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A look to London 2012
Interview with James Trotter, Physio HQ

The role of imaging
A look at hamstring strain injury

Thyroid disease
Often undetected and untreated

- NRL Injury Report 2011
- Optimising bike set up
- Why athletes dope
- Injuries sustained in weightlifting
- Stretching the hip flexors
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Journal of Science and Medicine in Sport
Congratulations to our Olympic representatives

Nello Marino is pictured with Elastoplast strapping tape, which no doubt will be greatly used throughout the upcoming Olympics. Elastoplast is a major partner of Sports Medicine Australia.

If you have a worthy cause or issue related to sports medicine or physical activity that you would like promoted in *Sport Health* via a promotional item, e.g. hat, t-shirt, mug, email nello.marino@sma.org.au

SMA CEO, Nello Marino talks all things Olympics and reminds members to consider SMA Fellowship.

Unless you’ve been living under a rock you would be well aware that the London Olympics commence very soon. For almost all SMA members this is a truly exciting time and many would be connected to a practitioner with a role at some stage in the development of an Olympic athlete.

It’s also a time for SMA to reflect on its roots, bearing in mind that one of the primary reasons for the establishment of SMA (then ASMF) was the need for medical coverage at sporting events. We see a very different representation of medical personnel today, to what was seen in 1956, and the influence of organisations such as SMA should not be underestimated. Today the Olympic medical team is truly multidisciplinary with representation from Sports Physicians, Sports Physiotherapists, Dietitians, Psychologists, Physiologists and Soft Tissue Therapists.

“... we wish everyone travelling to London as part of the Australian Olympic Team every success for the Games...”

A number of SMA members will participate as part of medical support teams at the London Games, either as part of the Australian Olympic Team medical appointments or as a team practitioner with a specific team.

This issue of *Sport Health* features one particular member participating in the London Games as well as a couple of employees who also take up important roles with water polo and basketball (refer page 43). On behalf of the Board and all the members of SMA we wish everyone travelling to London as part of the Australian Olympic Team every success for the Games and we are sure they will play a huge part of the success of the event and our athletes.
ASMF Fellowship – An honour of great support

Not surprisingly a number of SMA Fellows are part of the Olympic medical team travelling to London. ASMF Fellowship is a formal recognition of the contribution made by SMA members to sports medicine and Sports Medicine Australia. Whilst on the surface this might seem to be reserved for sports medicine services in elite sport, this is certainly not the case. Fellowship is available to any SMA professional member that has held membership for at least seven years and the Fellowship is truly reflective of the diversity of both profession and engagement in SMA and sports medicine activities. Fellowship is awarded annually at the SMA National Conference and the fundamental criteria are as follows:

1. Applicants must have attended at least four of the seven preceding National Conferences of Sports Medicine Australia.
2. Within three years of application have published at least one article relating to sports medicine in a refereed journal or have presented at least one paper, poster or workshop at a national or international conference related to sports medicine.
3. Have made a significant contribution to the promotion of Sports Medicine Australia and to the development and practice of sports medicine/science for a minimum period of five years in one of the following: clinical/scientific, governance/administration, education or other such as conference committee or editing/significant contribution to SMA publications. More detail on these is contained in the application form.

Fellows are a diverse group of esteemed individuals who as a group make an enormous contribution to the continued development of SMA and in particular, young researchers and practitioners.

This is evident through their annual support of conference awards which acknowledges exceptional papers and presentation, particularly by early career researchers and practitioners. This support of early career researchers is also evident in the ASMF Fellows support of the SMA Research Foundation, now in its third year which to date has supported 10 new research projects over the last two years.

The ASMF Fellows continue to work tirelessly towards ensuring that talented researchers and practitioners get every opportunity to excel in the field of sports medicine and we encourage all members to strive for Fellowship. More information and application forms for ASMF Fellowship can be found at sma.org.au/members/asmf-fellows/

Nello Marino
Chief Executive Officer
Sports Medicine Australia
nello.marino@sma.org.au
What is your profession?
I’m a sports medicine physician and academic – Professor of Sport and Exercise Medicine.

How many years have you been in this profession?
Graduated as a doctor 28 years ago; got first uni job in 2000.

Where do you work?
My main office is at the University of British Columbia, Vancouver, Canada. I’m in a fancy new research centre called the ‘Centre for Hip Health and Mobility’ and I can bike there in 15 minutes or walk home along a ‘seawall’ in about 40 minutes.

What does your typical day consist of?
Biking to work (did I mention that?) and doing whatever it takes to help drive the physical activity promotion and injury prevention/treatment agenda forward. The common thread is working with teams of folks in research, publication such as the British Journal of Sports Medicine, or in various forms of education.

What is your favourite aspect of your job?
The fact that physical activity is now appreciated to be a hugely powerful determinant of health. When I started I was just trying to help out folks who were injured and wanted to be active but were being told to stop exercising by doctors. Then people like Steve Blair discovered that physical inactivity was killing more Americans than smoking, diabetes and obesity combined so now we have a major role in public health.

What has been the highlight of your career?
The incredible people I have had the pleasure of working with in the different facets of sport and exercise medicine. The cliché is that if your work is your passion you never do a day of work in your life. The people I have been fortunate enough to be mentored by, my colleagues, and those younger folks I work with who inspire me, mean that every day is a career highlight. I have been fortunate to be at major events and there have been tangible ‘successes’ but the highlights all involve great people – and many are SMA members.

When, why and how did you become involved with SMA?
Dark ages. Because SMA is Australia’s peak national umbrella body for sports medicine and sports science, and is widely acknowledged overseas as the world’s leading multi-disciplinary sports medicine body (How did I do? I love exam questions!).
When, why and how did you become involved with The British Journal of Sports Medicine (BJSM)?

Paul McCrory finished his term in 2007 and I guess they wanted someone non-Australian to take over. Seriously though, I’d had great experience in journal work by having been Editor of Sport Health (as Paul had previously). Looks like it’s the career path. The great thing about BJSM is that it is part of the BMJ Group so the Editor gets tremendous support with critical elements like digital media, podcasts, and videos. We have a lot of scope to serve clinicians working in sport, exercise and physical activity. Check it out at www.bjsm.bmj.com

When, why and how did you become involved with be active 2012?

The national conference is always on my radar – it is one of the world’s premier meetings. And the combination with the 4th International Congress on Physical Activity and Public Health meeting this year meant I would have paid my way to come – wouldn’t miss it for the world!

What will you be discussing in your refshauge lecture at the upcoming be active 2012 conference?

Given that the conference audience is multidisciplinary, I’m going to share my experience in the elite sport setting to talk about ‘success’ in sport and work. I’ll focus particularly on the ‘team’ environment – sporting teams, the off-field sports medicine/sports science teams. I aim to merge the science of ‘success’ with the science of ‘teams’ so that it’s relevant for everyone. Ambitious eh!

What are you passionate about?

Not much. I’m all about being cool, calm and collected. Composure. Sang froid (also ‘sangfroid’ in Wikipedia).

What’s the best piece of advice anyone has ever given you?

Gaylene Clews was interviewed on ABC radio in the early 1980s and she said that what she loved about Deeks was that he was a great listener. I’ve failed to meet that goal but I reckon it’s a terrific tip.

Name four people, living or not, you would invite for a dinner party and why?

Lorimer Moseley, Abraham Lincoln, the Heath Brothers, Madonna and Heather McKay (ok, so counting was never my strong suit). Adrian Bauman and John Orchard on the bench.

Favourites

Travel destination: Wherever my wife, Heather McKay is.

Sport to play/watch: Can’t beat a great game of Aussie Rules at the MCG in Spring with pies.

Cuisine: Cereal for sure – Weet-Bix in Oz, Weetabix when out of the country.

Movie: Diva, A Few Good Men, High Fidelity. Love the movies.

Song: Dire Straits. I really have to get contemporary eh! 51 cents??

Book: Clinical Sports Medicine for the great plot. I’m dying to find out what happens at the end but keep falling asleep.

Gadget: Running shoes and EndNote (come on, give me a break! I can’t believe you reckon I am such a nerd!).
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**SPORT HEALTH** addresses topical issues and insight into key SMA practices and activities.

**MEDINFO NOW** is an online research database offering easy-to-use search tools for the latest medical news and research via email.

**MEMBER eNEWS**, SMA’s electronic monthly update providing news and professional development opportunities.

**FACT SHEETS** and **POLICY** resources offer a means to engage with patients and an opportunity to promote your business through branding opportunities.

Ensure you are making the most of your SMA membership.

Discover the ways to keep up to date at sma.org.au
Q & A with Australian National Preventive Health Agency CEO, Louise Sylvan

Dr J undertakes a Q & A with the Australian National Preventive Health Agency’s (ANPHA) Chief Executive Officer, Louise Sylvan. ANPHA is Australia’s first national preventive health agency – committed to improving health outcomes for all Australians. ANPHA’s establishment was a key recommendation of the National Health and Hospitals Reform Commission and the National Preventive Health Taskforce and strengthens Australia’s investment in preventive health to help turn the tide on the rising prevalence of preventable chronic diseases.

ANPHA supports the development and implementation of evidence-based approaches to preventive health initiatives targeting obesity, alcohol, tobacco and other substance abuse.

Q: I note that ANPHA’s three main areas for focus are (1) reducing tobacco smoking (2) reducing harmful alcohol consumption and (3) the obesity epidemic. A related international body – the Oxford Health Alliance – has three very similar (but slightly different) areas of focus: (1) tobacco smoking (2) poor diet and (3) physical inactivity. A keynote speaker at the latest Sports Medicine Australia conference in Perth, Mark Fenton, said in his presentation*: “It’s not just an obesity epidemic. We’re tackling twin epidemics of physical inactivity and poor nutrition.” Why has ANPHA decided to list the ‘obesity epidemic’ as a priority area rather than ‘physical inactivity’ and ‘poor diet’ as twin priorities?

