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Tel: (02) 6230 4650
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Email: smanal@smoa.org.au
Web: www.sma.org.au
Circulation: 5900
ISSN No. 1032-5662

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SUBSCRIPTION RATES 2003

Australia $35
Overseas $50

SMA members receive Sport Health as part of their membership fee

Single copies and back copies $15
(includes postage)

PP No. 226480/00028

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Contents

FROM THE CEO ___________________________________________ 2
Sports Medicine in the 21st Century: Roald raises the bar

Dr J __________________________________________________ 4
Will a Nobel ever be awarded to someone in sports medicine or science?

DOPING IN SPORT ________________________________ 7
Adam Firth: The new Australian Sports Anti-Doping Authority _________ 7
Adam Firth: The Mark French case _____________________________ 10
Grant Schofield & Geoff Dickson: Ethics and doping: an issue of context __ 11

ANOTHER GOOD YEAR: Australian Sports Commission annual report _____ 15

SEASONAL AND GEOGRAPHIC ANALYSIS OF ACL INJURY RISK IN AUSTRALIA ___________________________________________ 20
John Orchard, Ian Chivers and David Aldous

BULLETIN ______________________________________________ 28

Cover photograph: Australian Sports Commission
How serious is this trend in the increase in chronic disease?

On the state government front, there are numerous initiatives, some of which (like the work of the WA Premier’s physical activity taskforce and the ‘10,000 steps Rockhampton’ project) are outstanding and probably unique in the world. Other initiatives (and governments) have a more patchy effort, with re-invention of the wheel, under-funding of interventions and squabbles over intellectual property.

Professor Bahr maintains that the skills of working with elite sporting teams, and knowledge of the sports medicine practitioners’ expertise in musculoskeletal medicine will become essential in both maintenance of the increasingly injury-prone ageing population, and also passing this information on to other health professionals. The AHWF report cites an increase of 1.5 million in GP consultations giving patients education or counselling about their weight and nutrition, so there is some positive movement in this area, but it is probably timely that the DAA is moving to make sure that the GPs get these messages right.

Professor Bahr raises the bar.

Sports medicine in the 21st Century: Roald raises the bar

Gary Moorehead


The Dietitians Association of Australia (DAA) responded with a gentle sledge about how encouraging it was to see the AMA taking ‘a more population-based public health approach’ and then proceeded to get stuck into numerous errors of fact and detail that it identified in the document. (Claire Hensal APD, Executive Director DAA. “Position statement on the AMA’s nutrition policy. December 2005.”)

Could this be interpreted as a message to the doctors to ‘stay off our turf’? DAA responded with a media release supporting the thrust of the AMA statement, but making the point that, with obesity, it takes two to tango – poor nutrition habits, but also a lack of physical activity.

How have other organisations responded?

The President of the Australian Association of Exercise and Sports Science (AAESS) Dr David Bishop, editorialised in the latest (December 2005) edition of the Journal of Science and Medicine Sport (JSMES) on the role of physical activity versus ‘specific, targeted, and prescribed exercise’. (Dr David Bishop. “If physical activity is the answer, what is the question?” JSMES 8:4, December 2005.)

While this paper makes some very good points, as with the AMA and DAA pieces, there is also a sense of the exercise physiologists out there with the doctors and dietitians, elbows thrusting, to be at the head of the pack.

So back to Professor Bahr. Roald Bahr’s thesis can be summarised quite simply. He believes that an essential policy approach is one based on keeping ageing populations active for as long as possible. This will mean that the sports medicine practitioners’ expertise in musculoskeletal medicine will become essential in both maintenance of the increasingly injury-prone ageing population, and also passing this information on to other health professionals. The AHWF report cites an increase of 1.5 million in GP consultations giving patients education or counselling about their weight and nutrition, so there is some positive movement in this area, but it is probably timely that the DAA is moving to make sure that the GPs get these messages right.

Professor Bahr maintains that the skills and knowledge of the sports medicine and science practitioners will move to the front line of healthcare. While hardly as glamorous as expectations of working with elite sporting teams, this work will be both plentiful and necessary.

But it is critical that we get the messages right.

Messages such as:

• Weight control is a function of energy balance. When discussing obesity, we must talk about nutrition AND physical activity.

• There is health benefit in physical activity WITHOUT any consequent weight loss.

This latter point seems to get overlooked in the current stampede/reaction to the obesity crisis. All focus seems to be on getting or keeping the weight off, with little or no mention of the health benefit of increasing physical activity even if there is no change in weight. One of the leading researchers in this area is Dr Steven Blair from the Cooper Institute in Dallas, whose research findings are best summed up by the statement: “The research showed that death rates were similar for moderate and highly fit men in all BMI categories, and death rates for men with low fitness levels were higher regardless of their BMI category.” (Steven Blair. Fitness, Not Fatness is the Issue. WEL newsletter for Wellness. 1, 1 Fall 1999.)

Sports Medicine Australia has made a great step forward with the recent combined Conference. The importance of the event can be measured in a variety of ways:

• The enthusiastic response of delegates (from all areas) who attended.

• The desire of our conference partners, the National Heart Foundation, the Department of Health and Ageing and the NSW Sporting Injuries Committee, to continue the partnership into the future.

• The speed and enthusiasm of the South Australian Government to provide support to sign up for the Conference for Adelaide in October 2007.

• The fact that all our overseas speakers want to come back in 2007 that maybe that was just a testimony to our partying!!

The research showed that death rates were similar for moderate and highly fit men in all BMI categories, and death rates for men with low fitness levels were higher regardless of their BMI category.” (Steven Blair. Fitness, Not Fatness is the Issue. WEL newsletter for Wellness. 1, 1 Fall 1999.)

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The only Australian Nobel Prize winners in medicine and physiology are:

- Peter Doherty (along with Robin Zinkernagel, a Swiss working in Australia) in 1996 for their discoveries in immunology.
- John Eccles (along with Hodgkin and Huxley of the UK) in 1963 for their discoveries regarding nerve cells.
- Frank Macfarlane Burnet (along with Peter Medawar) in 1953 for his discoveries regarding nerve cells.
- Howard Florey along with Fleming and Chain of the UK in 1945 for the discovery of penicillin.

In terms of the impact on improving the human condition, the discovery of penicillin (which was the biggest ever breakthrough in the field of antibiotics) would rank as highly as any of the Nobel prizes awarded for medicine. Alexander Fleming is credited with discovering that the mould penicilium could inhibit the growth of bacteria, but the Australian Sir Howard Florey (who has an institute named after him in Melbourne) is considered to have been most responsible for introducing the antibiotic penicillin to clinical practice.

Warren and Marshall deserve the highest of our praises for making a discovery which vastly improves a common disease in clinical medicine, for being prepared to challenge existing dogma about the causation of peptic ulcer and, locally, for conducting all of their work within Australia (in the city of Perth). You should take any chance you get to read about the story of Warren and Marshall, including the free text in the Christmas edition of the Med J Aust at http://www.mja.com.au/public/issues/183_11_0512/5/yard1800_fin.html

With respect to the field of sports medicine, a recent Nobel award has major relevance (Paul Lauterbur and Peter Mansfield in 2003 for the discovery of magnetic resonance imaging). In 1998 three Americans (Furchgott, Ignaro and Murad) shared the Nobel Prize for medicine for their work proving that exercise can cause diabetes-causing virus you would become much milder, presumably due to the viral environment in which to live). Otherwise, for example, not only could they believe that peptic ulcer is caused by an infectious agent, they assert that cardiovascular disease must be too, along with diabetes, rheumatoid arthritis, Alzheimer’s disease and many cancers, etc. If you consider this concept to be impossible, you should remember that mainstream gastroenterologists have only accepted in the last decade that Helicobacter pylori causes peptic ulcers. Furthermore, the fact that various chlamydia organisms are associated with cardiovascular disease, although not proven to be as yet, which has been proven to nearly the same degree as helicobacter pylori/peptic ulcer connection. For a summary of the Atlantic article, please refer to http://www.injuryupdate.com.au/forum/showthread.php?p=10646 post10646. And for a more formal reference, try Cochrane GM, Ewald P and Cochran S (2003) “Infectious Disease and the Knee” in particular. How many times do you see a patient go in for a knee effusion post-arthroscopy may be able to tell me that: 1. Whenever you have sent a knee effusion in this scenario for a culture it has always come back negative. 2. If you have ever happened to treat a patient in this scenario with a standard antibiotic (eg, Amoxicillin) it hasn’t helped with the knee effusion.

This is where a read of the story of Marshall and Warren is extremely valuable. They only managed to culture Helicobacter pylori when one of their cultures used diethylether scared away in a laboratory over the Easter break. Normally in pathologists if a culture is not positive after 48 hours, Which diseases in sports medicine might be caused by infection? The number one candidate, in my view, would have to be ‘chondral degeneration’ in the knee joint, in particular. How many times do you see a patient go in for a knee arthroscopy for a meniscal tear, and in which the surgeon also finds grade 1-2 chondral degeneration in the joint, followed by a rapid deterioration after the arthroscopy? A year later another arthroscopy is performed and this time the patient has grade 4 chondral degeneration and a disability that will last a lifetime. Of course, the ruling dogma is that the ‘early’ damage found in the first arthroscopy constituted a joint ‘weakness’ that after further ‘mechanical loading’ deteriorated to frank arthritis. Yes, I believe that early wear of the knee joint can later become advanced wear, but in the average patient this normally takes 20-30 years. How come it can happen to some poor victims in under 12 months when they don’t run a single step to the full diabetics that have a knee effusion for the entire year? In my mind, the likely culprit is an infectious agent and, sadly, the likely source of entry to the joint is the initial knee arthroscopy itself. OK, some of you sceptics out there who may actually be medicos who have treated patients with chronic effusion post-arthroscopy may be able to tell me that: 1. Whenever you have sent a knee effusion in this scenario for a culture it has always come back negative. 2. If you have ever happened to treat a patient in this scenario with a standard antibiotic (eg, Amoxicillin) it hasn’t helped with the knee effusion.

