 to 31 June 1996. It also represents the baseline for the period of time just prior to surfing schools introducing soft-edged rubberised boards. The remaining two sets each represent 12-month-periods: ‘1998’ from 1 July 1997 to 31 June 1998 and ‘2002’ from 1 July 2001 to 31 June 2002. Each individual case represents a presentation, not the individual injured surfer. The Byron Hospital Director of Nursing gave her consent for the data to be collected at the hospital by the nursing staff and doctors in the Accident and Emergency Department.

While awaiting treatment, injured surfers were invited to complete one A4 data sheet seeking their age, number of previous injuries, cause of the injury, approximate size of the surf, approximate number of surfers, and years of surfing. The medical input was to classify the severity of the injury. The patient's personal details were kept separate from the data collection. No patient can therefore be identified from a data sheet. Any questionnaires not specifically related to surfboard injuries

(eg, body-surfers) which may have been completed by mistake were culled.

The severity factor classifies injuries as either major or minor. Lacerations were classified according the Health Insurance Commission fee schedule-14. All fractures and dislocations or other injuries requiring further follow-up other than routine suture removal or the like were regarded as major. In the event of more than one notable injury occurring for any presentation, the most significant was rated accordingly.

The factor for past injuries is either ‘yes’ or ‘no’ for a self-reported history of past surfing injuries. The cause of the injury is ‘own board’, ‘some-one else's board’, or ‘other’ (such as a jellyfish or rocks). Wave size is an estimate for either ‘small’ (less than 1 metre), or ‘large’ (greater than 1 metre). Crowd size is an estimate for either ‘small’ (fewer than 10) or ‘large’ (greater than 10). Surfing experience is derived from the number of years as a surfer and categorises presentations as either ‘rookie’ (1 year or less) or ‘experienced’ (more than 1 year).

## Results

The total data set consists of 303 injury presentations from three cross-sequential samples for 1996 (n=83), 1998 (n=100) and 2002 (n=120). The mean age of presentations is 26.56 years with a standard deviation of 10.19. There is no significant difference for age across the three data sets ( $F[2]=1.398$ ,  $p=.249$ ).

Table 1 shows the interaction for severity of injury presentations over time. The interaction is not significant at  $p \leq .05$ . This result is interpreted to mean that the proportion of major to minor-injuries did not change from 1996 to 2002.

Table 2 shows a significant result with  $p < .05$  for the interaction between experience and time for presented

injuries. This is interpreted to mean that the proportion of rookies to experienced surfers presenting injuries has increased. The interaction can be interpreted by comparing the actual counts to the expected counts in Table 2. For example, in 1996 there were more than expected experienced surfers and fewer than expected rookies. In 2002 this is reversed to show fewer than expected experienced surfers to more than expected rookies.

The finding that more rookies are presenting with injuries would be due to the simple increase in surfing-school activities since May 1996. The positive interpretation is that, though there is a proportional increase in injured rookies, there has in fact been a decrease in the severity of injuries up to 2002.

Table 3 summarises the interaction results for past injuries, cause of injuries, size of waves and size of crowd in relation to the time factor. All the

interaction effects are significant at  $p < .05$ . The results in Table 3 generally create the impression that more inexperienced surfers are taking to the surf under less than ideal conditions. For example, the proportional increases of injury presentations in relation to smaller crowds and smaller waves give the impression of untempered keenness for rookies. Likewise, the proportional increase for injury presentations caused by other boards and a proportional increase in injury presentations with a history of injuries both raise concerns in the discussion to follow.