A: Australian Health Ministers have selected these three priorities for ANPHA. Obesity, as sports medicine people would well know, is linked to many chronic diseases including type 2 diabetes, osteoarthritis, cardiovascular disease and some cancers and consequently has been highlighted as a priority for ANPHA. Within obesity prevention, ANPHA is looking at both physical inactivity and poor nutrition as contributors. We also recognise these as important factors for good health and wellbeing, independent of weight.

“... it is... up to Ministers to decide if they wish to set national targets for physical activity levels...”

Q: Obviously you will appreciate the bias towards physical activity in both the Fenton presentation and our own organisation (SMA), even though sports nutrition is an important subspecialty branch within SMA. Fenton also reported in Perth that “calorie reduction diets tend to work in the short term but fail to ‘stick’ in the longer term if they aren’t accompanied by an increase in physical activity”. Is the obesity arm of ANPHA committed to a 50/50 split in resources between physical activity and good diet promotion, or will one of these two become the dominant focus of attack on the obesity epidemic?

A: Physical inactivity and poor nutrition are interrelated contributors to obesity and both require attention. ANPHA will consider each challenge and piece of work separately and allocate resources to achieve the best outcome possible for population health. ANPHA’s Measure-Up Swap It Don’t Stop It social marketing campaign includes a strong focus on physical activity, providing swapping strategies for everyday situations. The swap suggestions for the campaign and on the website (www.swapit.gov.au) are based upon relevant chronic disease, physical activity, nutrition, overweight and obesity guidelines and research.
Q: In an interview with ABC Radio’s National Interest program on 30 September 2011, you were bold enough to set a target of getting smoking rates in Australia down from 15 per cent of the population to 10 per cent of the population. It seems like a small reduction but it is actually a 33 per cent drop and many of the entrenched smokers are now marginalised members of the community (e.g. the mentally ill, unemployed, criminals), who will be particularly hard to budge. However, you do have the advantage of the plain paper packaging legislation, which if implemented would be the most progressive anti-smoking legislation to date. Currently only 45 per cent of Australians get sufficient physical activity. Are you also bold enough to set a target for desired physical activity levels in Australia, bearing in mind that as with smoking you will never get 100 per cent?

A: All Australian governments have committed to working towards reducing the smoking rate to the target of only 10 per cent of the population smoking by 2018 and ANPHA is supporting that work through the National Tobacco Campaign and other measures. The 10 per cent target was actually set by the Council of Australian Governments (Prime Minister and Premiers) in the 2010 National Partnership Agreement on Preventive Health (NPAPH) – and it is of course up to Ministers to decide if they wish to set national targets for physical activity levels as well. In fact, the NPAPH does set an outcome target in this area, to:

Increase the proportion of children and adults meeting national guidelines for healthy eating and physical activity by 15 per cent within six years.

So ANPHA in partnership with the state and territory governments is committed to supporting programs and campaigns which promote physical activity in every day life – including the National Physical Activity Guidelines for Australians, which outline the minimum levels of physical activity required to gain a health benefit and ways to incorporate incidental physical activity into everyday life.

“We’ve undoubtedly drawn many valuable lessons for public health endeavours including from our experience with tobacco. Obesity prevention is more complex and variable than tobacco and the messages and behaviours required are more complex and ongoing.”

The Australian Government has committed its largest investment in preventive health with the $872.1 million being provided within the NPAPH. NPAPH initiatives include a focus on healthy communities, healthy children and healthy workers and incorporate physical activity strategies. For example, $294.6 million is being provided to the Healthy Workers initiative, which aims to support workplace health programs. The majority of this funding ($289.4 million) is available to the state and territory governments to facilitate delivery of healthy living programs in workplaces and one of the focuses of Healthy Workers is increasing levels of physical activity amongst workers. It might be worth talking to a number of the jurisdictions about their programs in this area and in schools and communities.

Q: It has been said that with physical activity in the 2000s our government response was akin to its response to smoking in the 1970s – that the knowledge of what was needed was there but that there was no understanding of how to achieve it. It has taken the best part of 50 years to win the war against tobacco in Australia. Is physical activity going to be a harder nut to crack because there is no one to actually declare war against, or is it going to be easier because we have learnt so many lessons from the fights against tobacco smoking, drink driving and the like?

A: This is an interesting question! Tobacco control has a simple message – stop smoking. We’ve undoubtedly drawn many valuable lessons for public health endeavours including from our experience with tobacco. Obesity prevention is more complex and variable than tobacco and the messages and behaviours required are more complex and ongoing. Increasing physical activity requires a cultural shift and there are many facets and elements – such as workplace and school conditions, community facilities, city design and infrastructure – which bear on outcomes. Despite the complexity,
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ANPHA is committed to evidence-based and evidence-creating approaches in whichever sector can contribute to this overall task. Our particular role will be one of creating partnerships, bringing the evidence together and assisting in the learning process and the further implementation of strategies that will achieve the nation’s goals for overweight and obesity levels.

“Obesity... is linked to many chronic diseases including type 2 diabetes, osteoarthritis, cardiovascular disease and some cancers and consequently has been highlighted as a priority for ANPHA.”

Q: In the sports medicine world, we consider exercise is like superannuation in that you have to pay now to do it in many cases (team membership, equipment purchase, physiotherapy treatment if injured), but both the participant and the government reap the benefits many years later in terms of reduced rates of cancer, cardiovascular disease, diabetes, osteoporosis, depression etc. Do you have any plans to try to reduce the direct and indirect costs of exercise or do you think this is years away?

A: ANPHA plans to look at the economic issues surrounding prevention activity. One of the key issues here is contained in your question – that action now reaps its rewards many years later – thus the superannuation analogy is a good one. Governments became convinced about mandatory superannuation contributions through good economic analysis. We will work with others to get the case for prevention more solidly made in economic terms – and of course many of us in this field will need to present the cogent arguments for investment in prevention, even with good cost-benefit analysis, because of the long payback terms in many instances.

“... ANPHA in partnership with the state and territory governments is committed to supporting programs and campaigns which promote physical activity in every day life.”

Q: If you want an option on the table to categorise under the previous question, it is worth familiarising yourself with the New Zealand Accident Compensation Corporation (ACC). New Zealand funds treatment of sporting injuries in full, as opposed to Australia where the individual is supposed to fund treatment him or herself for the most part. I have argued in favour of the New Zealand system in the Medical Journal of Australia in 2002 and 2007, but this sort of government intervention is not on the agenda. The strongest argument in favour of it is that it can lead more efficiently to prevention of sports injuries. For example, New Zealand has lower rates than Australia of spinal injuries in rugby, dental injuries in sport and knee reconstructions. All of those people in New Zealand who have had their injuries prevented are less likely to get obese, in my opinion, because they are still fit to exercise. Is this too long a bow to draw in your opinion, or would you support the creation of a body to fund treatment of sports injuries in Australia?

A: Thanks for the specific suggestion. ANPHA has not examined this issue and we do not have current plans to undertake work in this specific area. We’ll tackle the broader economic issues in prevention as our first priority.

Q: How political are you allowed to be with respect to Medicare and the domain of the Federal Health Minister? For example, sport and exercise medicine physicians have recently suffered a rebate cut under Medicare. This has basically killed off bulk billing for sports medicine consultations and made it much more expensive for patients to see a sports physician (assuming fees have stayed constant). Are you allowed to pick up the phone to the Health Minister and say “Why on earth would you make exercise indirectly more expensive? Can you give sports physicians rebate parity with other consulting physicians to help us encourage people to exercise?”, and even “why don’t you fund physiotherapy for sports injuries?” or is acute health care not part of your circle of concern?

A: ANPHA is an expert advisory agency to governments. When we give advice, it is required by s11A of ANPHA Act for such advice to enter the public domain. So, on any issue where our advice is offered or requested by Ministers, we would formally assess the evidence and provide our advice in writing as required by the transparency requirements of our Act.

Dr J

Sports Medicine Australia would like to thank Louise Sylvan of the Australian National Preventive Healthy Agency for her time in answering these questions.

The opinions expressed in Dr J are the personal opinions of the author.

Donna O’Connor from the NRL Research Board and the University of Sydney looks at the injuries sustained in the 2011 season.

The National Rugby League (NRL) has conducted an annual injury surveillance system at both the NRL and NYC (National Youth Competition) level since 2008. The aim of this report was to identify the incidence, site, nature and risk factors of injuries sustained in the 2011 NRL and NYC season that resulted in missed playing time and make comparisons to previous seasons.

Method

Sixteen clubs participating in the NRL and NYC competition were asked to collect data on the injuries sustained by their players during the 2011 NRL and NYC season. There were 473 players that participated in first grade and 545 players that participated in the NYC competition during the 2011 season. Data was collected from all NRL teams and 15 NYC teams. Consequently data for NYC is based on 15 teams and 516 participating players.

“In 2011 the injuries resulting in most missed game time include ACL injuries, hamstring strains, ankle injuries and shoulder sprains/dislocations.”

Injury definition: The injury definition used is ‘any injury that was sustained during a first grade NRL game (or NYC game) or training session that resulted in missed game time’.

Injury incidence: Injury incidence was only calculated for injuries that were sustained during games as exposure hours could not be calculated for training. Therefore injury incidence was measured in units of injuries per 1,000 player hours. Only injuries that occurred in grade games were included in the numerator and only players participating in grade matches in each week were included in the denominator. The duration of each game was 80 minutes. This was calculated separately for NRL and NYC injuries.

Results and discussion

Table 1 (overleaf) provides an overview of NRL and NYC injuries sustained during the 2009–2011 seasons. Of the 358 NRL players injured in 2011, 655 injuries were reported averaging 1.8 injuries per injured player. Of the 655 injuries that were reported –

- 607 resulted in a minimum of one game missed.
- 68 per cent were sustained in an NRL game (445).
- 16 per cent were sustained during training (104).
- 9 per cent of injuries to NRL squad members were sustained during lower grade games.
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“The risk of missing more than one game through injury is 4 per cent.”