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Will a Nobel ever be awarded to someone in sports medicine or science?

By Dr J

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The new Australian Sports Anti-Doping Authority

Adam Firth

The year 2004-05 has been a landmark in a Australia’s anti-doping effort, Chairperson Brian Sando says in the latest -- and probably the last -- annual report of ASADA before the Government turns it into ASADA, the Australian Sports Anti-Doping Authority.

Acting Chief Executive Kim Terrell points out in the report that the establishment of ASADA, implementing one of the biggest testing programs ever undertaken in Australia and the work on the 2006 Commonwealth Games will be high priorities for 2005-06. For example, the Agency will conduct more than 7,000 drug tests in 2005-06 – on average, that’s at least 19 athletes tested every day of the year. Sport Health here publishes extracts from the report on issues of special interest to its readers, such as no advance notice testing, trends in notifiable events and the prospects for an online athlete whereabouts system.

The great thing about being involved in science is the thrill of watching our knowledge base evolve. Fifteen years ago the internet didn’t exist and, 25 years ago, no one suspected that Helicobacter pylori was a common cause of peptic ulcer. If you are working in sports and exercise medicine, you are working in an area which, despite its snobbing by the mainstream medical profession, is one which is critical to the advancement of human health. Maybe we won’t see a Nobel Prize-winning discovery in sports medicine in our lifetime, but maybe we will. What is assured is that there will be new and successful ways to prevent and manage major sports injuries that are discovered in our lifetime, and that some of them will be discovered in this wonderful country of ours.

On 25 June 2005 the Australian Government announced its intention to establish the Australian Sports Anti-Doping Authority (ASADA), which from early this year will take over from the Australian Sports Drug Agency (ASADA) as Australia’s NADO under the World Anti-Doping Code (WADC), but with significant additional functions to ASADA in the fight against doping in Australian sport.

No doubt ASADA is motivated at least in part by the Australian cycling controversies of the past two years and the experiences in the United States with the BALCO scandal. Its enabling rules and regulations are not yet finalised and accordingly this article can only make comment on some features that have been announced and in relation to such a body generally.

ASADA’s powers

It has been confirmed that ASADA will replace ASADA in handling the responsibilities of sample collection and testing, and education and advocacy. It will also play a role in policy development relevant to sports doping (most significantly will act as the investigator and prosecutor of all allegations of anti-doping rule violations relating to sports whose governing bodies in Australia sign on to use ASADA for such purposes. It will be a condition of government funding and other support that sports submit all their anti-doping operations to ASADA, and ensure that their members will cooperate fully with ASADA in the performance of its functions. It will also be a requirement that the sport accepts any adverse finding of ASADA against any of its athletes (or other persons within the sport’s jurisdiction), ensures that information notices are served on such persons and enforces penalties imposed in accordance with the sport’s anti-doping rules. The Government has used purse string control to good effect in forcing all Australian sports to sign on to the WADC and it can be expected that it will pursue use of ASADA with the same intent.

More specifically, in addition to ASADA’s existing powers, ASADA will have:

• power to conduct investigations on the basis of information acquired from its drug testing and other activities, or where it has received information from any other person, or on its own initiative;
• power to receive, use and disclose (where appropriate) information from Australian Customs Service or other law enforcement agencies with comparable anti-doping policy briefs,
• power to present the prosecution case before a tribunal (whether or not ASADA investigated the case).

The most significant new features of ASADA are in investigatory and prosecutorial functions. An independent, government-funded body fulfilling such a role has been sought by many sports organisations in this country for some time as the burden of anti-doping policy enforcement, and the integration of resources from developing their sport, their competitors and their athletes. This is particularly the case
with smaller sports that, dedicated as they are to drug-free sport, lack the resources to undertake enforcement proceedings against their athletes because of their other core functions. Cultural issues also may arise where a sport, wanting to treat its athletes more like family, is confronted with the prospect of having to prosecute them vigorously. ASADA will bring independence and an increased level of professionalism. Adoption of the WADC provides standardised anti-doping rules throughout Australian sport and the step towards centralisation of anti-doping rule violations is an obvious and sensible one. It provides the opportunity to develop a specialised pool of knowledge and expertise in anti-doping matters that no individual sport is capable of matching. The result should mean that enforcement is more efficient, consistent and accurate in its outcomes across sports while at the same time removing a significant burden from individual sports.

Anti-doping rule enforcement can be very complex and holds significant consequences to all those involved. Thus far, sports organisations have been dealing with enforcement matters about anti-doping largely on a sport-by-sport basis and no sport has at times been unsatisfactory, particularly in cases involving allegations such as trafficking or use of prohibited substances being brought to evidence other than a positive sample. The cycling cases of 2004-05, and in particular the French decision (see pp 30-39), provide lessons to those investigating and prosecuting anti-doping allegations, and highlight the consequences of treating matters more like a criminal prosecution, with specialist people undertaking ‘crime scene’ investigation, questioning of witnesses and evaluation of evidence with good understanding of the evidentiary requirements to prosecute the offence successfully.

Initial observations

Certainly the vast majority of those involved in the administration of Australian sport will welcome ASADA and happily hand over their anti-doping enforcement to this independent body. There is little doubt that it should prove a positive step for Australian sport but, although details are presently thin, there are at least three issues that stand out at this early stage:

1. independence of its functions and appropriate review mechanisms,
2. sufficiency of its powers to compel the giving of evidence, and
3. level of resources.

Independence

ASADA will be responsible for sample collection and testing, investigation of potential doping offences and the conduct of the prosecution. These functions need to be sufficiently independent of each other to ensure integrity and accountability, as well as ensuring that matters are given adequate inquiry prior to any decision being made to prosecute.

Independence between investigators and prosecutors has rightly been reflected in criminal investigation and prosecution by the state (ie, police and crown prosecutors respectively). The rationale is that the evidence should be given independent review prior to prosecution to ensure that only matters with sufficient prospect of success are brought before the courts. This serves the dual functions of ensuring efficient use of court resources and providing fairness to an accused by preventing many prosecutions unnecessarily being initiated, such as with witch hunts. An independent prosecution can evaluate the available evidence at face value without being influenced by experiences in the investigation that may cause bias, even where such bias is innocent or subconscious.

Independent assessment of a case against an athlete is also relevant where there has been an adverse finding in respect of a sample. The prosecution should ask the same questions a defendant would ask relating to the integrity of the sample, including collection, storage and chain of custody, or the possibility of contamination. These are all matters that will be within the province of ASADA and the suspicion is that where one person (or group) is responsible for collection and testing, and another is responsible for the analysis, or manufacture made or matter overlooked at an early stage may remain uncovered. There should therefore be sufficient separation of functions and those responsible for prosecuting an alleged violation must objectively test all evidence collected by others. Where necessary the prosecution should provide useful evidence to the defendant or make a decision to not proceed with a prosecution.

Of course there must also be a procedure for establishing risk of decisions, as with all government departments, and ASADA (like ASADA now) will be subject to the Commonwealth Ombudsman, the Administrative Appeals Tribunal and the Federal Court or Federal Magistrates Court for any administrative decisions (Administrative Decisions (Judicial Review) Act 1977). Such review does however require a complaint or appeal to relate to the action by ASADA and there may well be costs in taking such legal avenues. This again highlights the need for adequate internal checks so as to reduce the risk of inappropriate action in the first place.

Powers to obtain evidence

ASADA investigators must have the necessary powers to obtain evidence and it is therefore important for them to be able to compel witnesses to provide evidence. Present indications are that ASADA will not have expansive powers in this regard but it may be a matter of concern. This writer disagrees with that view. Fears that the coercive power may be abuse are readily addressed through processes of objection and review to and by the courts. Rules may also be developed so that where a provider is properly submitted that the evidence did not prove that French had committed a doping offence defined in the ASC Anti-Doping Policy.” That assessment arose from the further investigations in the Anderson inquiry and throughout appeal process but the question should be asked whether it is a little likely that any allegations were made against the athlete concerned in the first place. While it should be noted that the investigations on behalf of the ASC continued in great detail and at considerable cost to the ASC even after the first hearing. Concluded in June 2004, it appears that the assessment of all the evidence known as a result of this thorough investigation significantly altered the ASC’s earlier view as to whether any doping offence contrary to the ASC policy could be established. Certainly, it is preferable that where possible that complete inquiry be undertaken prior to tribunal proceedings being commenced.

It is the view of this writer that ASADA should have power to require sporting organisations to include in their anti-doping policies requirements that athletes and athlete support personnel cooperate fully and truthfully with ASADA investigations under threat of sanction. The ASC rules should therefore set out specific procedure for appropriate checks, objections and review in any individual case.

Another issue relating to evidence collection is the power to compel the provision of a DNA sample. Athletes are already compelled to provide blood and urine samples for testing and analysis under the anti-doping regime. The rationale is that the evidence obtained is innocent or subconscious.

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The Mark French Case

In December 2003 a plastic bucket, used by Mark French and others as a waste bucket, and a bag were found in a room previously occupied by French at the AIS cycling facility in Del Monte. The bucket was alleged to contain prohibited substances. French was served with infringement notices alleging that the contents were for use of glucocorticosteroid and/or equine growth hormone (eGH) (both being prohibited substances); or alternatively, being concerned in prohibited doping use by others. In June 2004 French was found at an initial hearing of the charge to have breached the Cycling Australia and Australian Sports Commission anti-doping policies and given (among other consequences) a 2-year ban. French won his appeal of that decision in July of this year, after effectively serving a year of the ban.

French admitted injecting himself with a substance called Testicomp and placing the waste products in the bucket. He named five other cyclists as being involved in group-injecting sessions at Del Monte. However, although he said he didn’t know what they were injecting. An information leaflet that accompanied a used packet found in the bucket indicated the leaflet that accompanied a used leaflet that was in the bucket when it was used and not subsequently contaminated by another person while sitting in the bucket. As part of his inquiry into these matters, the Hon Robert Andrew QC had DNA analysis undertaken on the bucket materials. Jobie Dajka, Sean Eadie and Shane Kelly provided comparative DNA samples but French did not. Of the 230 items in the bucket that were tested, “4 were from a single source DNA profile and seven were matched to Dajka”. Four of the items yielded a mixed DNA profile, which was consistent with having been contributed to by both the “unknown male” and Dajka. The needle shown to be containing the eGH was matched to the “unknown male”. The evidence did not show whether the needle was capped or uncapped where in the bucket it was located. It was conceded that, if the needle was uncapped, the eGH was in the needle when it was used.