**Table 1 – Severity of injury by time cross-tabulation**

SEVERITY		1996	1998	2002	TOTAL
Minor	Count	60	72	94	226
	Expected count	61.9	74.6	89.5	
	% within year	72.3%	72.0%	78.3%	74.6%
Major	Count	23	28	26	77
	Expected count	21.1	25.4	30.5	
	% within year	27.7%	28.0%	21.7%	25.4%
Total	Count	83	100	120	303
	% within year	100.0%	100.0%	100.0%	100.0%

Chi-square = 1.473, df = 2,  $p = .479$

**Table 2 – Experience by Time cross-tabulation**

EXPERIENCE		1996	1998	2002	TOTAL
Experienced	Count	57	70	66	193
	Expected count	52.9	63.7	76.4	
	% within year	68.7%	70.0%	55.0%	63.7%
Rookie	Count	26	30	54	110
	Expected count	30.1	36.3	43.6	
	% within year	31.3%	30.0%	45.0%	36.3%
Total	Count	83	100	120	303
	% within year	100.0%	100.0%	100.0%	100.0%

Chi-square = 6.533, df = 2,  $p = .038$ .

**Table 3 – Summary of cross-tabulations by Time for the remaining factors**

FACTORS	CHI-SQUARE	DF	P	INTERPRETATION
Past injuries	12.32	2	.002	More presentations with past injuries
Cause of injury	19.63	4	.001	More the other board than own board
Size of waves	8.74	2	.013	More injuries in smaller surf
Size of crowd	7.23	2	.027	More injuries with smaller crowds

df = degrees of freedom

## Discussion

The trends for surfing injury presentations at Byron Bay from 1996 to 2002 are both promising and foreboding. Tables 1 and 2 show the promising aspect in this study over this time frame. That is, the trend does not show a proportional increase in the presentations of major injuries compared to presentations of minor injuries, though at the same time there is a proportional increase of inexperienced surfers presenting with injuries. The foreboding trends are shown in Table 3 but understandably reflect the increased number of participants, especially of learner status. Though there was only one surf school in 1996, four are now operating in the region.

From a promising point of view, the severity of the presented injuries from 1996 through to 2002 has decreased. The injuries trend for rookies presenting has risen from about a third to almost a half of surfing injury presentations. In 1997, the first Surfing Australia-endorsed surf school, Surfing Byron Bay, started using surfboards with soft rubberised edges and flexible soft fins. In fact, Byron Shire Council now insists on their exclusive use for registration of a surf school. Perhaps their use may be contributing to the noted decrease in serious injuries.

These results should be good news for the New South Wales Sporting Injuries Committee in the light of its publication on youth sports injuries<sup>9</sup>.

Interestingly, presentations are proportionally more associated with smaller surf and smaller crowds and this phenomenon has not significantly changed over time. This possibly says that greater numbers of enthusiastic individuals are venturing out on to the less desirable surf and being injured. This observation could indicate another aspect of inexperience that applies to rookies once they are off the soft-boards and on to their own 'hard' boards.

The remaining factor in Table 3 – cause of injury – says that presentations are increasingly more associated with injuries inflicted by someone else's board. This could be an aggression factor related to the greater proportion of rookies who are often ignorant of

the established surfing protocols, as well as the intolerant stance of the more established surfers who often have a sense of entitlement for "their surf"<sup>10</sup>.

This study has on one hand answered concerning questions and at the same time has posed new ones.

Evidently Surfing Australia and the accredited surfing schools have done their job well and they have acted responsibly in taking on an increasing number of enthusiastic new surfers. At the same time there are questions raised from the data that might suggest future research should more closely examine behavioural and personality factors in relationship to injury-presentations and their severity.

**Dr Peter Roger has practised general and sports medicine at Byron Bay since 1973 and Dr Brendan Lloyd has had a clinical psychology practice there since 1995.**

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AUSTRALIAN PHYSIOTHERAPY ASSOCIATION  
Sports Physiotherapy Australia

By Belinda Gabbe

# Hamstring injuries and the ageing player

Australian Football is well known for its speed, physical clashes and spectacular play. As both a spectator sport and a participation sport, its popularity in this country is unquestioned but is often over-shadowed by the publicity associated with injuries sustained and their impact on players and club performance. Players sustain a wide variety of injuries and many sports physiotherapists, in their experiences working with clubs and managing injuries sustained, will have noticed the change in profile of injuries sustained as players age. For most, it is not difficult to recall an example of an elite player whose latter stage of their career was significantly hampered by recurrent soft tissue injuries, with hamstring injuries the most common.