The incidence rate for injuries was 64/1,000 hours for NRL games and 49.6/1,000 hours for NYC games. This higher injury rate at NRL level has been attributed to the higher game intensities at the elite level\(^2-5\). During 2011 there was a decrease in the incidence rate for game injuries sustained at the NRL level compared to previous years. Although there were a similar number of players injured throughout the season there was an increase in the number of player games missed due to injury (from game and training injuries). There is a 6.0 per cent risk of sustaining an injury in an NRL game and having to miss the subsequent game. This is a lower risk than recorded for the 2009 and 2010 season. The risk of missing more than one game through injury is similar in 2011 and 2010 which has increased from 2009. There were approximately six NRL players and five NYC players unavailable each week of the 2011 season due to injury. The NRL injury recurrence rate increased in 2011 to 16.8 per cent up from 14 per cent in 2009 and 2010.

Table 1 – NRL and NYC injuries 2009–2011

<table>
<thead>
<tr>
<th></th>
<th>NRL</th>
<th>NYC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injured players</td>
<td>358</td>
<td>347</td>
</tr>
<tr>
<td>% players injured</td>
<td>75.7</td>
<td>75.8</td>
</tr>
<tr>
<td>Injuries</td>
<td>655</td>
<td>656</td>
</tr>
<tr>
<td>Missed games</td>
<td>2342</td>
<td>2029</td>
</tr>
<tr>
<td>% injuries sustained in competition matches</td>
<td>68</td>
<td>77</td>
</tr>
<tr>
<td>Incidence rate for game injuries (per 1,000 playing hours)</td>
<td>64.0</td>
<td>72.4</td>
</tr>
<tr>
<td>Incidence rate for game injuries resulting in one missed game (per 1,000 hours)</td>
<td>58.8</td>
<td>62.9</td>
</tr>
<tr>
<td>Risk of sustaining an injury in NRL game and missing at least one game (%)</td>
<td>6.0</td>
<td>6.6</td>
</tr>
<tr>
<td>Risk of sustaining an injury in a game and missing more than one game (%)</td>
<td>4.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Missed games per club</td>
<td>146</td>
<td>127</td>
</tr>
<tr>
<td>Players unavailable each week</td>
<td>6.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* Analysis is based on data from 15 instead of 16 clubs.

Type of injuries

Muscular strains and ligament sprains were found to be the two most common types of injury sustained by NRL and NYC players (Table 2). Injury rate for muscle injuries are lower at NYC level compared to NRL level (7/1,000 hours v 17.4/1,000 hours) while there is a similar injury rate for ligament injuries (15.1–15.8/1,000 playing hours).

The incidence rate for concussions has been at a consistent rate over the last three years (4.2/1,000 hours for NRL and 3.4/1,000 hours for NYC). As in previous years, muscular strains again accounted for the most injuries sustained during training (47 per cent for NRL and 37.3 per cent for NYC). In relation to the average number of games missed per injury, dislocations are the most severe.
Table 2 – Percent, incidence rate and missed game by type of injury

<table>
<thead>
<tr>
<th>Injury Mechanism</th>
<th>NRL 2011</th>
<th>Average Missed Games</th>
<th>NRL 2010</th>
<th>Average Missed Games</th>
<th>Total NRL Injuries</th>
<th>Average Missed Games</th>
<th>NYC 2011</th>
<th>Average Missed Games</th>
<th>NYC 2010</th>
<th>Average Missed Games</th>
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</thead>
<tbody>
<tr>
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Injury mechanism

As rugby league is a contact sport it is unsurprising that the physical contact causes the most injuries. The number of ‘tackle contests’ (either executing a tackle or being tackled) in an NRL game can range from 550–685. Previous studies reveal ‘being tackled’ followed by ‘making a tackle’ are the two main causes of injuries\(^3\)\(^5\)-\(^7\)-\(^8\)-\(^17\). When excluding the unspecified injuries, the tackle contest accounted for approximately 47.5 per cent of all NRL injuries with a player ‘being tackled’ contributing to 30.4 per cent of all injuries. The four predominant causes of injuries at NRL and NYC level were: being tackled; tackling; running; and collision with player/object. When injuries were classified into ‘contact’ and ‘non-contact’ injuries it was revealed that 27.8 per cent of NRL injuries (24.3 per cent for NYC) were non-contact. When injuries are sustained (during NRL games) while being tackled they will generally be to the ankle (23.5 per cent) and knee (16.8 per cent) whereas the shoulder (21.5 per cent) is more likely to be injured when making the tackle. The hand and head are the next two sites likely to be injured when making the tackle. These trends replicate the 2010 and 2009 data. Collisions predominantly result in head injuries (35.7 per cent) while running injuries generally result in hamstring strains (48.3 per cent).
**Table 3 – Injury mechanisms**

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<tr>
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<td>Percent</td>
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**Table 4 – Injury severity**

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<th>NRL games/1,000hrs</th>
<th>Average missed NRL games/club</th>
<th>NYC games/1,000hrs</th>
<th>Average missed NYC games/club</th>
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<td>Mild</td>
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<td>12.6 11.2 15.5</td>
<td>21.1 22.2 31.5</td>
<td>10.1 7.5 11.1</td>
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<tr>
<td>Moderate</td>
<td>25.2 25.9 17.7</td>
<td>43.4 31.1 28.5</td>
<td>16.2 21.1 24.0</td>
<td>25.3 24.5 29.1</td>
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<td>Major</td>
<td>13.7 11.8 7.6</td>
<td>90.4 84.6 48.3</td>
<td>12.2 15.0 13.7</td>
<td>85.1 62.0 37.7</td>
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</tbody>
</table>

**Severity**

Severity for this study is based on the number of games missed. The following definitions were used for the purposes of this report:

- Mild: 0–1 games missed due to injury.
- Moderate: 2–4 games missed due to injury.
- Major: a minimum of 5 games missed due to injury.

“The four predominant causes of injuries at NRL and NYC level were: being tackled; tackling; running; and collision with player/object.”

**Injury prevalence**

Table 5 (overleaf) outlines the number of missed games by injury diagnosis and the average number of games missed per club due to this category. For example, there were 75 hamstring strains resulting in 168 missed games which equates to each club on average having players unavailable for 10.5 games during the season due to hamstring strains. In 2010 there were 76 hamstring strains resulting in a total of 188 missed games. There were 14 pectoralis major injuries in 2011 (6 in 2010) resulting in 113 missed games (10 missed games in 2010). Eleven of these were sustained while the player was making a tackle. In the NYC, there were 14 leg and foot fractures that resulted in players being unavailable for a total of 183 games which equates to each club on average having players unavailable for 12.2 games during the season due to these injuries.

There is some variation between NRL and NYC players in the body area most frequently injured. The upper leg (groin, hamstring and quadriceps) accounted for 24.3 per cent of all NRL injuries with an incidence rate of 15.4/1,000 hours compared to 6.7/1,000 hours in the NYC (17.3 per cent). The foot and ankle account for 19.2 per cent of all NYC injuries with an incidence rate at 10.3/1,000 hours compared to 9.8/1,000 hours at NRL level (15.4 per cent). Sixteen percent of NYC injuries were to the shoulder at an injury rate of 8.3/1,000 hours compared to 8.7 per cent of all NRL injuries (5/1,000 hours). In 2011 the injury rate for knee injuries was similar in both grades (8.3–8.5/1,000 hours). The shoulder has previously been reported as a common injury among...
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junior and semi-professional players\textsuperscript{2,9-11}. Hamstring injuries are common to team sports such as Australian Rules football\textsuperscript{12}, rugby union\textsuperscript{13}, soccer\textsuperscript{14} and cricket\textsuperscript{15} and again were prevalent in rugby league accounting for 11.9 per cent of all NRL injuries (similar to 2010) and 8.4 per cent of all NYC injuries.

In 2011 the injuries resulting in most missed game time include ACL injuries, hamstring strains, ankle injuries and shoulder sprains/dislocations. At the NYC level shoulder sprains and dislocations resulted in the most missed game time (an average of 11 games per club) followed by forearm/wrist/hand fractures, ACL knee injuries, ankle sprains and syndesmosis injuries. It has been speculated that the increase in shoulder injuries in today’s game may be influenced by tackle technique\textsuperscript{16}.

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*Some injury data was incomplete so some injuries could not be included in this table."
Days since previous game

Figure 1 illustrates the injury rate for a 5–16 day period between games. Only game injuries were analysed and round one injuries were not included as we didn’t have a reliable record of when the last trial for each club had been played. The highest incidence of injury during NRL games in 2011 occurred after a 15 or 16 day break. In 2010 the highest injury rate was after a 12 day break which is also after the bye. The overall injury rate after the bye was 65.1/1,000 hours. There was also a higher incidence rate of major injuries (> 5 missed games) after 10, 15 or 16 days (24.8–43.4/1,000 hours) compared to a major injury rate of 5.5/1,000 hours when there is five days between games. The highest incidence of injury in the NYC occurred after a 12 (99.1/1,000 hours) or 16 day (86.8/1000 hours) period between games. The overall injury rate after a ‘bye’ in the NYC was 75.3/1,000 hours.
“Muscular strains and ligament sprains were... the two most common types of injury...”

However care must be taken with this interpretation. The injury rates after the bye are based on a small sample (e.g. a 12 day break only occurred on 10 occasions during the season compared to 216 occasions when a team had seven days between games) even though all injuries are calculated per 1,000 playing hours. However when looking at individual teams the range in injury rate after the bye significantly varies for both grades with some teams reporting no injuries and others with an injury rate higher than 170/1,000 hours. At this stage we can only speculate why this may occur and need to determine if this trend continues. The clubs that recorded very high injury rates after their bye may want to review their training commitments in relation to the scheduling of games – does a 12–16 day break result in either extra training as a ‘top up’ or several days off with no training? Does this influence the injury rate after a bye?