What is sport?

Both Radford (1998) and Wright (1998) argue that sport is more than entertainment and business. They assert that there is a sense of deeper quality that defines sport.

The context and ethics in sport

It is our thesis that the context in which a particular sport is played influences the moral code that is accepted by the participants. An extension of this is the research that the illicit use of performance-enhancing substances is seen as a necessary part of “making a go” of many top level sports. It is not clear that the transparent professionalism evident in the National Football League (NFL) and the Olympics, where several athletes are being fined for running. In this system outcomes and sponsorship depend entirely on winning football matches. Contrast this with a local soccer match at a club level. Players are amateurs. They can lose financially. Indeed there will be a financial cost for them simply to participate. It is our argument that media and personal reactions to the use of banned substances at these different levels should be quite different.

At first glance the use of banned performance-enhancing substances seems completely wrong. The minority who are caught are labelled by the media and public as cheats, which of course they are because they are breaking the rules of their sport. However, a closer examination of the issues behind banning certain substances reveals that this position is less clear cut.

Why are certain performance-enhancing substances banned?

In a nutshell, substances may be banned because they are illegal in most countries, they are not a food and provide an unfair advantage or they are health harming. In 1996 Juan Antonio Samaranch, then President of the International Olympic Committee (IOC), defined doping as: “Doping is cheating. Doping is akin to death. Death physically, emotionally, spiritually, morally and in certain situations such as many professional sports, these qualities are lost. Whether or not this is desirable is questionable. The public, the media, and we as sports scientists can debate what the outcome of doping is.”

References

1. Shane Kelly, Sean Eadie, Jobie Dajka, Brett Lancaster and Jobie Dajka, Testicomp and Testicomp/Dil. No just was taken against any of these cyclists, and it is argued that their actions are defensible.

2. CAS (A4/2004) Partial Award 21 July 2004. In that case, allegations were made again French for “falsely claiming to have a shopping list of various prohibited substances” and that of French at the AIS cycling facility in Del Monte.

3. The finding resulted in an investigation by the Australian Olympic Committee against Jobie Dajka. While the maximum fine to be imposed in an Olympic Olympic team was found for lying in an interview with the Team Membership Agreement by lying to the Hon Robert Andrew QC about the facts, he did not reject.

Ethics and doping in sport: an issue of context?

In the French case followed its earlier decision in AOC’s Eadie, that for doping allegations, which are very serious to an athlete, the standard of proof requires a higher level of evidence than an assumption based upon written materials accompanying a product. In this instance (as in Eadie) it required analysis of the bottles to determine whether or not they in fact contained a prohibited substance.

Another evidentiary problem involved one of the needles in the bucket, which was shown to contain eGH. There was, however, no analytical proof that it was French who actually used the needle, as compared to another person, nor could it be concluded with sufficient certainty that the eGH was in the needle when it was used and not subsequently contaminated by another person while sitting in the bucket. As part of his inquiry into these matters, the Hon Robert Andrew QC had DNA analysis undertaken on the bucket materials. Jobie Dajka, Sean Eadie and Shane Kelly provided comparative DNA samples but French did not. Of the 230 items in the bucket that were tested, “4 were from a single source DNA profile and seven were matched to Dajka”. Four of the items yielded a mixed DNA profile, which was consistent with having been contributed to by both the “unknown male” and Dajka. The needle shown to be containing the eGH was matched to the “unknown male”. The evidence did not show whether the needle was capped or uncapped where in the bucket it was located. It was conceded that, if the needle was uncapped, the eGH was in the needle when it was used.

The Mark French Case

What is sport?

Both Radford (1998) and Wright (1998) argue that sport is more than entertainment and business. They assert that there is a sense of deeper quality that defines sport. This quality is something beyond winning or losing. They argue that modern sport cannot be understood simply as a profit-driven business open to the market forces. Radford talks of ethical and moral codes of conduct that are part of this deeper quality that makes participation in sport worthwhile. Indeed this is the essence of the amateur sports person: someone who is involved in sport for the enjoyment of the process.

Sport, however, is different to different people. The context in which the sport operates and is contested makes a significant difference to what is acceptable and what is not. This applies equally to behaviour on and off the sporting field. Take, for example, the professional football. In elite football one can see quite acceptable behaviour to ensure that the player’s team secures a victory. On the other hand, the same action in the context of junior sport will more likely be considered unethical, or “the wrong thing to do”. However, it is the context on the content, and the unwritten codes of conduct will differ. Importantly, this must also mean that what sport is about in different contexts has implications for what the outcome of participation means to the athlete.

In the amateur context the athletes do not compete for money. They are in it for the challenge, the enjoyment, and perhaps the attainment of other ideals of sport such as fitness, health or the pursuit of excellence. This is very different from the full-time professional athletes who first and foremost must make a living from their chosen profession. By and large this will depend heavily on results obtained on the sporting field. This can (and usually is) quantified fairly easily in terms of winning and losing. The aims of the amateur and the professional will clearly be quite different because the context is very different. Sport may have certain qualities that distinguish it from other forms of entertainment and business. However, these qualities really do depend on the nature context of the sport. Heikila (1993) and Volkwein (1993) both contend that, in certain situations such as many professional sports, these qualities are lost. Whether or not this is desirable is questionable. The public, the media, and we as sports scientists can debate the loss of the central qualities of sport at this level. However, the fact remains that at the professional level sport must maintain a business model.
by excluding oneself de facto from the rules of conduct required by all human society.

More specifically WADA gives the rationale for a World Doping Code as “Anti doping programs seek to protect what is intrinsically valuable about sport. This intrinsic value is often called the spirit of sport, it is the essence of Olympism; it is how we play true. The spirit of sport is the celebration of the human spirit, body and mind, and is characterized by the following values:

1. Ethics, fair play, and honesty
2. Health
3. Excellence in performance
4. Character and education
5. Fun and joy
6. Team work
7. Dedication and commitment
8. Respect for rules and laws
9. Respect for self and other participants
10. Courage
11. Community and solidarity.”

We contend that the basis for banning substances, although sound in principle, may suffer some problems in practice. These are critically examined below.

Illegal substances
Some substances (e.g., marijuana) are banned not because they are performance-enhancing but because they are illegal in most countries.

The substance is not a food and provides an unfair advantage
If a substance has a performance effect and it is not a food then it may be banned. What are the reasons for banning non-foods that are performance-enhancing? The IOC Medical Commission argues that performance-enhancing substances mean that athletes are unable to compete on a level playing field. The level playing field argument is not sufficient. Perhaps the use of some performance-enhancing substances pales into insignificance when you consider the entourages that support most elite athletes from some countries. The line taken by some is that non-foods are simply “not natural”. Performance gains from these substances are therefore above and beyond what a human being might expect under “normal” conditions. What about cases where the substance is taken for therapeutic reasons? Surely, this induces an unnatural state. However, some argue that returning an athlete to a “normal” state is different. What about gains in performance through elaborate and expensive training regimens and/or equipment? For example, if the danger of using red blood cell booster erythropoietin (EPO) is that the blood becomes dangerously thick because of the increased red cell mass, then the other endurance boosters which have a similar effect need to be examined. It is not uncommon for an elite athlete to achieve an elevated haematocrit through altitude training, altitude simulation or altitude temperature sleeping. All of these methods are expensive, not easily available and potentially dangerous to health in the same way as EPO. These differences here need to be defined more clearly by the IOC Medical Commission and WADA.

Black (1996) argues that societal welfare would actually be improved with drugs in sport unregulated. Black contends that a fairer contest and improved access to medical services for athletes would lead to better overall outcomes. Similarly, it has been argued that the above criteria for banning certain substances are simply not reasonable in the context of modern professional sport (Kong, 1995; Volkwein, 1995). Professional athletes compete for money to make a living. Winning is what they must do on a regular basis. Losing with dignity may be the nice thing to do. Right or wrong, this is the reality for many of our top sports people in what is clearly a competitive and cutthroat business. As sports scientists we debug the problems with such an attitude. But this is the attitude of many, not just elite athletes.

The paradox of the Olympics
An interesting paradox exists in the market place of the Olympics. The Games are sold to the public as the pinnacle of human excellence. They have a “wholesome” feel replete with naturally occurring romantic and traditional ceremonies. Surely, this induces an unnatural state. However, some argue that returning an athlete to a “normal” state is different. What about gains in performance through elaborate and expensive training regimens and/or equipment? For example, if the danger of using red blood cell booster erythropoietin (EPO) is that the blood becomes dangerously thick because of the increased red cell mass, then the other endurance boosters which have a similar effect need to be examined. It is not uncommon for an elite athlete to achieve an elevated haematocrit through altitude training, altitude simulation or altitude temperature sleeping. All of these methods are expensive, not easily available and potentially dangerous to health in the same way as EPO. These differences here need to be defined more clearly by the IOC Medical Commission and WADA.

The spirit is dependent upon producing results. The support staff operate is vastly different to an athlete’s health simply because of the physical and mental demands. Training and competing at the highest level may make the athlete more susceptible to injury and illness. It is well known, for example, that extensive endurance training suppresses immune system function and big business that is the modern Olympiad. Athletes compete in conditions of professional sport where an Olympic gold medal is worth as good as money in the bank. The future livelihood of the athlete and his/her entourage (including sport scientists) is dependent upon producing results. The context in which the athlete and support staff operate is vastly different from that of an athlete who needs to be examined. Since the virtual abolishment of the amateur athlete in the 1992 and 1996 Olympic Games, it is our opinion that the IOC has failed to come to terms with the effect this change has had on the context in which business is now conducted. The rhetoric continues from the IOC about the frontline campaign against doping. But until the real issues are dealt with, the present farce will continue.