## The problem with hamstring injuries

Overall, hamstring injuries are the most common injury sustained by Australian Football players. Ongoing injury surveillance in the elite Australian Football League (AFL) shows that the incidence of hamstring injuries has varied little over the past 10 years and evidence from the community-level of Australian Football shows that around 13%-14% of all injuries sustained are hamstring injuries. The major challenge related to hamstring injuries is their rehabilitation and returning the athlete to play successfully. Hamstring injuries have a high rate of recurrence and there is no fail-safe rehabilitation program. Combined with the costs related to missed training time, unavailability for matches and treatment, primary prevention of hamstring injuries remains a key priority for Australian Football.

## Identifying risk factors for hamstring injuries

In general, injury prevention follows a simple four-step process: (i) identify

the problem (ie, hamstring injuries); (ii) identify risk and causative factors; (iii) develop strategies for prevention based on the risk and causative factors; (iv) implement the prevention strategies and evaluate whether or not they work. This framework forms the basis of a scientific approach to preventing sports injuries and the prevention of hamstring injuries is no different.

Much of the research over the past 20 years has focused on identifying risk factors for hamstring injury. Early on, the quality of this research was substantially limited by the retrospectivity and generally poor study designs used which predominantly involved comparison of hamstring-injured athletes with uninjured athletes to determine the differences between the groups, or comparison of the hamstring-injured leg with the uninjured leg in an attempt to understand why the injury was sustained. Both of these approaches have significant limitations and rely on the premise that the differences seen were pre-existing (ie, were there before the injury). Unfortunately, once an injury has been sustained, it is virtually impossible to determine whether the differences seen were the result of injury or pre-existing. Many of the early studies were therefore unable to identify definitive risk factors for hamstring injury.

Over the past decade, most of the advancement in understanding risk factors for hamstring injuries has come from prospective studies undertaken in Australian Football at the elite and community-levels. In these studies, uninjured players are recruited, undergo baseline testing and are followed prospectively, usually for a competitive season, to establish which factors predispose the athletes to hamstring injury. Though many potential risk factors such as strength, flexibility, warm-up and cool-down behaviours,

participation in other sports, training exposure, anthropometric characteristics and joint range of movement have been investigated, there is one striking finding that is consistent across the studies: age.

## Hamstring injuries and the ageing player

Several studies in Australian Football have identified increasing age as a significant and independent risk factor for hamstring injury (*Clinical risk factors for hamstring muscle strain injury: a prospective study with correlation of injury by magnetic resonance imaging; Intrinsic and extrinsic risk factors for muscle strains in Australian Football; Risk factors for hamstring injuries in community-level Australian Football; Predictors of hamstring injury at the elite level of Australian Football.*) That is, irrespective of any other factors, the risk of hamstring increases as the athlete gets older.

What is interesting is the age at which risk of hamstring increases for players, with studies showing that players aged  $\geq 23$  years at greater risk at the community-level of football, and two studies showing 24 and 25 years to be the cut-off for elevated risk of hamstring injury at the elite-level of Australian Football.

For a sport in which players would not be considered 'veterans' until the latter half of their 20s and early 30s, the finding that a significant risk in hamstring injury risk occurs in the mid 20s is surprising, raising these questions: why this is so and what can be done to change injury risk? Players cannot reverse the normal course of ageing to reduce their risk of hamstring injury. But what if there are changes that occur in ageing athletes that could be altered through targeted programs? If this were the case, the incidence of hamstring injuries in this high risk group could be reduced.



A number of theories have been proposed for the relationship between age and hamstring injury risk such as lumbar spine pathology and age-related changes in skeletal muscle. While the theories warrant discussion here, it is important to note that there is no definitive evidence to support these hypotheses to date.