Figure 1

It was also revealed that the highest injury rate for muscle strains is in an NRL game following a 5, 9, 15 or 16 day break since the previous NRL game. In 2010 muscle strains were highest after a 12 or 13 day turn around. Seventy one percent of injuries sustained after a 12–16 day break were contact injuries.

“The most prevalent injury sites for ‘major’ injuries for both grades were the knee, foot/ankle and shoulder.”
Table 6 – Days since previous game

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<tr>
<th>Days</th>
<th>Average missed game/injury</th>
<th>Muscle strain injuries/1,000 hrs</th>
<th>Ligament injuries/1,000 hrs</th>
<th>Concussion/1,000 hrs</th>
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“Of the 358 NRL players injured in 2011, 655 injuries were reported averaging 1.8 injuries per injured player.”

Summary

In summary there were 75.7 per cent of NRL players that sustained an injury during the 2011 season with an incidence rate of 64/1,000 hours. This equated to a 6 per cent risk of sustaining an injury in an NRL game and having to miss the subsequent game. The risk of missing more than one game through injury is 4 per cent. On average each team has six players unavailable for first grade each week. There were 57.1 per cent NYC players who sustained an injury with the injury rate for 2011 at 49.6 injuries per 1,000 playing hours. There was a 4.5 per cent risk of sustaining an injury in an NYC game.

Donna O’Connor

NRL Research Board and the University of Sydney

Acknowledgements:
The author would like to acknowledge the contribution of the NRL and NYC clubs and their staff in the reporting of injury data during the 2009–2011 NRL and NYC season.

References, as indicated within the article, are available at sma.org.au/publications/sport-health
Sports Physician, Dr Julien Freitag talks about the issue of drugs in sport and highlights why some athletes may choose to dope.

On the world sporting stage, the issue of performance enhancing substances was highlighted at the 1988 Seoul Olympics. The stripping of Ben Johnson’s 100m gold medal for the illegal use of the anabolic steroid stanozolol meant that the Seoul Olympics are sadly remembered more for the events in the drug testing laboratory than for the achievements on the sporting field. The world’s attention had been drawn to the problem of drug abuse in sport, and it has remained in the headlines ever since.

For the cycling world the dangers of drug use were highlighted dramatically with the death of Tom Simpson on the climb of Mount Ventoux in the ‘67 Tour De France. A famously competitive and successful cyclist, well-liked by his peers and the adoring public, his death from amphetamine use was a shock to all who followed the sport. Not a shock because of the drugs he was abusing but a shock because of the fatal result of their use. Simpson was not the first to use performance enhancing drugs, he was just the first modern day cycling hero to pay the ultimate price in search for ‘success’.

The issue of drugs in sport is highlighted by many complexities. The modern Olympics have been developed around the ancient Greek ideal of eudaimonia – to have a well-lived and flourishing life. Sport historically offers an arena in which to test and improve personal attributes of strength, valour, self-confidence, and courage, whilst also promoting physical health. However, as sport is thrust more onto the international scene, there is a role switch from the pursuit of personal human excellence to the pursuit of performance excellence. Although both worthy pursuits, one concept focuses on excellence of a person whilst the other on excellence of a sporting performance. It is the quest for performance excellence that has seen many athletes turn to performance enhancing drugs.

“We not only have to continue developing new techniques to detect doping, we have to change the environment and the culture in which doping occurs.”
“With the public demanding success... athletes who would prefer not to use drugs may feel as though they have no other choice.”

Whereas personal or human excellence fits sport into life, performance excellence demands that life conforms to sport1. The athlete standing on the dais has reached such heights by totally submitting themselves to coaches, doctors, physiologists, psychologists and others. Those who have not devoted their lives to sport, who have lived a more balanced life, are often confined to the role of spectator.

It is often far too easy for us to label athletes found to have used or admitted to using performance enhancing substances as ‘cheats’. The reasons for using banned ergogenic aids are varied and an athlete’s choice is not usually singularly influenced by one reason and not the others. Understanding the unfortunate relationship between drugs and sport requires an awareness of cause and association, as follows.

Inadvertent use

Many performance enhancing drugs (e.g. painkillers) are used to treat common conditions within the community and are readily available through chemists and supermarkets. Thus, quite apart from the deliberate use of ergogenic aids, there remains the possibility of inadvertent self-administration of ‘over the counter’ preparations that contain banned substances2.

The ‘medicalisation of life’

By the time athletes have turned professional most have been given so many pills, salves, injections, and potions by amateur and pro coaches, doctors and trainers, to pick them up, cool them down, kill pain, enhance performance, reduce anxiety, that there is not much stuff they won’t sniff, spread, stick in or swallow4. In what can be termed the ‘medicalisation of life’7, it is becoming all too widely accepted that solutions can be sought readily through medicine.

Houlihan in ‘Dying to Win’3 writes that ‘we are an increasingly
drug-obsessed society where pharmaceutical solutions are sought not simply for medical complaints, but also for… activities that are a normal part of social life’.

Sebastian Coe – famous for his exploits on the field and also for his staunch advocacy of doping control, wrote – ‘Sport is an integral part of a healthy lifestyle in today’s society. Yet society has come to rely increasingly upon drugs to treat illness, ease pain and to maintain life. Sadly, we are all too aware of the abuse of drugs in sport to enhance performance’. A common satirical complaint voiced by athletes finishing second, that ‘I need a better doctor’ typifies the attitude among both elite athletes and society.

“The world’s attention had been drawn to the problem of drug abuse in sport, and it has remained in the headlines ever since.”

Community attitude and pressure

Athletes are under considerable pressure to win – in the world of international sport, athletes are not just competing for themselves, but also as representatives of their country. To do one’s best is not always seen as good enough, and to not come first, can be perceived as tantamount to failure. With the public demanding success, an attitude promulgated by the media, athletes who would prefer not to use drugs may feel as though they have no other choice.

Possibly the greatest ill-directed pressure comes from an athlete’s ‘support’ staff. Coaches, administrators and sporting officials, believing that their own reputation is graded upon the results of their athletes, may push too hard for that winning performance, that winning edge. They may not – at least no longer – have doping programs, but they may also choose to look the other way.

Competitive pressure

There is an increasingly accepted opinion amongst athletes and the watching public that doping practices are necessary to be competitive. The commitment required by elite athletes is astronomical and for the dedication and sacrifices to go un-rewarded (in terms of ‘winning’) can be a harsh reality. With competitors training as hard and as focused as each other, it is those with a performance edge who will achieve ‘performance excellence’. For some, that edge is not a ‘natural ability’, but instead, a performance enhancing drug. ‘You dope to cope’ may be just a catchy one liner but it’s a poignant and relevant comment none the less.
Personal and financial rewards

International sport today is ‘way past’ the concept of amateurism. Elite athletes are offered strong economic incentives to succeed on the world stage. As Dr Webb (former Chairman of the Australian Drugs in Sport Committee and Australian Sports Medicine Federation) stated, ‘the areas where drug taking would appear at its highest are those where there is … obviously greater financial rewards’.

“... it is becoming all too widely accepted that solutions can be sought readily through medicine.”

As sport has moved from amateurism to professionalism, many athletes are participating not for the love of the sport but because it is their chosen area of ‘employment’. As an occupation, with financial success measured by their performances, some athletes may view the use of performance enhancing substances as simply good economic management.

All these arguments are not excuses for the practise of doping. They do not give athletes an ‘out’ or a license to use performance enhancing substances. It is important, however, to recognise and be aware of the influencing factors before passing judgement.

We not only have to continue developing new techniques to detect doping, we have to change the environment and the culture in which doping occurs.

Dr Julien Freitag
Sports Physician

References, as indicated within the article, are available at sma.org.au/publications/sport-health/
How do I trademark my logo?
Brought to you by Papercut

This is a question our clients often ask us after we have created their branding. Trademark registration is not compulsory but it is advisable. A trademark can protect your brand name against misrepresentation under the trade practices or fair trading legislation.

A trademark will add value to your business
An appropriate trademark is an integral part of the marketing strategy for your business. Your clients will identify a certain quality and image with goods and services bearing your trademark.

Types of trademarks
A trademark can be a logo, word, phrase, letter, number, sound, smell, shape, picture, aspect of packaging or a combination of these. Commonly a trademark is associated with a logo or brand.

Registration of your trademark
Once your designer has created your logo and you have approved it, you can then apply to have it registered. A registered trademark gives you the exclusive legal right to use, license or sell it within Australia for the goods and services for which it is registered under.
Always search existing trademarks for availability before using a mark or applying for registration. You may find yourself the subject of legal action if the mark you propose to use is already registered or in use by someone else.

How long does a trademark last?
A trademark can have an infinite life representing significant business value. Initial registration is for a period of 10 years, with renewal fees payable every 10 years following.

What does it all mean?
There’s the TM symbol, which basically means ‘I’m thinking about, or I’m in the process of registering my design as a trademark – or I have this design and simply want to claim it as protected’.

Then there’s the R (register mark) symbol, which means ‘I went through the process with IP Australia and registered my trademark’. You’re not allowed to use this symbol in trade until you get the certification that your logo has passed IP Australia’s registration process.

How do you get a trademark?
You need to apply with IP Australia. They will examine your application to see if it meets legislative requirements. Depending on your projected market, you may consider extending the application to international protection.

Go to IP Australia for more information www.ipaustralia.gov.au

Disclaimer
This is not legal advice, please check with your lawyer or IP Australia for further information.

Source: www.ipaustralia.gov.au

The keys to business success

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Caught the economic downturn? Time for a business health check
Brought to you by Peter Rankin – Davidsons

The key to operating a successful business and making money in an economic downturn or recession is to know where your business performs well and where it can improve. The ‘signs’ of a healthy business are sustainable profits and strong trading cash flows. Whereas, the ‘symptoms’ of a business under performing and at risk of being ‘infected’ by a recession or downturn, include declining sales with high fixed costs.