The future of sport
So what of the future of sport as we know it? What can be done, if anything, to stem the tide of performance-enhancing substances that have a negative effect on sport? What can be done to return some of the ethos to sport? To what end will the IOC currently sanction. The large number of legal challenges to drug violations would suggest that this is unlikely. However, this scenario still seems to be the most probable. Indeed, all that is needed to be developed is a method whereby athletes do not take banned substances. There are three possible ways to stop athletes doping:

1. Change human nature. That is, change the propensity to cheat, the outcome of a sporting contest.
2. Develop technology capable of detecting doping.
3. Develop performance-enhancing substances that do not possess any harmful side effects. This effectively eliminates the three reasons utilised by the IOC, Medical Commission, and the level playing field argument. As a result, once the first two issues are dealt with. If new substances could be produced which circumvent the advantages that other substances benefit without the side effects, then there is little in the way that can be done to distinguish this from a new substance not banned such as creatine monohydrate or glycerol.

A change in the human condition (Option 1 above) is never going to happen – morality cannot be legislated. Increases in penalties for those caught doping are also unlikely to be effective. Changing morality back in the right direction might be a return to the amateur athlete. Because athletes would be competing at a non-professional level the context would change and the old ethics of sport might be applicable again. It is difficult to see how this could happen given the current professionalism of sport as a consumer good. Legislating against the professional athletes is fraught with difficulty. As a result, we believe that finding an effective testing procedure which is perfect and unbeatable is feasible but it is obviously many years off at best. Developing non-harmful substances is similar to developing effective testing procedures. The technology is clearly a long way off. Interestingly, the latter two options revolve around technology.

Conclusions
The issue of ethics in modern professional sport is an issue of the context in which the sport is played. Doping, one of the most contentious issues in modern sport, is a present day issue. As a result doping may be regarded by athletes as acceptable under certain conditions. It is argued that some of the conditions under which sport provide a suitable context for doping to be acceptable. Interestingly,
Another good year: ASC Annual Report

Funding for sports

The following table shows the allocations of grants to particular sports in 2004-05.

<table>
<thead>
<tr>
<th>SPORT</th>
<th>AUS</th>
<th>HIGH PERFORMANCE</th>
<th>DEVELOPMENT</th>
<th>OTHER*</th>
<th>TOTAL</th>
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<td>310</td>
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<td>111</td>
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<td>571</td>
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<td>0</td>
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<td>119</td>
<td>33</td>
<td>49</td>
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<td>10</td>
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<td>-</td>
<td>30</td>
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<td>55</td>
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<td>176,750</td>
<td>242</td>
<td>60</td>
<td>120</td>
<td>618,750</td>
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<td>990</td>
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<td>10,000</td>
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<td>156,670</td>
<td>190,000</td>
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<td>70,500</td>
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<td>-</td>
<td>52</td>
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<td>0</td>
<td>62</td>
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<td>219</td>
<td>15</td>
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<td>234</td>
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<tr>
<td>Judo</td>
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<td>15</td>
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<td>-</td>
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<td>0</td>
<td>186</td>
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<td>25</td>
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<td>32,500</td>
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<tr>
<td>Lacrosse (beam)</td>
<td>-</td>
<td>25</td>
<td>0</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Modern pentathlon</td>
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<td>60</td>
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<td>0</td>
<td>60</td>
</tr>
<tr>
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<td>-</td>
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<td>0</td>
<td>337</td>
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<tr>
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<td>0</td>
<td>368</td>
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<td>725</td>
<td>170</td>
<td>244,000</td>
<td>1,715,600</td>
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<td>76</td>
<td>0</td>
<td>63,000</td>
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<tr>
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<td>0</td>
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<td>38,000</td>
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<td>60</td>
<td>0</td>
<td>121</td>
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<tr>
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<td>30</td>
<td>25</td>
<td>0</td>
<td>55</td>
</tr>
<tr>
<td>Powerlifting</td>
<td>-</td>
<td>32</td>
<td>5</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Roller sports</td>
<td>189</td>
<td>143</td>
<td>108</td>
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<td>462</td>
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<tr>
<td>Rowing</td>
<td>1,392,700</td>
<td>3,070</td>
<td>80</td>
<td>0</td>
<td>4,562,700</td>
</tr>
</tbody>
</table>

the Olympic movement is struggling with this concept as the emphasis in the Games moves from amateur to professional sport. To solve the doping problem in modern sport several actions are needed.

Firstly, the IOC Medical Commission needs to develop a doping policy that is defensible. The present reasons for banning substances are not necessarily sound in the context of the professional athlete. Doping must be controlled by changing human nature and the attitude towards winning at all costs. If history gives any clue to the future behaviour of the human race this appears an unreasonable task. Developing technology to ensure detection and sanctioning of athletes involved in doping practices or producing effective and safe performance-enhancing substances both appear to be worthwhile goals. Technology is the key to the future of sport and sport scientists clearly have a role to play.

The public's unfavourable view of health-harming but performance enhancing substances is unlikely to change. Similarly, the financial rewards and “win at all cost” mentality of elite sport are unlikely to change in the foreseeable future. So the solution must be safe ergogenics or safe use of ergogens. Those athletes who take performance-enhancing substances under this regime would at least be able to seek overt advice from experts. The experts would have an incentive to find out about the best usage and associated health risks of those substances. Although not an ideal outcome because some athletes will unnecessarily feel a need to take substances in order to be competitive, the situation would at least be better for the overall health of athletes than the present high covert use of such substances. A better solution is only possible through a resolution of the present mismatch of public perception of sport ethics and the pressure to perform placed on our athletes by the same public. This will not be resolved in the foreseeable future.

References


International Review for the Sociology of Sport, 26, 355-363.


Associate Professor Grant Schofield and Dr Geoff Dickson are at the Division of Sport and Recreation, Auckland University of Technology.
Junior Sport

Another major area of interest in the ASC annual report for Sport Health readers concerns national junior sport, which incorporates the Active After-school Communities program and other junior sport initiatives that help develop safe, fun and quality environments for sport for young people.

Active After-school Communities

The Active After-school Communities program, a major component of the Australian Government’s Building a Healthy Australia, is a four-year $590 million program launched in June 2004 to provide more opportunities for primary school-aged children to participate in structured physical activity in the after-school timetool. The ASC has employed 147 staff at national, state and regional levels to develop and implement the Active After-school Communities program. All of the out of school hours care services involved in the program in term 1 of 2005.

The first phase roll-out of the Active After-school Communities program has been successfully completed, with 897 primary schools and out of school hours care services nationally participating in the program in term 2 of 2005.

These schools and out of school hours care services have received a total of $1,516,716 in grants to support education and evaluation of the pilots will be made available on the completion of each pilot. These pilots have informed the development of the Active After-school Communities program. All of the out of school hours care services involved in the Victorian pilot have been invited to participate in the Active After-school Communities programs.

Active Australia Schools Network — the ASC continued its partnership with the Australian Council for Health, Physical Education and Recreation to assist the development of school–club links. The Active Australia Schools Network supports more than 1100 member schools representing metropolitan and non-metropolitan schools (including regional and rural) around Australia.

Junior Sport Framework

The ASC continued to provide leadership to national sporting organisations in adopting the Junior Sports Frame and of junior sport-specific policies. The ASC has been working closely with nine pilot national sporting organisations during the development of their junior sport policies. These nine sports are swimming, netball, tennis, football, basketball, hockey, wrestling and volleyball. The policies and processes undertaken by these sports will be documented and shared with other sports. An additional 26 national sporting organisations have requested and received copies of the Junior Sport Framework.

Other initiatives

During the reporting period, the ASC also continued with the implementation of the following initiatives:

- Out of School Hours Sports Program — in partnership with VicHealth, the ASC has launched in the ACT with four sports: basketball, tennis, netball and volleyball. The policies and processes undertaken by these sports will be documented and shared with other sports. An additional 26 national sporting organisations have requested and received copies of the Junior Sport Framework.
- Australian schools Network supports more than 1100 member schools representing metropolitan and non-metropolitan schools (including regional and rural) around Australia.

- Good Sport Monitor — the Good Sport Monitor program supports safe, fun and nurturing junior sport environments by making resources and strategies available to sporting clubs and organisations that can be modified and implemented to address inappropriate behaviour in junior sport. The pilot was conducted in the ACT with four sports: basketball, tennis, netball and volleyball. The policies and processes undertaken by these sports will be documented and shared with other sports. An additional 26 national sporting organisations have requested and received copies of the Junior Sport Framework.
- Good Sport Monitor provides a stream within the department and this includes a professional support officer, a postgraduate scholarship holder and a PhD scholarship program. In addition to the above staff, the Biomechanics department has a program with a strong educational focus.
can improve their effectiveness as coaches. Staff work closely with colleagues in Athlete and Coach Services to develop innovative approaches to performance excellence. During the reporting period, Performance Analysis was worked with all AIS sports to deliver a variety of services. During 2004–05, Performance Analysis also was involved in developing a corporate digital repository to store and share digital resources around the AIS Canberra campus.

Performance Psychology With a greater emphasis on evidence-based practice in service delivery, the Performance Psychology department has completed over a dozen projects that developed and quantified the impact that mental skills have on performance. A substantial up-skilling of AIS performance psychologists that service sports has also seen a greater acceptance of psychological services that deliver tangible results.

Skill Acquisition services expanded from focusing solely on AIS developmental programs to supporting some of the leading-edge organisations and organisations’ programs. Research activity was aimed at identifying avenues to further develop athlete perceptual and motor skills outside of the usual practice environment. To this end, a three-dimensional visual simulator and a number of computerised vision training tools were developed and implemented. Skill Acquisition also had a strong educational role through the supervision of sport-based PhD scholars and ongoing involvement in a variety of coach education programs.