A paper published in 2004 (*Lumbar spine region pathology and hamstring and calf injuries in athletes: is there a connection?*) argued the case that extraforaminal nerve root entrapment at the level of L5 was a plausible explanation for the elevated risk of hamstring injuries in older athletes. The authors proposed that degenerative changes at the L5/S1 region of the spine may trigger hypertrophy of the lumbosacral ligament, leading to subtle entrapment of the L5 nerve root which in turn could alter the motor control of the hamstring muscles and increase the risk of injury, although their method of measurement of success was not clearly stated. They went further and reported preliminary success with imaging guided cortisone injections to the lumbosacral canal in athletes at high risk of hamstring injury.

While theoretically plausible, particularly given the anatomic, cadaveric and clinical anecdotal evidence put forward by the authors, proof that lumbar spine pathology explains the increased risk of hamstring injury in older athletes is lacking but further studies are clearly warranted to confirm or reject this

theory. If we do find that lumbar spine pathology is a causative factor for why older football players sustain hamstring injuries, what action can we take? The development of preventive programs would be difficult. Could we prevent the pathological changes from occurring? Overall, if the relationship between ageing and hamstring injury is due to lumbar spine pathology, the potential for widespread prevention of hamstring injuries in this age group is unlikely.

An alternative explanation for the link between age and hamstring injury risk in Australian Football lies in the ageing of muscle itself. Literature regarding skeletal muscle and ageing is relatively clear.

Ageing is associated with changes in skeletal muscle such as the loss of muscle mass, reduction in muscle fibre number and size, loss of fast-twitch muscle fibres, and denervation of muscle fibres. What is more difficult to ascertain is how relevant these changes are to Australian Football context where the concept of ageing in the athlete differs to the general population. Much of the literature related to age changes in skeletal muscle has focused on the elderly. There is a distinct lack of data to describe the changes that occur in skeletal muscle over the age range of athletes who compete in sports such as Australian football.

There is some evidence to suggest that skeletal muscle fibre loss begins around 25 years of age which is consistent with

the age at which hamstring injury risk increases in football. Perhaps even subtle degenerative changes in the hamstring muscles are important. Any reduction in muscle function or strength could predispose the athlete to hamstring injury as the demands of the sport do not necessarily change with age.

While there is conflicting evidence that muscle weakness predisposes Australian Football players to hamstring injuries, whether or not this becomes increasingly important in the older athlete has not been specifically investigated. Nevertheless, muscle weakness or dysfunction would be more conducive to the development of programs or strategies to reduce the incidence of hamstring injuries in older players. There is a growing body of evidence to suggest that targeted training programs can reduce the incidence of hamstring injuries in football populations but whether or not the success of these programs is across the age range is not known. Should the relationship between age and hamstring injury risk lie in age-related skeletal muscle changes, perhaps muscle training programs should reflect this.

### Where to from here?

Much of the literature to date has highlighted the relationship between age and hamstring injury risk in Australian Football.

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# OSTEOPATHY IN SPORT

Peter Parker

**Where exactly does osteopathy fit in the sporting environment? Where does it fit now and where should it rightfully be? There is still an enormous amount of confusion as to where an osteopath may fit in the structure of health care in sport. I hope that that articles serves to clear some of this confusion.**

Much of what I write will be generalising as to how the majority of osteopaths work. There are always variances and I do not wish to segregate those who work differently. We would hope that our five years of undergraduate training (degree and masters) give us the knowledge as primary care practitioners to make an accurate diagnosis on and off the field. This means that osteopaths are taught using current accepted models of orthopaedic and neurologic diagnosis, thereby making it safe to treat people suffering many different complaints including back pain, headaches, disc injuries, arthritis, etc.

Osteopathy has grown substantially over the last 10 years in private practice throughout Australia. Its success is based on its excellent clinical results and the increase in graduate numbers through the university system. When I graduated 11 years ago, I was one of only 15 students to do so nationally. Now that number per year has increased by approximately eight times. It has led to an increased recognition in the community, and particularly in the sporting arena where many osteopaths now work with elite level athletes in and out of the private practice setting.

Osteopathy is now reaching the level of growth whereby we as a profession are starting to be recognised officially in sporting arenas. Our recent recognition for full membership with Sports Medicine Australia is fantastic and validates that involvement. It allows osteopaths to be among allied health peers to share knowledge and understanding. The community will be the one to benefit and that is what we are all about.