People who care about their health visit an expert – a health professional. Business owners who care about their business should similarly visit an expert – their accountant and/or financial adviser to complete a business health check.

Prevention is better than cure!
To ensure your business remains healthy and continues to prosper in these uncertain times, you should undertake a business health check. A visit to your key professional adviser can protect your business from the full effects of a recession and better prepare you for recovery. At Davidsons we can access online valuation technology that includes a Risk and Value Driver Assessment Questionnaire.

The Questionnaire acts like a health check and grades your business in terms of its risk and pinpoints opportunities for value improvement; the cure!

Below is a sample of the many topics covered in the Questionnaire.

<table>
<thead>
<tr>
<th>How healthy is your business?</th>
<th>Your Score</th>
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<tbody>
<tr>
<td>1. Have you segmented your customer sales to identify profitable products/service lines and customer risk?</td>
<td>1 Poor</td>
</tr>
<tr>
<td>2. Do you use benchmarking to identify your business’ strengths and weaknesses?</td>
<td>5 Good</td>
</tr>
<tr>
<td>3. Does your debtor’s policy include discounts for early payment and personal guarantees for large customer accounts?</td>
<td>1 Poor</td>
</tr>
<tr>
<td>4. Does your approach to managing staff include capping salary increases and paying incentives for above budget performance?</td>
<td>1 Poor</td>
</tr>
<tr>
<td>5. Do you have systems and procedures in place to reduce the business’ reliance on you?</td>
<td>5 Good</td>
</tr>
<tr>
<td>6. Do your business protection strategies include adequate risk insurance in case of an unforeseen triggering event?</td>
<td>1 Poor</td>
</tr>
</tbody>
</table>

Ask Davidsons Accountants and Business Consultants to provide you with a copy of the Risk and Value Driver Assessment Questionnaire so your business thrives, not just survives, into the future.

For further information please contact Peter Rankin at Davidsons, peterr@davidsons.com.au

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Is the sport sector underpaying its staff?

Brought to you by Angelique Lele, General Manager, Sportspeople

The sport, fitness and aquatic sector is still struggling to recover from the economic downturn of 2009, according to findings from the 2011 Sportspeople Salary Survey.

Sportspeople’s Managing Director, Robert McMurtrie observed “Generally speaking, most of the data from our past surveys has indicated salary levels in the sport, fitness and aquatic sector are reasonably aligned to the national wage growth trends. However in the past three years we have seen this sector increasingly fall behind in the recovery from the economic downturn in 2009.”

“Most importantly though in the past twelve months we’ve seen the first overall decrease in wages since we first started surveying the sector in 2003. While the national average weekly earnings grew 4.9 per cent in 2011, we saw earnings in the sport, fitness and aquatic sector actually fall 3.5 per cent.”

“While pay rates improved conservatively in the 2010 Sportspeople Salary Survey, up 2.7 per cent from 2009, it should be noted the ABS Average Weekly Earnings data (2010) showed a national wage growth of 4.7 per cent. This is a consistent trend from the 2009 Sportspeople Workplace Survey with an overall wage growth of only 3.6 per cent, against the national average weekly earnings growth of 4.2 per cent. If we look at the 2009, 2010 and 2011 data, the sport, fitness and aquatic sector has now fallen behind national wage growth for three consecutive years.”

“If you accept the notion that salaries need to grow at least equal to or more than the CPI, it can be argued that for many people working in the sport, fitness and aquatic sector the last twelve months has been tough going. The wage decline (3.5 per cent) in the sport, fitness and aquatic sector is a vast contrast to the published 3.5 per cent increase in the CPI weighted average (all groups) for the corresponding period.”

“While the mean salary for women decreased only 1.5 per cent and to a lesser extent compared to men, their full-time earnings are still not equivalent to their male colleagues. However the gap between the number of males and females earning $80,000 or more is narrowing. 50 per cent more males in the 2011 survey earned $80,000 or more, down from 126 per cent (2010) and 212 per cent (2009). Interestingly, hourly rates in excess of $30 were earned by more females (40.8 per cent) compared to males (35.9 per cent) however, we suspect this is as a result of the high number of women working in the fitness and aquatics sector particularly where an hourly rate of pay is common.” he said.

1,108 respondents participated in the 2011 Sportspeople Salary Survey. The 2011 Sportspeople Salary Survey is managed by job board operator and recruitment agency Sportspeople and is part of a Series of Sportspeople Surveys undertaken since 2003. A full copy of the 2011 Sportspeople Salary Survey is available at the Library section of Sportspeople’s website, www.sportspeople.com.au

Sportspeople is a leading recruitment agency and job board operator in the sport, fitness and aquatic sector. For more information visit www.sportspeople.com.au
Trish Wisbey-Roth, SMA member and sports physiotherapist, discusses optimal bike set up to maximise cycling performance and minimise overuse injuries.

The interaction between the athlete’s body and the sporting equipment used in cycling is highly complex and influenced by many variables including the anthropometric measurements of the cyclist, their flexibility, cycle specific strength and even neural mobility. Other factors that can affect performance include $O_2$ consumption, physiological efficiency and resistance caused by wind drag, while riding position will directly influence the power that can be produced. Optimising riding position within the comfort ranges of the cyclist’s biomechanical limitations therefore becomes very important to not only minimise injuries but also optimise performance.

There may be many individual variations that are important to take into account when determining the ideal bike set up. Some of these factors will include the number of kilometres ridden per week, the importance of aerodynamics to the athlete (wind resistance is approximately 90 per cent of the resistance to the bike moving forwards), the terrain/bike type being used, and the athlete’s preferred posture on the bike (riding ‘on the hoods’ or ‘down in the drops’).

“In reality most cyclists that physiotherapists see for bike set up present with a history of injury. It is therefore very important the cycle specific musculoskeletal findings are taken into account when individualising the set up.”

Physiotherapists have the unique skill to perform a detailed musculoskeletal screening to assess spinal/neural mobility, hip and lower limb mobility and muscular strength prior to adjusting bike set up. This additional athlete specific information is highly important to factor into the individualised position of the athlete on the bike.

When doing cycling biomechanical set ups in the clinic, the **ideal seat height** is determined using the following equation:

\[
\text{Ideal seat height} = 0.98 \times (\text{lower limb leg length} + \text{cleat thickness}).
\]

**Lower limb leg length** = height of the highest point of the Greater Trochanter to the floor. This is measured vertically with a tape measure without shoes, and the feet approximately pedal width apart with weight bearing symmetrical. When the cyclist has different leg lengths, determine the seat height using
the shorter leg measurement until a Scanogram is ordered to confirm leg length difference.

Cleat thickness can vary significantly from 10 to 40mms and in the typical road cycling shoe this should be measured with a tape measure without shoes and added to the leg length measurement. This prevents the athlete standing on the cleat while being measured and therefore being measured in a plantar flexed (and therefore longer than true leg length) position. The newer type Hybrid or Mountain bike shoes where the cleat is recessed into the shoe and the athlete can stand plantar grade allows a combined shoe thickness and leg length measurement to remain quite accurate.

Adjusting seat height. The above equation provides the ‘ideal’ seat height from the centre/top of the saddle to the centre of the pedal axel when the crank arm is positioned in line with the seat tube.

Keep in mind that this measurement is ideal only if the cyclist has good cycle specific strength and stability, optimal spinal, hip flexion, hamstring, neural and upper limb mobility. In reality most cyclists that physiotherapists see for bike set up present with a history of injury. It is therefore very important the cycle specific musculoskeletal findings are taken into account when individualising the set up.

What to consider when the original bike seat height was well below the ideal: These cyclists often present with hip restriction, ITB or knee issues as knee compressive forces are increased with increased knee flexion on the bike. Practical experience has shown that when the athlete is used to a lower seat height it is best to not raise the seat above $0.96 \times (\text{lower limb leg length} + \text{cleat thickness})$ initially. This will allow the cyclist to gradually get accustomed to the longer hamstring and calf length, greater hip flexion and increased neural mobility required as the seat is raised. Encourage the cyclist to only ride at a recovery ride (E1 effort) level for the first 2–3 weeks and minimise big hills while the muscle recruitment patterns and cycle specific flexibility adjusts to the new bike position. Studies have shown that moving toward the ideal seat height increases recruitment of both the gluteals and the gastroc, while lower limb muscle groups will function close to their maximal length. It is therefore a good idea to inform the cyclist that they may feel muscles working differently and to let you know if they find the adjustment in position too big a change. As many cyclists are very sensitive to joint angle and muscle length changes in the cycling position, it may be worthwhile to increase the seat height by no more than 10mms at a time, particularly if the seat was positioned very low to begin with.

What to take into account when the original bike seat height was well above the:

Ideal: These cyclists often present with back pain, sciatic nerve irritation, excessive side-to-side movement on the seat and sometimes neck and upper body neural symptoms from the overstretch position.

"... may be worthwhile to increase the seat height by no more than 10mms at a time, particularly if the seat was positioned very low to begin with."

For the cyclist to have any chance of optimising cycling position the seat must be brought down to the ideal seat height measurement of $0.98 \times (\text{lower limb leg length} + \text{cleat thickness})$. This position will allow effective recruitment of gluteals and calf muscles as well as unloading the overstretched hamstring and neural structures. Dropping the seat to the ideal height will also allow the athlete to drop their heel through the bottom half of
the pedal cycle and pull back on the cleat pedal providing a much more efficient pedal action. As the bike works on reaction forces to propel it forward, the most effective and efficient pedal action for a cyclist is to in fact pull back on the pedal from half way through the down stroke through the bottom of the pedal action. A good cue for the cyclist is to think of scraping mud off the bottom of their cleat.