Physiology The Physiology department provided intersport monitoring to AIS sports and national sporting organisations, with the pilot sport-based PhD scheme continuing to provide a vehicle for high levels of direct interaction with coaches and athletes. The capacity for effective monitoring of athletes in their annual training and competition environments was enhanced by the availability of new equipment developed jointly with the Cooperative Research Centre for MicroTechnology. Devices originally developed for use in rowing and swimming were successfully modified for application in numerous other sports.

Physiology staff members assisted in the preparation of Australian athletes for the Athens 2004 Olympic and Paralympic Games, both as members of official scientific support groups travelling with national teams, and through the completion of special projects such as the development of methods to protect rowing boats from excessive water intake in rough conditions. Cooling garments produced through collaboration between AIPS Physiology and RSIT University were used by Australian athletes during the lead-up to the Olympics and Paralympics, as well as during Paralympic competition.

A number of the sport-based PhD scholars completed their tenure and new scholars were recruited. A sport-based post-doctoral program was established, enabling the retention of some of the graduating PhD scholars within the national sports system. One of the PhD scholar's received a prestigious award from the organisers of the largest sports science/medicine conference in the world.

Major areas of applied research included exercise immunology, environmental physiology, enhancement of recovery from exercise-induced fatigue and refinement of methods for athlete assessment. Physiology staff also played a leading role in a Talent Search initiative aimed at enhancing Australia's competitiveness in the women's skeleton event at the 2006 Winter Olympics.

Physical Therapies Post-Olympics, the Physical Therapies department has taken the opportunity to fine tune servicing to AIS sports in the daily training environment in Canberra, the states and within competition environments. The benchmarking process of the department continued throughout 2004–05 with the project nearing completion. A commitment to research has continued with near completion of projects for the inaugural Beiersdorf PhD Fellow, examining the differences between cyclists and triathletes in electromyographic patterns of the lower limbs. A second PhD scholarship position will examine the relationship between injury biomechanics and injury and injury. A collaborative PhD with Latrobe University has recently been initiated to examine aspects of patellar tendinopathy.

Strength and Conditioning Strength and Conditioning continued its proactive coordination of, and quality-assurance role for, AIS sports located in the states and in Canberra. It also played a leadership role with state and territory institute and academy of sport personnel in the ongoing development of national protocols for testing and exercise prescription to provide consistency for elite athlete development. It has continued its role of service delivery for all Canberra-based sports programs, provided replacement for all service providers for state-based programs. Staff were made available to the Australian Olympic Young Athlete to support a new initiative that provided Australian athletes with a recovery and gym facility.

Technical Workshop Technical Workshop staff provide a high level of electronic and mechanical expertise for all departments within the Athlete and Coach Services and Technical Direction sections. In 2004–05, a priority was to research, design and prototype equipment for the new AIS pool. This has included the mounting system for the force measuring turn wall, a video trolley system and a new force measurement block.

Other projects that the workshop has been involved with in 2004–05 include the skeleton project, a riggered housing for a portable display unit developed for the Performance Analysis unit, an adjustable throwing frame for athletes with a plaster castable load bicycle pedal cranks, strain gauge transducer beams for Biomechanics and dynamometer adaptors for a range of bicycles for Physiotherapy.

Applied Sensors

In January 2003, the AIS and the Cooperative Research Centre for MicroTechnology agreed to develop a new PhD position to design and develop leading-edge software for coaches and scientists. The success of these projects, most of which focus on acquisition and automated analysis of data from sensors and video, promises the development of new sensors. Projects undertaken during the reporting period include a system to analyse training data from sensors attached to rowers to support a successful development of a three-dimensional video aid for computer-based skill-testing, refinements to a PDAM-based trackside timing and cycling and analysis of GPS and sensor data from equipment attached to athletes, boats and sleds. Projects commenced during the period include a new generation swimmer-tracking system for competition and player tracking in Rugby Union.

Technical Direction Technical Direction provides leadership to Australia’s high performance sport through national expertise in career education, elite sports research, talent identification and laboratory standards, in addition to benchmarking services and facilitating discussion on topics of current interest.

Benchmarking, best practice and innovation The Benchmarking and Innovation program takes a national leadership role in identifying future directions for innovation and world-leading practice for the AIS. The program has been undertaken through research, collaborative networks and by researching emerging technologies, innovative service delivery methods, operating systems and management systems within Australia and overseas.

During 2004–05, the program followed up a benchmarking study on Physiotherapy and Soft Tissue Therapy with an investigation into the value-add of alternative physical therapies, including chiropractic, osteopathy, podiatry, clinical Pilates and acupuncture. A third and final report on Physical Therapies was delivered on a proposed best practice structure and operational model for Physical Therapies at the AIS. Investigations have also begun into program delivery for sport science and sports and how sports can optimise the effectiveness of support services.

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Seasonal and geographical analysis of ACL injury risk in Australia

There are northern (warm-season) and early-season biases for ACL injuries in the AFL that have been revealed by a long-standing reliable injury surveillance system\(^5\). Recent study has suggested that the underlying explanation for these trends is the relative predominance of high-traction grasses in the northern states and early in the football season\(^6\). Little is known about the relative risk of ACL injury at non-professional level in Australia or in the NFL competition.

Recently, many media commentators have claimed an increase in injuries on dry sporting fields, possibly caused by drought in Australia and subsequent water restrictions in major centres\(^7\). Unfortunately there is no national injury surveillance system in Australia to investigate these claims. A national sports injury insurance scheme, the Accident Compensation Corporation (ACC), exists in New Zealand\(^8\). Although New Zealand has a superior system of monitoring injuries that occur in sport, its methods are not perfect because of lack of exposure data (number of sports participants and matches played). There is also little climatic variation between the different regions of New Zealand to test any hypothesis based on geographical differences.

In the United States, ACL injuries in the NFL show a strong early-season bias for matches played outdoors on Astroturf, but not indoors\(^9\). There is a small early-season bias for matches played on natural grass. The Astroturf data is consistent with the observation that shoe-surface traction on Astroturf positively correlates with the ambient temperature\(^10\), which is dropping over the course of the season in outdoor stadiums, but not in indoor stadiums. ACL injuries are particularly common in the major football codes (Australian football, rugby league, rugby union, soccer) and in snow sports. They also occur at a slightly lower rate in basketball, netball, volleyball and martial arts. ACL injuries are thought to be very common in netball, although the likely reason why this is considered a higher risk sport in Australia (compared to basketball) is that it is played mainly by females, who have a much higher relative risk for ACL injuries than males\(^11\).

The first section of this study examines available data for operations performed on the cruciate ligaments across Australia to see whether there is evidence of any northern (warm-season) bias at the community level. Estimates of the number of ACL injuries in Australia can be made, as the Health Insurance Commission (HIC) provides details of the number of item numbers claimed for each procedure under Medicare in each of the states and territories of Australia each month, with data going back to July 1994. The second section of the study examines ACL incidence in the NFL competition to look at both the geographical and temporal spread of ACL injuries occurring in first grade matches.

One hypothesis to be tested is that there will be a northern (warm-season) state bias for number of reconstructions performed in males, due to the popularity and high risk of the football codes, and the expected risk that warm-season grasses in Australia may pose a greater risk of ACL injury. As somewhat of a control, the figures for females will be examined, with the expectation that any northern (warm-season) state bias would be minimal, as the higher risk sports that are popular with females are generally not played on natural grass. The hypotheses to be tested with respect to the NRL data are that there will be warm-season and early-season biases in a similar fashion to the AFL competition.

Methods


The item numbers which were assessed were 49546, 49539 and 49542, which cover all primary cruciate ligament reconstructions. Item 49539 was not included, which is used for revision surgery for 49536, 49539 and 49542, where either the first operation has failed or the ACL has been re-injured.

Participation figures for various states were taken from the report by the ABS of Participation in Sport and Physical Activities 1999-2000\(^12\).

Population figures were taken from the Census 2001.

The ACT and Northern Territory are territories rather than states, but will be referred to as states for the purposes the data presentation and discussion.

Comparison of relative risks with 95% confidence intervals are performed using the Taylor series expansion method\(^13\). This study also examined ACL incidence data for natural grass surfaces in the NRL to see whether or not there is a northern (warm-season) bias, similar to that seen in the AFL.

A player status for all first grade players in the NRL was kept by the author over the time period 1999-2004 inclusive, based on media reports of injuries. Where players were missing through injuries and the diagnosis was available in the media, a record of injury was kept. Media reports are definitely not 100% accurate, yet for serious diagnoses like ACL tears in professional sport the accuracy probably approaches 100%. ACL injuries are so important and serious (particularly the vast majority which require immediate surgical reconstruction) that, if a first grade player suffers one in a major game, it is almost certainly reported extensively in the media. Surface characteristics for each stadium were assessed by the primary author (who is a club doctor for the Sydney Roosters visited each ground once per year on average) in conjunction with Michael Pinch, the ground manager for Aussie Stadium (Table 2).