Osteopathy is certainly not new. Its modern roots date back to 1872. This manual therapy was developed in the 18th Century by an American physician, Dr. Andrew Taylor Still. He watched helplessly as his three children died of meningitis in the 1850s. He believed that the body was created as a perfect, harmonious whole and contained the basics necessary for its own healing. Fascinated by the human body, he devised his own philosophy and principles which have more than stood the test of time with excellent clinical outcomes. He eliminated the use of addictive and toxic drugs from his practice and considered surgery a last resort as a means of treatment. The first osteopaths came to Australia in 1908 from the United States.

Osteopathic treatment is considered non-invasive, gentle and safe. The range of techniques are all hands-on and expansive, including direct techniques such as manipulation and massage and indirect techniques to decrease tension in the connective tissues of the body and restore a sense of balance. Osteopathy is thus ideal for treatment of infants, children and the elderly.

There is still a long way to go to provide the practitioners needed in the community, especially regionally, but the numbers are heading the right way. The Australian Osteopathic Association has a mandate for responsibly increasing the number of osteopaths in the community and, in particular, rural and remote regions of Australia.

The real beauty of osteopathy lies within its philosophy, diagnostic interpretation and palpation skills. Thinking, knowing, seeing fingers looking for the imbalance or primary which is driving the athlete's complaint. At undergraduate level we spend extensive time learning and practising all the hands-on skills to ensure that when we graduate we have the necessary skills to be competent with the public. Then the real journey begins. Osteopathy marvels at the human body and what it shows us every day. Our

career is not a series of techniques that are performed day in and out. It is a journey of professional development and increased skill. Roland Becker, a famous American osteopath, once commented that "you need two lifetimes to begin to understand the human body". For him, and I would hope many osteopaths in Australia, it is a passion and a journey.

## So where do we fit in sports medicine?

Biased as I naturally am, I am a passionate believer in what osteopathy can offer the weekend warrior right through to the elite athlete.

Of course there is crossover with physiotherapists. We are treating many of the same injuries. We are in the same health sector. I have worked extensively with physiotherapists in my three years working with the Wallabies from 1999-2001. They were a fantastic learning-curve resource for me. The two professions worked synergistically for the benefit of the athlete. Thus I believe they could work well together in a sports environment and offer even more resources to athletes, which ultimately increases their chances of staying on the track.

Osteopaths can offer an enormous amount in the sporting domain. We are in sporting teams and organisations. We are also in medical teams for events such as the Paralympics and PGA. Many of the athletes who are treated by osteopaths in private practice comment on how they would love an osteopath to be on their team for their "hands-on" skills. The fact that to date we have been limited is mainly due to our numbers and high demand in private practice. As a profession we need to educate other allied health professionals and the medical fraternity on what we do if we expect to get a leg up and become more involved.

Becoming full members of SMA is a step forward for us and one the osteopathic family very much appreciates.

## Common questions asked about osteopathy

### Can patients claim their osteopathic treatment on private health insurance or Medicare?

Most private health plans with “extras” cover a portion of the treatment cost. Many clinics are now installing the HICAPS facility, which allows patients to claim this portion on the spot by scanning their private health insurance card.

Osteopathic treatment is now covered by Medicare only under an Enhanced Primary Care (EPC) plan in conjunction with the osteopath and the general practitioner.

### Is osteopathic treatment claimable under Workcover, transport accident insurers or Veterans Affairs?

Yes, osteopaths are able to treat patients supported by third-party insurers but you should check the individual bodies in each state. TAC and Workcover patients are required to provide details of the claim number for their case and the name of the contact they are given from the insurer.

Patients who are covered by the Department of Veterans Affairs must first obtain a referral from their GP made out to the osteopath they are booked in to see.

### What happens during my first treatment?

Patients are asked on arriving at the practice to complete a brief questionnaire which details their past medical history and presenting complaint. The osteopath will then take a detailed history of their condition as well as any other relevant medical history such as previous trauma, accidents or medications.