“Optimising riding position within the comfort ranges of the cyclist’s biomechanical limitations therefore becomes very important to not only minimise injuries but also optimise performance. “

Interested in learning more? Trish is holding the following courses throughout Australia and New Zealand for 2012:

- 3 dimensional assessment and treatment of lumbar spine and pelvis
  June 2–3, 2012, Sydney

- Understanding ribs, the thoracic spine and neck: a simplified approach
  June 16–17, 2012, Sydney

- Evening workshop on optimising motor control
  August 22, 2012, Wellington, New Zealand

- Optimising biomechanics in cycling
  August 23, 2012, Wellington, New Zealand

- Optimising biomechanics in running
  August 24, 2012, Wellington, New Zealand

- 3 dimensional assessment and treatment of lumbar spine and pelvis

- The latest on the hip, assessment and treatment
  September 15, 2012, Sydney

- Optimising motor control of the lumbo/pelvic and hip complex
  September 16, 2012, Sydney

- Optimising biomechanics in cycling
  October 13, 2012, Sydney

- Optimising biomechanics in running
  October 14, 2012, Sydney

For further details and booking information visit www.bbclasses.com.au/trish
When dropping the seat warn the cyclist that their motor patterning may significantly change and it can take several weeks for the body to adjust to the new joint angles and muscle lengths involved in the new lower seat position. They often report they cannot find their ‘climbing muscles’ initially after adjusting a seat down in height.

**Forward/backwards seat position**: Once the seat height for the individual athlete has been decided on, the seat itself can be moved forwards or backwards to minimise forces at the knee and reach to the handlebars (handlebars can also be moved up/down, shorter/longer handlebar stem). This final measurement is taken on the front leg when both cranks are positioned in the horizontal position. Drop a plumb bob or Laser vertically down from the inferior pole of the patella and it should fall within the centre of the pedal axle.

**Trish Wisbey-Roth**  
Masters Sports Physiotherapy (AIS/UC)  
Past Australian Cycling Team/Olympic Physiotherapist  
Specialist Sports Physiotherapist (FACP)

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**Dimensions describing the geometry of a bicycle**

![Diagram of a bicycle with labeled dimensions]

- L1 – Handlebar stem length =
- L2 – Handlebar stem height =
- L3 – Top tube length =
- L4 – Seat tube length =
- L5 – Pedal axle to top of seat =
- L6 – Crank length =

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- 4th International Congress on Physical Activity and Public Health (ICPAPH)
- Australian Conference of Science and Medicine in Sport (ACSMS)
- National Sports Injury Prevention Conference (NSIPC)

under the banner of “be active 2012”.

We are delighted to be hosting the 2012 International Congress on Physical Activity and Public Health (ICPAPH 2012) in Sydney, Australia. ICPAPH 2012 will provide a scientific forum for professionals from many fields and disciplines to share in the latest research, practice and policies relating to safe participation in physical activity.

be active 2012 will bring together some of the finest speakers from Australia and around the world to present a comprehensive scientific forum on all facets of these fields - from elite performance to community participation in sport, physical activity and their impact on individual and public health.

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A review of the role of imaging in return to play decision making in higher grade hamstring strain injury

Sports physician, Dr Peter Baquie presents a brief review of hamstring anatomy and muscle/tendon healing, and imaging’s role in determining prognosis and return to play readiness to reduce risk management.

Hamstring injuries continue to result in considerable time missed across all football codes by weight of injury frequency, time to settle and frustrating incidence of injury recurrence.

“Hamstring injuries remain common across football codes.”

From a team perspective using Australian Football League (AFL) figures, there is a sting in that whilst one player in four returning from a hamstring strain may suffer a recurrent injury, three others will not. There is then a degree of risk management inherent in return to play decisions and the need to refine return to play readiness.

In an attempt to clarify which athlete may be prone to recurrence, the role of imaging in assisting prognosis and return to play decisions has previously been considered. Studies were performed in the early and mid 2000’s, with strong Australian radiology and clinician prominence, reviewing prognostic value of Ultrasound and MRI taken at the time of injury to predict likely return to competition. These studies focused on muscle parameters such as length/cross sectional area of oedema as prognostic markers of hamstring injury. Uncertainty of interpretation meant that imaging has not generally been part of return to play assessment.

Recent studies have revisited the role of imaging at the time of injury as an aid to predict likely return to competition. These studies show that for lower grade strains, return is along traditional time expectations. However for the higher grade strains, studies suggest significant lay-off is required. However there is large variance about this timeframe for these higher grade events.

As these higher grade strains often involve the musculotendinous unit, a case is made to add tendon parameters in imaging assessment algorithms with the aim to assess adequate tendon healing progression to plan sound return to play.

A review of hamstring anatomy and strain pattern and muscle and tendon healing demonstrates disparity in muscle and tendon healing frames. Whilst muscle healing may provide adequate functional recovery (absence of clinical indicators and completion of running and skills progression program), the delay in tendon healing means the musculotendon junction unit is at risk of failure and the athlete to injury recurrence.
A measure of structural healing adequacy with imaging at time of proposed return having satisfied these functional parameters may assist return to play decision making. Moreover imaging after return to play may detect sub-clinical deterioration in muscle and tendon structure that may alert to potential for imminent recurrence sometime after return.

This article presents a brief review of hamstring anatomy and muscle/tendon healing and imaging’s role in determining prognosis and return to play readiness to reduce risk management. While home country exposure places an emphasis on Australian Rules football, studies in other football codes suggest the concepts are readily likewise applicable.

“It is proposed that it is the mismatch between muscle and tendon healing that may underlie difficulty in being precise on timing of competition return and recurrence that may be delayed.”

Incidence of hamstring injury and recurrence in football codes

The AFL has performed an annual injury survey since 1992. Hamstring strain has remained the single injury occurring most frequently. Incidence has remained more or less constant over this period. For each club six players on average will miss games within the season with hamstring strain.

The figures are similar to other football codes. For example, Woods et al\(^2\) showed hamstring strains accounted for 12 per cent of total injuries in professional soccer players. There were five hamstring strains occurring per club per season causing players to miss 18 days on average from competition. Similarly, in the Union of European Football Associations (UEFA) competition Ekstrand et al\(^3\) reported posterior thigh strain as the single most common injury causing players to miss games. In a study of Professional Rugby Union, Brooks et al\(^4\) documented an average of seven hamstring strains per club per season.

Further, the recurrence rates for hamstring injuries remain relatively high. In the AFL the rate of recurrence has averaged 23 per cent over the last 10 years\(^1\) although possibly a significant reduction in the last two years. This suggests one to two players for each club will have a recurrent injury within that season.

Data from the UEFA study reveals 16 per cent of all hamstring injuries were recurrent injuries. Of importance in this study is there was no difference in grades of recurrent injuries and initial injuries\(^2\).

In Rugby Union Brooks et al\(^4\) reported a 23 per cent recurrence of hamstring injuries with an average of 17 days lost time from training and playing for new injuries and recurrent injuries being ‘significantly more severe’ with 25 days lost. Ekstrand et al\(^3\) reported re-injury resulted in a significantly longer period of time from competition. However, the same author in a recent UEFA study reported 16 per cent of all hamstring injuries were recurrent injuries and reported in this recent group\(^2\) lay-off for re-injuries was not longer than for initial injuries.

Prevention of injury

Clinicians have addressed the issue of primary and secondary prevention strategies. Whilst the Holy Grail is to define a single remedial factor for both primary and secondary prevention, it is apparent that multiple factors both modifiable and fixed\(^1\), sport and athlete related\(^14,15\) probably interact and compound to exceed the threshold for a strain event\(^12,13,16,18,19,20,21\).

Is there an ‘acceptable’ recurrence rate?

The dilemma when planning return to competition following hamstring injuries is balancing longer injury lay-off and lessening likelihood for recurrence.

In a review on return to play decisions following muscle injury, Orchard and Best\(^8\) commented, “Although the pessimist will cite that an unacceptable 12.6 per cent of hamstring strains recur during the first week after return to play, the optimist, who is often the coach, will be reassured that 87.4 per cent of players successfully complete their return game. The realist will understand that even the majority who make it through that first game are still at high risk in the ensuing weeks” emphasising that while recurrence may be shortly after return, there is ‘a lengthy period of increased susceptibility\(^9,10\).’

Orchard et al\(^10\) described return to play as one of ‘risk management’. There may be no finite appropriate and universally ‘acceptable’ incidence rate for recurrence of soft tissue strains, with most clinicians sharing a similar sinking feeling.
Case study

A 23 year old AFL footballer suffered a passive knee extension hamstring strain injury in a contest when the trunk and hip were flexed when he slipped early in the season.

The above figures show imaging appearance two days after injury and at Day 23 when the athlete had declared he was recovered, only to have an episode of discomfort at training the following day.

The symptom settled after this set-back and appearance at Day 37 when clinical testing was normal and playing function was sound shows the disparity in imaging signal between the muscle and tendon.

The MR imaging demonstrates a halo of high signal about the tendon with near resolution of muscle abnormality (given the appearance at Day 37, return to play was delayed to Day 47. He played one game at explosive intensity without symptoms, but injury recurred the following week – Day 54 post initial injury).

Assessment of return to play readiness

Orchard and Best\(^8\) propose that despite ‘objective testing and clinical evaluation’, the injury may recur and surmise that true tissue healing may be slower than clinical findings suggest. This is reinforced by Heiderscheit et al\(^9\) who state the traditional measures in assessment of readiness to return made ‘insensitive to persisting deficits’.

Readiness to return to play assessment implies satisfying functional parameters with inference on structural integrity and adequacy of healing.

Functional parameters

Recent attempts to improve clinical assessments include a review by Askling et al\(^22\) describing active flexibility deficits at a time when other parameters suggested readiness to return. Schache and colleagues\(^23\) described test of maximal hamstring isometric contraction asymmetry as indication of imminent hamstring strain susceptibility.

Slider and colleagues\(^24\) reviewed strength and running biomechanics in a group who had MRI evidence of biceps tendon residual scarring over five months from injury. The group concluded this scarring and reduction in tissue motion predisposed to proximal biceps femoris injury.