---

**Table 1** - Majors sports at risk for ACL injury in young males, along with estimated grass profiles for various states of Australia

<table>
<thead>
<tr>
<th>State</th>
<th>Major Football Codes</th>
<th>Proximity to Snowfields</th>
<th>Grass Profile</th>
<th>Examples of Common Grass Types in Community Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>New South Wales</td>
<td>Rugby league and union, soccer</td>
<td>Close</td>
<td>Warm-season</td>
<td>Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td>Queensland</td>
<td>Rugby league and union, soccer</td>
<td>Very distant</td>
<td>Cool-season</td>
<td>Bermuda grass, Queensland blue couch</td>
</tr>
<tr>
<td>South Australia</td>
<td>Australian football, soccer</td>
<td>Distant</td>
<td>Mainly cool-season</td>
<td>Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td>Tasmania</td>
<td>Australian football, soccer</td>
<td>Distant</td>
<td>Cool-season</td>
<td>Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td>Victoria</td>
<td>Australian football, soccer</td>
<td>Close</td>
<td>Mainly cool-season</td>
<td>Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td>Western Australia</td>
<td>Australian football, soccer</td>
<td>Very distant</td>
<td>Warm-season</td>
<td>Ryegrass and Bermuda grass</td>
</tr>
<tr>
<td>ACT</td>
<td>Rugby league and union, Australian football, soccer</td>
<td>Very close</td>
<td>Cool-season</td>
<td>Bermuda grass, Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>Australian football and rugby league</td>
<td>Very distant</td>
<td>Warm-season</td>
<td>Ryegrass and Bermuda grass</td>
</tr>
</tbody>
</table>

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**Table 2** - Grounds analysed in the NRL

<table>
<thead>
<tr>
<th>State</th>
<th>Ground</th>
<th>Grass Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>Aussie Stadium, Sydney</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Telstra Stadium, Homebush</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Sheppards, Homebush</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Campbelltown Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Leichhardt Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>SKI Jubilee Stadium, Kogarah</td>
<td>Ryegrass and annual bluegrass</td>
</tr>
<tr>
<td></td>
<td>Brookvale Stadium</td>
<td>Kikuyugrass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Parramatta Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Energy Australia Stadium, Newcastle</td>
<td>Bermuda grass, ryegrass and Kikuyugrass</td>
</tr>
<tr>
<td></td>
<td>WIN Stadium, Whilonging</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Parramatta Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Express Advocate Stadium, Goldst</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Toyota Park, Cromulla</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Sunshine Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>ANZ Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>Daily Farmers Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
<tr>
<td></td>
<td>ACT</td>
<td>Bermuda grass</td>
</tr>
<tr>
<td></td>
<td>Canberra Stadium</td>
<td>Ryegrass</td>
</tr>
<tr>
<td></td>
<td>Melbourne</td>
<td>Olympic Park</td>
</tr>
<tr>
<td></td>
<td>Ericsson Stadium</td>
<td>Bermuda grass and ryegrass</td>
</tr>
</tbody>
</table>

---

**Table 3** - Participants in ACL surgery

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Patients</th>
<th>ACL Surgery Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>135</td>
<td>Primary surgical</td>
</tr>
<tr>
<td>Canberra</td>
<td>120</td>
<td>Primary surgical</td>
</tr>
<tr>
<td>Melbourne</td>
<td>110</td>
<td>Primary surgical</td>
</tr>
<tr>
<td>New Zealand</td>
<td>90</td>
<td>Primary surgical</td>
</tr>
</tbody>
</table>

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John Orchard, Ian Chivers, David Aideus
Results

The states and territories of Australia are listed in Table 1, along with the most common football codes played, proximity to snowfields and expected major grass types on football fields. The number of cruciate ligament reconstructions performed in the private system over the decade 1994-2003 are listed in Table 5. The majority of these were in people aged 15-44, with reconstructions more common in males than females. Population figures for Australia in 2001 from the Census data are listed in Table 4.

Table 5 and Table 6 show estimates, for males and females respectively, of participation in those sports considered to have a significant risk of ACL injury. For males, sports were grouped into high risk sports (outdoor contact football codes and snow sports) and medium risk (touch football, basketball, netball, volleyball and martial arts). For females, a single group of high risk sports was created (netball, soccer, Australian football, snow sports, touch football, basketball and martial arts). Participation numbers were taken directly (or estimated, for shaded figures) from the ABS report1. Participation data for other popular sports such as cricket, tennis, hockey, swimming, cycling, running, golf and aerobics were not considered in this analysis as the risk of ACL injury in these sports was considered to be low.

Table 7 shows the ratios of male to female reconstructions (among age group 15-44 in each state). There were more reconstructions performed in males in every state, despite that the relative risk of ACL injury is known to be higher in females. The explanation is almost certainly a participation bias, with males far more likely to participate in higher risk sports (Table 5 and Table 6). The male-female ratio was higher in the warmer northern states of Queensland, Western Australia and New South Wales, and lower in the cooler states of Tasmania, Victoria, South Australia and the ACT.

Table 8 shows the percentage of various populations estimated to have undergone cruciate reconstruction over the decade July 1994-June 2003. Although there are many assumptions and systematic errors within these estimations, the errors may be similar for each state. Table 9 shows the risk for each state compared with the Australian averages (including 99% confidence intervals for the rows involving male and female reconstruction rates per high risk sport participant). These figures show a significantly lower cruciate reconstruction rate in males in Tasmania (compared to the rest of Australia) with a similar trend in Tasmanian females that was not nearly as strong. In males there is also a significantly lower reconstruction rate in Victoria and, with respect to participation in high risk sports, a higher rate in Queensland and Western Australia, neither of which is seen in females.

For the section of the study involving ACLs occurring in the NRL, there were 51 reported ACL injuries occurring in first grade matches (including representative matches and finals) over the period 1999-2004 inclusive. There were eight in 1999, seven in 2000, eight in 2001, thirteen in 2002, nine in 2003 and six in 2004. There was no obvious northern bias present for ACL injuries (Table 10), with the rate of injuries at northern venues (18.2±1000 games) being comparable to Sydney venues (21.8±1000 games) and southern venues (24.2±1000 games). The highest individual stadium rates were Ericsson Stadium in Auckland and Parramatta Stadium, both of which have generally had a mixed grass profile of annual bluegrass, ryegrass and bermudagrass, although the ACL injury rates at both of these venues was not substantially higher than other grounds.

There was no significant difference between grounds with a bermudagrass profile in the early season (17.1±1000 games) and grounds with a kikuyugrass profile in the early season (28.9±1000 games), although kikuyugrass stadiums had higher absolute rates of ACL injury. The relative risk for kikuyugrass compared to bermudagrass was 1.86 (95% CI 0.80-3.11).

There was however a strong early-season bias, with 35 ACL injuries occurring in rounds 1-15 of the NRL season and 16 occurring in rounds 14-26 or the finals (risk ratio 2.1, 95% CI 1.1-3.8).

Discussion

The first section of this study examines Medicare data for cruciate reconstruction in the various states of Australia. Medicare is responsible for all insurance claims in the private hospital setting, which is where the majority of ACL surgery reconstructions take place. ACL reconstructions are performed in public hospitals on public patients, but a waiting list of 1-2 years makes this option a difficult one for active sportspeople. Therefore many young Australians who play the sports that are at risk of ACL injury will either have private health insurance to use if they suffer an ACL injury or will pay for the procedure privately using cash (or the proceeds from alternate insurance). Table 11 shows that private health insurance rates are fairly similar in each state, with males in Queensland and Northern Territory slightly higher and Tasmanian females that was not significant. In males there is also a significantly lower reconstruction rate in Victoria and, with respect to participation in high risk sports, a higher rate in Queensland and Western Australia, neither of which is seen in females.

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Table 8 - Rates of private cruciate reconstructions in various populations for the decade July 1994 - June 2003

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1.03</td>
<td>0.91</td>
<td>0.83</td>
<td>0.78</td>
<td>0.72</td>
<td>0.69</td>
<td>0.64</td>
<td>0.60</td>
<td>1.09</td>
</tr>
<tr>
<td>Rates (per 1000 population)</td>
<td>0.99</td>
<td>0.97</td>
<td>0.95</td>
<td>0.93</td>
<td>0.92</td>
<td>0.90</td>
<td>0.88</td>
<td>0.87</td>
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</tr>
<tr>
<td>Rates (per 1000 working-age males)</td>
<td>1.14</td>
<td>1.13</td>
<td>1.12</td>
<td>1.10</td>
<td>1.09</td>
<td>1.07</td>
<td>1.05</td>
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<td>Rates (per 1000 working-age females)</td>
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<td>0.48</td>
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<tr>
<td>Rates (per 1000 working-age individuals)</td>
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<td>0.96</td>
<td>0.94</td>
<td>0.93</td>
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<td>0.91</td>
<td>0.90</td>
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</table>

Table 9 - Rates of cruciate reconstruction per state compared to Australian averages

<table>
<thead>
<tr>
<th>A C L  I N J U R Y  R I S K  S T A T E S</th>
<th>NSW</th>
<th>VIC</th>
<th>QLD</th>
<th>SA</th>
<th>WA</th>
<th>TAS</th>
<th>ACT</th>
<th>NT</th>
<th>AUST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1.03</td>
<td>0.91</td>
<td>0.83</td>
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<td>0.72</td>
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<td>0.64</td>
<td>0.60</td>
<td>1.09</td>
</tr>
<tr>
<td>Rates (per 1000 population)</td>
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<td>0.97</td>
<td>0.95</td>
<td>0.93</td>
<td>0.92</td>
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<td>0.88</td>
<td>0.87</td>
<td>0.98</td>
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<td>1.09</td>
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<td>0.49</td>
<td>0.48</td>
<td>0.47</td>
<td>0.53</td>
</tr>
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<td>0.96</td>
<td>0.94</td>
<td>0.93</td>
<td>0.92</td>
<td>0.91</td>
<td>0.90</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Table 10 - ACL injury rates by NRL ground

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney</td>
<td>Bermuda/ryegrass</td>
<td>20</td>
<td>27.8</td>
<td>0.99</td>
</tr>
<tr>
<td>AUS Stadium</td>
<td>Bermuda/ryegrass</td>
<td>159</td>
<td>15.7</td>
<td>0.78</td>
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<tr>
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Table 11 - Percentage of the population with private health insurance (2001), by state 14

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</table>

There are some variations in the figures by state for Australian females (Table 10), but in general these are less than the variations seen in males. The absolute rate of cruciate reconstruction for females in South Australia and the ACT (Table 8), which may partially reflect the popularity of the sports of netball and skiing respectively in those regions, although their rates for females are still higher than other states when participation rates are adjusted for.

There is a general trend of a 'warm-season bias' for cruciate reconstruction for males in Australia in the states where Australian football is the predominant male sport (Table 11). This trend is seemingly absent for females in these four states, supporting the hypothesis that in Australia, warm-season grasses are a risk for ACL injury in Australian football.