A thorough physical examination will follow which includes analysing specific movements and hands-on assessment of the problem region. An osteopath looks at the body as a unit, which means that the examination may include an assessment of areas adjoining the problem region in order to assess the overall effect of the complaint.

Once a definitive diagnosis has been made, the osteopath will use a variety of hands-on techniques which may include soft tissue massage, joint manipulation, stretching and gentle connective tissue balances aimed at restoring health to the affected area.

The treatment may also include advice on postural, exercise or dietary changes that patients can make to aid in their recovery.

The initial consultation will generally last anywhere from half an hour to an hour. Any subsequent consultations, should they be required, are generally 30 to 45 minutes.

### How many treatments will they need?

Every patient who walks through an osteopathic clinic doors is different and is treated as such. Osteopaths tend not to follow any “recipe book” for treatments, regardless of the problem, which makes this a difficult question to answer. In general, the longer the problem has existed the longer the recovery, but factors such as posture, compliance with exercises and the frequency of treatment can directly affect recovery. The osteopath will give a clear idea as to prognosis and any changes to it as treatment progresses.

### What is the difference between osteopathy, chiropractic and physiotherapy?

This is one of the most common questions we are asked. There are some similarities between the three modalities both in conditions treated and in some of the techniques used. The main differences are found in the philosophies behind each modality and how the principles of treatment are applied.

It is not for any one health professional to explain the theories behind other modalities, but the main principles of osteopathy are that the body is a unit and the structure and function of the body are interrelated. This means that dysfunction, or damage, to one area of the body can have drastic effects on other areas. Osteopaths aim not only to treat the symptoms of the problem, but also the cause behind them. In doing so, all of the techniques are hands-on and are specific to the individual's condition and medical history.

Osteopaths traditionally take the time needed to treat patients thoroughly. As an average, most would spend 30 minutes one on one. Osteopaths often work to the motto “find, fix it and leave it alone”. As a rule of thumb, most will try to get a result ASAP rather than a treatment plan week after week.

These questions represent but a few of the many enquiries SMA members may have about osteopaths. There are now many osteopaths in the community. The Australian Osteopathic Association is their peak representative body in Australia and has mandatory, audited Continuing Professional Development standards.

For more information on the AOA and to find the closest osteopath to you, go to [www.osteopathic.com.au](http://www.osteopathic.com.au) or call 1800-4-OSTEO(67836).

As SMA CEO Gary Moorhead said in the last issue of Sport Health, “Osteopathy is a conventional medical science primarily focused on disorders of the musculoskeletal system”. We are complementary to the care that already exists. Try osteopathy, let us show you what we do and I hope that we can add a significant dimension to the face of sports medicine in Australia.

**Peter Parker, is a registered osteopath and Federal President of the Australian Osteopathic Association.**

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It is clear that older athletes are at significantly elevated risk of hamstring injury. What we do not know is exactly why. An upcoming paper in the *Journal of Science and Medicine in Sport* provides some preliminary evidence that the risk factors for hamstring injuries in older Australian Football players are different. Perhaps the best buys for hamstring injury prevention are to investigate high risk groups such as older Australian football players with a view to developing specific prevention strategies for this group.

Understanding the risk factors for hamstring injuries and their prevention is much like a jigsaw puzzle. Each new piece of research meshes with previous research and guides the next piece. The puzzle is far from complete but it is clear that the research undertaken in Australian Football is making the picture clearer.

**Dr Belinda J Gabbe is at the Department of Epidemiology and Preventive Medicine at Monash University**



# Comings, Goings, Happenings

At the July 2006 combined meeting of the SMA National Board and the Presidents of the SMA State Branches it was unanimously agreed that the national constitution of SMA (the "Articles of Association of the Australian Sports Medicine Federation Limited") should be amended to make it easier for members to be elected to the National Board.

Currently there is an eligibility requirement for a member wishing to be elected from a state as a National Director to have served "at least 2 of the last 5 years on their State Council or Board". The National Board and State Presidents are of the view that this requirement is unnecessarily restrictive and that, for election as a National Director, it is sufficient that the candidate is a full member of SMA from the state they are seeking to represent. The Board subsequently passed a motion that this proposal be put to the next AGM.