Thus there appears to be a link between function and structure of the recovering hamstring.

Structural assessment

Although the importance of the total lumbo-pelvic kinetic chain has been highlighted\(^14\), only the hamstring muscle-tendon unit (HMTU) structure will be reviewed.

1. Gross anatomy

Hamstring anatomy has previously been well described\(^25\). Important features in hamstring anatomy include:

- Semitendinosus and long head of Biceps share a common (‘conjoint’) tendon of origin from the medial facet of the ischial tuberosity.

- Semitendinosus has a direct muscle attachment to ischium plus a large component of muscle attaching to the proximal common tendon shared with biceps femoris\(^27\).

- For each of the three muscles, the tendons have an extended continuity within the muscle complex. For biceps femoris the proximal and distal tendons extend extensively through the length of the muscle\(^25\).
The anatomy of the proximal hamstrings was reviewed by Batterman et al\(^2\)\(^7\) to clarify if there was any structural basis for the biceps femoris being the more common injury site given the common tendon origin. It was proposed that with contraction there is result in high tensile shear stress across this common tendon and the musculo-tendinous junctions for each muscle.

This shear stress may have clinical significance in recurrence with shear stress across an incompletely recovered tendon rendering it vulnerable.

Site and pattern of hamstring injury

Woodley and Mercer\(^2\)\(^8\) reviewed the sites and patterns of hamstring strains. The long head of biceps was reported to be affected in two thirds of cases with semitendinosus and semimembranosus comprising the remaining one third. Two thirds of hamstring injuries involved the musculo-tendinous junction region, more often in upper HMTU.

“Emphasis on primary and secondary prevention means addressing multiple compounding sport and athlete factors.”

In a recent MRI study of hamstring strains, Ekstrad et al\(^4\)\(^2\) found 84 per cent of injuries within biceps femoris, while 11 per cent occurred in semimembranosus and 9 per cent in semitendinosus.

In a longitudinal imaging study performed in Australian Rules football, muscle strains separate to the muscle tendon (myofascial or epimysial) were present in a third of imaging positive injuries\(^2\)\(^9\). These injuries occurred mainly in the upper two thirds of biceps, and were shown to have a favourable prognosis\(^2\)\(^5\).

2. Microstructure and healing of musculo-tendinous strains

Healing of muscle, tendon and muscle tendon interface occurs with different time frames\(^2\)\(^3\),\(^2\)\(^6\),\(^3\)\(^1\).

Muscle healing with maturation of type 1 collagen is well underway by early in the third week, with myofibre regeneration by the end of the third week. Tendon healing with maturation of collagen type 1 occurs after six weeks with consolidation over subsequent four weeks and maturation over 12 months.

Consequently, injuries to the muscle and/or the tendon pose differing healing timeframes to the differing components of the injured tissue. It may be that this healing rate difference renders the recovering MTJ vulnerable to re-injury.

- Healing of muscle component may result in improvement in symptoms (pain settles, contractile function, strength and power improves).
- Tendon healing lags but may remain asymptomatic.
- Healing deficit within the tendon may predispose to recurrent HMTU strain (early recurrence – week one or two).
- Increased load on healing HMTU may mean that tendon healing is not just delayed in comparison to muscle, but may be impaired and tendinopathic changes develop.
- Muscle may continue to strengthen – as a positive adaptive response to load – but tendinopathy changes may progress sub-clinically.
- ‘Myo-tendinopathy’ may mean HMTJ failure may be delayed until there is adequate cumulative micro-trauma (low grade event) – clinically presenting as a sensation of tightness or insecurity – or an episode of macro-trauma that exceeds threshold of strain (high grade event).

3. Structural assessment of healing and review of role of imaging

If this mismatch in tendon and muscle healing is significant, it may be apparent on imaging.

1. Imaging correlation of initial injury severity and prognosis

Slavotinek\(^3\)\(^1\) assessed reliability of imaging in HMTU strains to determine prognosis. He reviewed studies looking at
Smart Healing with Every Step
Advances in Aircast Walkers give more Protection & Increased Comfort

Faster, Improved Healing
Research has also shown that patients have more confidence ‘weight bearing’ in Aircast Walkers (compared to casts and some other walkers), which leads to both faster and stronger bone healing*. Aircast’s unique combination of semi-rigid protective shells and exclusive Duplex™ Aircell Technology, provides graduated pulsating compression, which is clinically proven to promote faster healing.

“A Comparison Study of Plantar Foot Pressure in a Standardized Shoe, Total Contrast Cast and Prefabricated Pneumatic Walking Brace”

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One of the most important factors when choosing a walking brace is the shape and height of the rocker sole.

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Biomechanical testing by a leading Movement Analysis Laboratory confirms the Aircast Walker provides superior kinematics over the gait cycle. (See Fig. 2)

Fig 2: The Pressure Map below illustrates how the XP Walker’s centre of pressure movement from posterior to anterior is a smooth progression forward, for ease of natural gait.*

Preclinical Discussion Report - Comparison of the Kinematics, Forces, Moments and Pressure when using two designs of walker - Professor Jim Richards - The Movement Analysis Laboratory - School of Public Health and Clinical Sciences - UCLan, Preston - Nov. 2010

Faster oedema reduction with Duplex™ Aircell Technology
How does the Duplex™ Aircell Technology work? (Fig. 1)
- In the first few seconds, the compression is stable, as the patient is standing still.
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- Furthermore, because the walking brace has overlapping medial and lateral aircells, the compression is more important distally than is it proximally, thereby enhancing circulation, through the massaging effect.
- The exclusive Duplex™ Aircell Technology provides graduated compression which promotes efficient oedema reduction.

Typical Compression Profile (Fig. 1)

Compression is lowest at “Heel Strike”
Compression increases during “Mid Stance”
Compression is greatest at “Heel Off”

Fig. 1: How does the Duplex™ Aircell Technology work? (Fig. 1)
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Typical Compression Profile (Fig. 1)

Compression is lowest at “Heel Strike”
Compression increases during “Mid Stance”
Compression is greatest at “Heel Off”

*Preliminary Discussion Report - Comparison of the Kinematics, Forces, Moments and Pressure when using two designs of walker - Professor Jim Richards - The Movement Analysis Laboratory - School of Public Health and Clinical Sciences - UCLan, Preston - Nov. 2010
objective parameters of muscle injury, including cranio-caudal length\(^*37\), cross-sectional area comparing muscular strain signal area as a percentage of total muscle area, and strain tissue volume\(^*38\).

He suggested that whilst all three parameters correlated with time to return to competition, cranio-caudal length of injury had the closest association. Furthermore, cross-sectional area exceeding 55 per cent predicted an absence exceeding six weeks.

A study of Australian footballers by Gibbs and colleagues\(^*39\), and apparent in the recent study of Ekstrand\(^*43\) demonstrated that the sub-group of clinically injured footballers with negative imaging returned to play in a short period.

In a recent retrospective study of Professional American Football Players, Cohen et al\(^41\) correlated MRI findings after acute hamstring strain with time to return to play. They compared a traditional radiological grading system (0- nil abnormality, 1- oedema only, 2- disruption-partial tear, 3- complete muscle or tendon disruption) with a proposed MRI scoring of injury severity, based on number of muscles involved, location within muscle, percentage of strain area, longitudinal length and presence of retraction.

The results demonstrated a marked difference in time to return to play between lower grades of injury (average of 1.1 missed games for grade 1, 1.7 games for grade 2) and higher grade strains (6.4 games for grade 3 injuries). The MRI score was consistent with the radiological grade of injury and time to return to play with scores <10 returning to play in less than one week, and scores >15 (i.e. multiple muscles involved, >75% area and retraction) corresponding to prolonged recovery.

2. Imaging to assess healing

The challenges of MRI to track the ultra-structure of tissue healing have previously been considered\(^31\). MRI demonstrates extra-cellular fluid presence (oedema and haemorrhage) and macroscopic fibre disruption. With healing, regression of these changes would be expected, with loss of feathering signal pattern between muscle fasicles and resolution of fluid in tissue planes. Within the tendon there is initial hyperintensity. As healing evolves this lessens with thickening and maturation of scar within the tendon\(^31,36\).

Based on a study by Connell and colleagues\(^37\), MRI may be the preferred modality over ultra-sound for assessment of healing, as it detected abnormalities for a longer period following a strain event. At six weeks from injury, 36 per cent of injured athletes had persisting abnormality on MRI compared to 22 per cent on ultra-sound. However, on both modalities there is abnormality still present about the time some athletes are returning to higher intensity activities, suggesting healing may be progressing beyond the time-frame of return to competition\(^31\).

“Confirmation on imaging of tendon structural deficits at time of functional apparent healing may lead to early introduction of tendon specific measures as part of rehabilitation for high grade hamstring strains in the football setting.”

3. Imaging as a predictor for recurrence

Verrall and colleagues\(^*40\) conducted a prospective study in a cohort of 30 Australian Rules footballers with hamstring injuries to determine if any specific clinical or MRI features were associated with a higher risk of recurrence. The results demonstrated a more than doubling of the likelihood for recurrence based on injury size assessment on initial scanning (i.e. > 55 per cent cross-sectional area or calculated volume > 21.8cm\(^2\)). Earlier return to sport was not observed to be associated with higher recurrence rate.

Conversely, in a prospective study by Gibbs et al\(^*39\) neither the length of the lesion or cross-sectional area were correlated with risk of hamstring injury recurrence.

Slavotinek\(^31\) previously commented that while it is difficult to interpret the significance of persisting abnormality on MRI at the time to return to competition, having normal MRI at the time to return means it is ‘unlikely to sustain a recurrent injury’. Further his opinion is that while there is a large variance in the degree of abnormality present at time of return to competition, recurrence is less in groups where there has been significant (>70%) resolution of MRI abnormality\(^31\).

Overall, the results suggest that pre-return assessment – both functional and structural – may assist in the assessment of progression of healing and assist in determination of readiness to return.