With respect to ACL injuries in the NRL competition, an early-season bias for ACL injuries is definitely present. Since most grounds use either bermudagrass and ryegrass or kikuyu and ryegrass, the cool-season species of ryegrass is likely to be predominant later in the season (late autumn and early winter). Either the presence of eye later in the season or the reduction in thatch through abrasion related to regular use, or both, is/are likely to be responsible for the early-season bias for ACL injuries in the NRL. There is minimal difference between both grass type and location and injury rates and location in the NRL, hence it can be stated that there is no apparent northern (warm-season) bias in the NRL. Ryegrass
tends to produce less thatch than bermudagrass (Figure 1) which may explain why it is associated with a lower rate of ACL injury.22–24 Although there are limitations in the quality and quantity of data in the NRL component of the study, they suggest that there is no evidence that either annual bluegrass or kikuyugrass compares favourably to bermudagrass with respect to ACL injury risk. Previous research from Conway et al. (2005) using a similar data set to the one in this paper, suggested that North Queensland Cowboys, who are the most northern team in the NRL, had a similar rate of ACL injuries to the rest of the competition.25 They found their rate of ACL injury for North Queensland to be 2.75 injuries per 100 player hours from 1998 to 2002, and found this to be not significantly different from other teams.25

With respect to risk of rugby league injury in general (rather than for ACL injury) and the physical demands of the season, most of this work in this area has been published by Gabbett. Although the climate of South-East Queensland in Australia has consistently found match injury incidence towards the end of the playing season in semi-professional and amateur rugby league,26–29 This is in contrast to the trends observed in other football codes played in temperate climates.26 Gabbett has found that the intensity of matches increases towards the end of the playing season and he attributes this increase in intensity as the likely cause of the increased injury incidence towards the end of the season.26 The Gold Coast, where his studies have been conducted, being a subtropical climate with a generally wet autumn, may not exhibit the same changes in grass composition as traditional autumn-winter football season in a cooler climate.30

Studies of rugby league injuries in the United Kingdom, where the professional competition changed from a winter to a summer season in 1996, have consistently shown a higher incidence injury in summer than winter rugby league.22–24 When injuries were analysed by stage of the season and month of the year, it was found that summer months had a much greater correlation with risk of injury than stage of the season.25 That is, injuries were more common in the warmer months irrespective of whether these months were at the start or finish of the season. The ‘dry-season’ (summer) bias is proportionally greater in back, who tend to suffer non-contact injuries, than in forwards, who tend to suffer contact-mechanism injuries.22 Authors who have noted an increased injury incidence in summer rugby league injury have attributed the dry-season (summer) injury bias to differences in the playing surface, particularly hardness.22–25 Obviously historical confounders (other changes in the way that rugby league was played post- and pre-shift to a summer season) may have affected the results. Notwithstanding that the NRL data presented in this study are unoficial and may contain some minor inaccuracies, they present further evidence that the rate of ACL injury on grounds which are ryegrass predominant (which includes most NRL venues in the second half of the season), is lower than for warm-season grasses like kikuyugrass and bermudagrass. The confounding effect of the progressive reduction in thatch depth over the season is also likely to be contributing to a lower ACL injury rate in the second half of the season. Although this study has many details which are unknown, including accurate data about grass types at venues throughout Australia, it is further secondary evidence that grass type may be responsible for fewer ACL injuries occurring in certain locations (ie, ryegrass in the more southern states in Australia leading to lower ACL injury rates). It is noted that there are many weaknesses and assumptions in this analysis. It would be far preferable for Australia to have a centralised sports injury surveillance system like New Zealand does, to monitor state by state trends in injuries. The ACL injury rate and overall injury rates in the AFL have been lower over the past few seasons, possibly due to changes in preparation in grounds once the risk factors associated with various ground conditions have been published.25 It may be possible to reduce the rate of ACL injuries in Australia, particularly in the northern states, by changes to the way that community football grounds are prepared. These may include promotion of ryegrass as a preferred species, watering of dry, hard grounds and scarification of grounds with an excessive layer of thatch.25–27 Because of the cost of ACL injuries to the community, it is strongly encouraged that a national ACL register is developed with measures in the longer term to reduce the rate of ACL injuries.

Conclusions

• There was a strong early-season bias for ACL injuries in the NRL competition over the period 1999–2004.
• No obvious geographical bias for ACL injuries was seen in the NRL competition over the same time period.
• In the AFL, states in Australia at the community, for males there is a trend towards greater number of ACL reconstructions in the warmer states (Q, WA and SA) compared to the southern states (Vic and Tas), in a similar fashion to the trend already seen in the AFL.
• In the ‘rugby’ states there is no evidence of a ‘northern’ bias. The NRL data are more similar to the data previously published for the US NFL, where there is an early-season bias but no geographical bias.

Acknowledgements

Michael Finch, the ground manager for Australian Stadium, is acknowledged for his assistance in determining the major grass types used on each of the major NRL venues.

References

11. Askling J, Soderlund K, Stendahl H. Differences in national grass types used on each of the major NRL grounds. Volume 23 – Issue 4 – Summer 2005-06 26

John Orchard, Ian Clivers and David Aldous are at the University of Melbourne
Knee injury research

In this article, I will focus on, (i) management of patellar tendinopathy; (ii) management of patellofemoral pain; (iii) the role of ‘core stability’; (iv) prevention of ACL injuries. So, what does the research tell us?

1. Effective treatment strategies for patellar tendinopathy

Patellar tendinopathy is a significant overuse injury, mostly encountered by athletes who load their tendons with jumping activities. Its recalcitrant nature makes it a frustrating condition for the athlete and the physiotherapist. It has therefore been the focus of much research, both internationally and within Australia.

The main players here are (in Australia) Jill Cook (La Trobe University), Karim Khan (OK, he works at the University of British Columbia and lives in Vancouver, Canada, but we still think of him as one of us!) and Craig Purdam (Australian Institute of Sport). Internationally, they are Roald Bahr (Norway), Hakim Alfreidson (Sweden) and Louis Almekinders (USA). The main findings, earlier, identified that patellar tendinopathy is not an inflammatory condition but rather one of degeneration. Current research is investigating the source of pain and the pathological processes, including the role of neovascularisation.

Physiotherapy interventions were traditionally focused on eccentric strengthening, with progressions guided by maintenance of pain-free environment. Research pioneered by Alfredson led to changes in clinical practice and subsequent research to evaluate these changes. Currently, small RCTs and case series have indicated that:

- eccentric quadriceps training can reduce patellar tendinopathy symptoms; and,
- a decline squat exercise (where the feet are positioned on a board, declined at 25 degrees to the horizontal) designed to load the extensor mechanism maximally and performed with video-taped monitoring, may gain greater benefits for the injured athlete, although further research is required.

Furthermore, the research to date suggests that ultrasound-guided sclerosing of surrounding neovessels performed by experienced orthopaedics (and radiologists) may also assist in reducing the pain associated with patellar tendinopathy.

2. Effective treatment strategies for patellofemoral pain

Patellofemoral pain is the most common single diagnosis encountered by running athletes. It is typified by anterior or retro patellar pain that is aggravated by activities that loads the patellofemoral joint, including stair ambulation, squatting, running and jumping activities. Its prevalence, especially among recreational and sub elite athletes, has led to a large body of dedicated clinicians understanding the cause of pain and to evaluating optimal interventions.

The main players here are (in Australia) Kay Crossley (ie., me), Sally Cowan and Karen Bennell (at the University of Melbourne), Jenny McConnell (The University of Sydney) and Bill Vicenzino and Paul Hodges (The University of Queensland) and, internationally, Irene Davis and Chris Powers (in the United States).

Current research is investigating the source of pain and the pathological processes, including the role of neovascularisation. Multi-modal physiotherapy interventions that include vast retraction, patellar taping/bracing, hip muscle retraining and stretching/mobilisation are commonly used by physiotherapists. These have been evaluated in well-controlled RCTs. Current research has shown that:

- multi-modal physiotherapy can restore ambulances in the onset of the medial relative to the lateral vasti; and,
- patellar taping can reduce patellofemoral pain, improve the coordination of the vasti, and enhance quadriceps function, and
- patellar bracing can reduce loads of the patellofemoral joint.

There is much research underway at present, both here in Australia and internationally. Current research projects include:

- evaluating the effectiveness of in-shoe orthotic devices, in isolation and in combination with a multi-modal physiotherapy intervention (Vicenzino); and,
- evaluating the timing of gluteal muscles in individuals with patellofemoral pain (Cowman).

Using biomechanical models to evaluate patellofemoral joint stress (Powers),

- investigating risk factors for patellofemoral pain (female runners (Davis)), and
- evaluating motor unit synchronisation in people with patellofemoral pain (Hodges).

3. ‘Core Stability’ plays a role in the development of knee injuries

The term ‘core stability’ is used to describe the neuro-motor control of the lumbar spine-pelvis-hips region. It has been reported that there is a strong relationship between core stability and injury prevention.

Main players: in Australia, David Lloyd (The University of Western Australia), Dr Hopper (Curtin University), Adam Bryan (University of Melbourne) and Julie Steele (University of Wollongong) and internationally, Irene Davis and Edward Wrisberg (USA) and Scott McLean (USA).

Main Findings:

Oestrogen: Doesn't appear to have a direct effect on the mechanical properties of the ACL itself, may affect soft-tissue compliance and visco-elastic properties of muscles.

Compared to males, females:

- run, land and cut with greater relative valgus loading,
- demonstrate timing of muscle activation that is less protective of the ACL,
- have greater torsional stiffness of the leg in both the passive and the active muscle state, and
- have lower limb muscles which are more compliant.

Prevention of injury: Probably the most important article to come out in the area of injury prevention is Exercises to prevent lower limb injuries in youth sports - cluster randomised controlled trial by Olsen O.R., Myklebust G, Engesetbren L, Holme I and Bahr R in the British Medical Journal 2008; 339:347-49. This can be found on the internet using the searching program, PubMed or at: http://bmj.bmjournals.com/cgi/content/full/339/7756/347.

Furthermore, there is a number of researchers based at La Trobe University in Melbourne who are looking at different factors related to knee injuries, in particular at the effects of different graft types (hamstring or patellar tendon) on outcomes and biomechanics and also the effectiveness of different rehabilitation programs on outcomes after ACL reconstruction. These researchers include Kate Webster, Julian Feller and Randall Cooper.

Where is the research?