As a result, the following Special Resolution will be moved under Item 9 "Special Business" at the Annual General Meeting to be held at the Shangri-La Fijian Resort, Yanuca, Fiji on 21 October 2006:

Moved Dr Anita Green (National Vice President), Seconded Dr Rob Reid (National Director – ACT): "That the Australian Sports Medicine Federation Articles of Association are amended to delete clause 15 (3) 'Any nominee for National Director shall not be eligible unless they have served at least 2 of the last 5 years on their State Council or Board.' Clauses 15 (4) and 15 (5) shall be renumbered 15 (3) and 15 (4)."

If you wish to vote for or against this motion in absentia, a proxy form can be obtained by contacting the returning officer, Gary Moorhead at gary.moorhead@sma.org.au or Beverley.Dunster@sma.org.au or by calling 02 6230 4650.

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Minister for Sport Senator Rod Kemp -- in a not-altogether-fulsome message of support for the **AFL antidoping code** in the Senate recently -- has given his assurance that it nevertheless complies with the WADA Code.

He had been asked in Parliament about the concerns of AOC member Kevan Gosper that the AFL's actions would "damage Australia's international reputation in the fight against drugs in sport".

"I have made it very clear to the AFL what my views are on this particular matter," Senator Kemp said. The AFL are WADA compliant. The AFL have signed up to the WADA code, and that is very important.

"But, with the additional testing that they do, the AFL can now take a real lead, look more closely at their sanctions and have some tougher sanctions and a more open and transparent reporting process."

SMA has publicly endorsed the confidentiality provisions of the AFL code, which was drawn up with input from the former Australian Sports Drug Agency (now the Australian Sports Anti-Drug Authority), as well as the AFL Medical Officers Association.

SMA sees the policy as an effective and responsible way to deal with the health and other ramifications of the illicit drug issue in so far as it affects Australian Football.

SMA in no way condones the use of illicit drugs which are a danger to health and welcomes well-based programs and policies to prevent it. But we do not believe that breaking down the confidentiality provisions of the AFL Illicit Drugs Policy is a sensible way to proceed if the point is -- as it should be -- that the AFL stance against illicit drugs be effective.

Medical confidentiality is necessary both for medical practitioners to be able to provide good and proper care of players and also to maintain player support for a policy which we believe is effective and socially responsible.

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SMA NSW has organised a one-day **Sports Trainer Conference** on 14 October at the St George Leagues Club at Kogarah, starting at 8.30 am.

Topics (and speakers) include tendons (Dr John Orchard), knees (Dr Sam Sorrenti), shoulders (Andrew Hughes), heat illness (Phil Chapman), advanced taping principles (Phil Driscoll) and on-field assessment (Jarrod Scott).

The club is at 124 Pacific Highway, Kogarah.

For more details, check [www.smansw.com.au](http://www.smansw.com.au).

## RIP Dr John Diggle

We regret to report the death recently of Dr John Diggle, one of the founding members of the organisation now known as Sports Medicine Australia.

Dr Diggle was one of the band of prominent sports medicine personalities who were gathered together in Melbourne by the Games organisers to look after the 3,300 athletes at the 1956 Olympics.

Along with other pre-SMA pioneers -- including John Bloomfield, Fred Better, Norman Long, Fritz Duras, Peter McMahon, Edgar Tanner and "Spudda" Thwaites -- he was involved in the discussions and developments that led from that Olympics experience, via the amalgamation in 1963 of the Australian Sports Medicine Association (ASMA) and the Australian Federation of Sports Medicine (AFSM), to the birth of the Australian Sports Medicine Federation (AMSF), forerunner of SMA.

In a long career in sports medicine, Dr Diggle was President of the then Victorian ASMF from 1970 to 1972, MO to several Davis Cup teams, ASMF Fellow, ASMF National Life Member and of course an active and respected member of SMA.

In his later years, he was practising at Pambula on the New South Wales south coast.