Research into sports injuries is benefiting from the boom in biomechanical modelling. In the past we have had to rely on the use of surgically implanted strain gauges (not used too often -- for obvious reasons) to provide data, but much of this information is now being encountered by biological tissues during physical activities.

As three-dimensional motion analysis systems become increasingly available and user friendly and with more accurate information about muscle forces, mathematical models can better predict the loads in relevant tissues. This information will greatly expand our understanding of all injuries, not just ACL, and help us to develop the mechanistic mechanisms of treatment effects.

As physiotherapists, we need to be able to use this information, to help us to devise better treatments and to identify individuals who are most likely to benefit from these interventions.

Dr Kay Crossley, Bl教授(Physial, Positional Therapist), head of the Sports Physiotherapy, is at The University of Melbourne and also practices at the Olympic Park Sports Medicine Centre, Melbourne.
Conference 2005:
An overwhelming success

Our combined conference in October 2005 was an overwhelming success, with 1,115 delegates and 78 trade exhibitors attending. So, on behalf of the 2005 Organising Committee, I would like to thank all sponsors, speakers, trade exhibitors and delegates who supported this year’s event.

Evaluation forms and other anecdotal feedback were overwhelmingly positive, with special mention made of the quality of the keynote speakers and workshops.

The “experience” of combining ACSMS with the national physical activity and sports injury prevention conferences was also perceived as substantially to the value of the overall event.

This was highlighted in Roald Bahr’s opening address (Overdosing sports medicine - from sprained ankles to clogged arteries in which he captivated the audience with his immense knowledge and understanding across all three areas).

Due to the overwhelming success of the 2005 event, Sports Medicine Australia and the National Heart Foundation have agreed to organise a repeat version in Adelaide from 13 to 16 October 2007.

SMA gives a special thank you to major sponsors Asics, Tourism Victoria, Australian Department of Health and Ageing and the Department for Victorian Communities, whose support ensured that we could mount a conference of the highest calibre. We would also like to thank the Heart Foundation, the NSW Sporting Injuries Committees and VicHealth for their support.

The ASMF Fellows Awards were once again a huge drawcard, Dr Karim Khan winning the Asics Medal valued at $5,000 for his paper Action School: BC: daily physical activity increases bone strength in prepubertal boys. A complete list of prizewinners is published below.

For those who were unable to attend the 2005 conference, the Organising Committee of the 2006 Asics Conference of Science and Medicine in Sport invites delegates to join them in Fiji from 19 to 21 October 2006 to experience three intriguing days of conferencing that can be combined with active or more passive leisure-time activities.

Alternatively, the conference secretariat can be contacted at acsms@sma.org.au to obtain further information.

2005 Australian Sports Medicine Federation fellows awards

Best Paper Awards

ASICS Medal - Best Paper Overall
Karim Khan, University of British Columbia
Action School: BC: daily physical activity increases bone strength in prepubertal boys
Co-Authors: H Macdonald, S Manske, K Reed and H McKay

ASICS Best Paper - Lower Limb
Jill Cook, Latrobe University
Painful tendo-achilles injuries: are they a true clinical diagnosis
Co-Authors: P Malliaras

ASICS Best Paper - Clinically Relevant Conditions
Gabriel Ng, The Hong Kong Polytechnic University
Therapeutic laser and running exercise promote tendo-achilles healing: a rat model
Co-Authors: D Fung

For your library

The Little Black Book of Sports Medicine (414pp)
Eds: TM Howard and JD Butcher
Published by Elsevier Mosby
ISBN 0721672843

The 4th edition of the Little Black Book is out, with updated information for physicians and support staff for diagnosing and treating injury and illness.

Year Book of Sports Medicine 2005 (424pp)
Ed. In Chief: RJ Shephard
Published by Elsevier Mosby
ISBN 0323026230

The 2nd edition of the Year Book of Sports Medicine includes material on preventive medicine, traditional format, with new research since the last edition.

Handbook of Fractures (442pp)
Eds: JA Elstrom, WW Virkus and AM Pankovich
Published by Elsevier
ISBN 0443013585

The 3rd edition of the Handbook of Fractures is out, with material added on preventive medicine, epidemiology, sports injury and ergogenic aids and doping.

Athletic Training and Sports Medicine (707pp)
C Stanley and G Johnson
Published by Elsevier Mosby
ISBN 0323062450

The objective here is to help the athletic trainer to recognise medical conditions and to understand when to go for the doctor. Comes with a free DVD-ROM.

Pharmacology Application in Athletic Training (235pp)
BC Mangus and MG Miller
Published by FA Davis, distributed by Elsevier
ISBN 0803607784

Another textbook for students of orthopaedic injury, with such new features as clinical presentation, surgical technique and clinical technique boxes, rehabilitation timelines and new material on therapeutic exercises.

DC Saidoff and S Apfel
Published by Demos, distributed by Elsevier
ISBN 1932609042

Intended for active adults, with information about the basic structure and function of the musculoskeletal system and advice on how to exercise it safely.

Research Methods in Athletic Training (399pp)
BL Arnold, BM Gansneder and DH Perrin
Published by FA Davis, distributed by Elsevier
ISBN 0888607784

A guide for certified and student athletic trainers to conducting, publishing and finding funding for research.

Immun Function in Sport and Exercise (332pp)
Ed: M Gleeson
Published by Churchill Livingstone Elsevier
ISBN 0443013585

This is the 5th edition of the Immun Function in Sport and Exercise, with new research since the last edition.

Bone Strength in Prepubertal Boys (297pp)
Eds: M Trew and T Everett
Published by Churchill Livingstone Elsevier
ISBN 0443074461

The aim here is to help athletic trainers and allied health professionals understand across all three areas.

Exercise and Sports Science, this one involving medications.

Participation, the types of drugs adverse effects on rehabilitation and exercise promote tendo-achilles healing: a rat model
Co-Authors: D Fung

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Participation, the types of drugs adverse effects on rehabilitation and exercise promote tendo-achilles healing: a rat model
Co-Authors: D Fung
ASICS Best Paper - Performance Enhancement and Basic Science
Daniel Green, The University of Western Australia
Do skinfolds accurately assess changes in body fat in obese adolescents?
Co-Authors: K Watts, E Davis, T Jones, B Beeson, A Siafarikas, S Bell and T Ackland

ASICS Best Paper - Health Promotion
Kylie Ball, Deakin University
Socioeconomic inequalities in leisure-time walking: are poor environments to blame?
Co-Authors: A Timperio, J Salmon, B Giles-Corti and D Crawford

Sport and Recreation Victoria Best Paper – Injury Prevention
Leonie Otago, University of Ballarat
The risk management knowledge of basketball coaches and their influence on the injury prevention strategies of their players?
Co-Authors: J Swan and S Ramage

Best Young Investigator Awards
ASICS Best Young Investigator - Lower Limb
Stuart Warden, Indiana University
Knee ligament healing is accelerated by low-intensity pulsed ultrasound and delayed by a non-steroidal anti-inflammatory drug.
Co-Authors: K Avin, E Beck, M DeWolf, M Hagemeier and K Martin

John Sutton Best Young Investigator - Basic Science
Sonya Marshall-Gradisnik, Southern Cross University
Natural Killer cell numbers and natural killer cytotoxic activity after 6 weeks of testosterone enanathate administration in both young males
Co-Authors: S Rogerson, G Deakin, R Meir, R Coutts, S Zhou and R Weatherby

NSW Sporting Injuries Committee Best Young Investigator - Injury Prevention
Rochelle Eime, University of Ballarat
A controlled evaluation of a squash eyewear promotion strategy
Co-Authors: C Finch, R Wolfe, N Owen and C McCarty

ASMF Fellows Award Best Young Investigator - Health Promotion
Corneel Vandelanotte, Ghent University
Efficacy of a computer-tailored intervention for increasing physical activity in a sequential or simultaneous intervention mode
Co-Author: I de Bourdeaudhuij

Best Poster Awards
Queensland Academy of Sport Best Poster - Clinically Relevant Conditions
Mark Watts, Brisbane Orthopaedic and Sports Medicine Centre
Tibial interference screw position in soft tissue ACL graft fixation: biomechanical considerations
Co-Authors: D Hayes, G Tevelen and R Crawford

AOK Health Best Poster Performance Enhancement and Basic Science
Karen Beatty, The University of New South Wales
Measurement of load during gymnastics training
Co-Author: A McIntosh

Journal of Science and Medicine in Sport Best Poster - Injury Prevention
Tania Pizzari, La Trobe University
Stress fractures of the base of the second metatarsal in elite female classical dancers
Co-Authors: G Davidson and S Mayes

Sports Medicine Australia Best Poster - Health Promotion
Elizabeth Cyarto, The University of Queensland
Is the CHAMPS physical activity questionnaire for older adults reliable in an older Australian sample?
Co-Authors: R Dickinson, A Marshall and W Brown

ASMF Fellows Best Poster - Health Promotion
Vincent Learinhan, The University of Western Australia
Influence of Data Scale in Walkability Analyses

Special Categories
Wendy Ey Women In Sport Award
Kay Cox, The University of Western Australia
Type of exercise determines short and long-term health benefits of a swim and walk program in older women: the SWEAT 2 study
Co-Authors: V Burke, L Beilin, I Puddey, J Grove and B Blanksby

Honourable Mentions
Honourable Mention ASICS Best Paper Performance Enhancement and Basic Science
Magnus Hagmar, Karolinska University Hospital
Endothelial function: is exercise more important than estrogen in post-menopausal women?
Co-Authors: MJ Eriksson, C Lindholm, K Shenck-Gustafsson and A Lindén Hirschberg

Honourable Mention AOK Health Best Poster Performance Enhancement and Basic Science
Deirdre McGhee, University of Wollongong
How does respiratory state and measurement method affect brassiere size calculations?
Co-Author: J Steele

Honourable Mention Wendy Ey Women In Sport Award
Kathy Martin, WTA Tour
The WTA Tour Ten-Year Age Eligibility and Professional Development Review
Co-Authors: V Burke, L Beilin, I Puddey, J Grove and B Blanksby