Review of imaging component in hamstring injury management in Australian Football League

In 2009, Pizzari et al reviewed hamstring management at AFL Clubs by interviewing team medical staff\(^2\). They reported that clubs used MRI in ‘initial diagnosis and prognosis of hamstring strain injuries’ either routinely (6/16) or mostly (8/16) – or sometimes (2/16).
“Recurrent injuries continue to occur, yet recent studies show incidence and severity may be lessening probably reflecting enhanced awareness and interventions.”

Those interviewed were aware of limitations of imaging in prognosis. Further if there was variance between clinical assessment and imaging, then clinical assessment would prevail with return to sport decision-making along the lines described by Orchard and Best\(^1\) with resolution of clinical findings on examination, completion of running program and full training for one week (generally). There was strong acknowledgement of the risk management concept and adoption of concept of acceptable risk.

Some clubs stressed the importance of management after return to play as part of recurrence prevention with modified training volumes.

Ekstrand\(^4\) described imaging as MRI or ultra-sound or a combination being performed in “the majority of hamstring injuries occurring to players from European high-level professional football players’ commenting that ‘MRI has been the preferred modality in recent years’.

**Imaging proposed**

Recent imaging studies reviewed demonstrated marked variance in absence for the higher grade injuries. As an aid to further assess healing at time of proposed functional readiness to return, especially in this higher grade group, a case is put to review the role of imaging around proposed time to return, possibly combined with screening for deterioration without functional deficit, with imaging surveillance after return to play.

**Timing**

- Initial injury assessment.
- Pre-return – at time when athlete is deemed ready to return to competition.
- Subsequent – week 2–3 after return to monitor sub-clinical tendon deterioration.
- MRI and US – it seems that from hamstring review documents that clubs are doing MRI at the time of injury. Whether others are using US or nil is uncertain. The possible role of US may need to be re-evaluated by doing it at the time of MRI to compare whether it does have a role so that it may be included longer term in imaging review and certainly at community level.

**Summary:**

- Hamstring injuries remain common across football codes.
- Emphasis on primary and secondary prevention means addressing multiple compounding sport and athlete factors.
- Recurrent injuries continue to occur, yet recent studies show incidence and severity may be lessening probably reflecting enhanced awareness and interventions.
- In parallel with addressing functional assessments and measures, a case is put to re-visit the ability of imaging to assess structural healing especially in the higher grade strains involving the musculo-tendinous unit.
- It is proposed that it is the mismatch between muscle and tendon healing that may underlie difficulty in being precise on timing of competition return and recurrence that may be delayed.
- Confirmation on imaging of tendon structural deficits at time of functional apparent healing may lead to early introduction of tendon specific measures as part of rehabilitation for high grade hamstring strains in the football setting.

Dr Peter Baquie

Acknowledgements:
Andrew Lambart and Andrew Russell, Hawthorn Football Club
Dr Paul Marks and Dr David Connell, Imaging@Olympic Park, Melbourne.
Sport Health interviews James Trotter, a physiotherapist who will work at the physiotherapy headquarters (Physio HQ) for the London 2012 Olympics.

What is your professional background?
Physiotherapist for over 15 years, working predominantly with sports, musculoskeletal and orthopaedic clients. I have been employed in private practice in Victoria, Tasmania, Canberra, and the UK, and have been based in Adelaide for the past eight years. I undertook the post graduate scholarship in physiotherapy at the AIS in 2000, and have worked with Australian Track and Field since 2001, Australian Women’s Water Polo since 2009, SASI Water Polo, ACT Hockey, and various state league teams such as Aussie rules and netball. I am an APA Sports Physiotherapist and APA Musculoskeletal Physiotherapist.

“It’s always a highlight when one of the athletes comes in with a medal.”

Tell us about your current role outside of the Olympics.
I am a Co-Principal of Leading Edge Physical Therapy in Adelaide, a private practice working with various sporting teams, local community groups, and pre and post surgical clientele. Our group also provides seminars to local groups and sporting clubs.

What are the profiles of the people you treat?
Predominantly active people of all ages. We see many developing athletes through the SASI programs we are involved with, a number of elite level athletes, and a lot of lower back and neck pain clients from all walks of life. However, we do not just see sporting injuries but also active people who garden, bike ride on the weekend, try to run after sitting all day at work, climb ladders etc, who are affectionately known as weekend warriors.
How did you get involved in working with the Olympics?

I was very fortunate to be involved with the HQ for Beijing. I had travelled many times with track and field from 2001 when Athletics Australia asked all their physios to fill out the Olympic nomination forms leading into Beijing, which included qualifications, experience, team travel and the like. As it turned out, I had worked with a number of Olympic sports at a state and national level, travelled with track and field, and am an APA Sports and Musculoskeletal Titled Physio, so I ticked all of the boxes. It was still a surprise when the Head of Physio for Beijing contacted me to congratulate me on selection.

“I believe support from your family and friends is the number one priority when you make a commitment to be involved with National Teams.”

What is your role at the Olympics?

In HQ, we have a number of roles. We service the ‘small sports’, those with a small number of athletes (eight or nine). These sports include beach volleyball, tae kwon do, judo, wrestling, archery, shooting, boxing, diving, synchronised swimming, tennis, table tennis, badminton etc. The larger teams such as athletics and swimming will take their own support staff, as do the teams of water polo, hockey and basketball. In HQ, we perform treatments as required, travel with teams to venues where we may assist with warm up, pre competition physio, post competition work, recovery work, and ‘on field’ injury assessment and management. It can be quite daunting as the Olympics are the most important event for these athletes, so we may need to make quick decisions about the athlete’s ability to continue competing. HQ physios may be asked to assist with the teams on occasions, for example if one of the team physios is unwell and cannot attend their team’s match.

Are there any injuries you specialise in the treatment of?

I have not undertaken specialisation training so I don’t specifically specialise, however I have an interest in hip and groin pain, lower back pain, knee and shoulder injuries (due to personal injuries), lower limb soft tissue injuries and running biomechanics.

“We are fortunate in sports medicine that we have these opportunities and are able to assist our athletes in becoming the best they can be.”

Are there other practitioners you work closely with in your role? Tell us about these working relationships in terms of handling the athletes.

One of the greatest aspects of working in HQ is the multidisciplinary approach. HQ has physios, sports doctors, massage therapists, psychologists, and great administration support. When an athlete presents, it’s quite straightforward to walk down the hall to the doctor rooms to discuss management, if the doctor feels medication may be warranted, or conversely discuss with the massage therapists
areas where the athlete requires specific attention. The HQ staff are all very experienced so further to athlete management there is a huge learning opportunity for all of the practitioners to bounce ideas around, discuss latest research findings and how to implement them into clinical practice.

“... we perform treatments as required, travel with teams to venues where we may assist with warm up, pre competition physio, post competition work, recovery work, and ‘on field’ injury assessment and management.”

Do you work with a nominated sport at the Olympics or cover a variety of sports?

Yes, at this stage I have been allocated to work with beach volleyball, archery and tae kwon do for London. In Beijing I was allocated wrestling, modern pentathlon and judo.

What are some of the more common medical/fitness issues the Olympic athletes you will manage have? And how do these injuries usually occur?

Really difficult question. Most sports have their specific patterns of injuries. Archery involves a lot of neck/shoulder and thoracic pain, with wrist, hand and finger pain on occasions. Beach volleyballers predominantly present with shoulder soreness due to serving and hitting, with neck and thoracic pain also. They will sprain ankles landing on soft sand, and report patella tendon soreness from jumping and landing. Again, depending on the sport will depend on the presentation.

What do the months leading up to the Olympics entail for you in terms of preparation?

In HQ, we keep in touch with the section managers for each of our allocated sports, go through the screening reports for each athlete, and keep up to date with injuries, training modifications, and treatment received. We prepare as much information as we can so when the athlete comes into HQ we know what has been working, what rehab they should be doing, and how much training they have/should be doing. With most of the athletes heading overseas in May/June for warm up events and preparation, the internet is a great way to keep track of athletes. We may also be involved with some of the pre-Olympic camps or events for the teams we have been working with over the past few years, but these teams tend to travel with the support staff who will attend the games.

What does a typical day at Olympics Physio HQ consist of?

Variable! It may consist of an entire day treating in the clinic, or we might be on the bus at 6am to head to a venue, come back for lunch then off to another venue for the afternoon, then a couple of hours after dinner in the
“Each day is different depending on which of your allocated sports is competing and which athletes require your assistance in the clinic, or at the venue.”

I understand this is not your first Olympics. You worked as an Australian Team headquarters physiotherapist at the 2008 Beijing Olympic Games. Have you seen any change in terms of medical treatment or plans of medical treatment between 2008 and 2012?

I think the principles of management are similar however some conditions we know a little more about, so overall the multidisciplinary team identifies and manages these problems a bit better than we did previously.

Tell us your most interesting encounter while working at The Olympics?

Although not specifically physio related, getting around Beijing was a fascinating, yet mildly frightening task. The road rules
are a loose guide at best, and most drivers did not speak English (which we were told about) so we needed to make sure we showed them the address on our accreditation which was written in Chinese and English to cover all bases. Once or twice I am sure we had a driver who could not read either Chinese or English, so we went the long way round, but we always managed to make it back to the village!

“One of the greatest aspects of working in HQ is the multidisciplinary approach.”

What are you looking forward to most?
The atmosphere and buzz of the games is something that is difficult to put into words, but amazing is a good start. Being able to work with Australia’s sporting elite, and hence some of the world’s best athletes is a privilege, as is working alongside some of Australia’s best physios, doctors, massage therapists, and psychologists, and who could forget being able to chat with some of the best coaches in Australia. London itself will be buzzing. I was fortunate enough to be in London in early August 2011, and the city was buzzing with activity.

“Being able to work with Australia’s sporting elite, and hence some of the world’s best athletes is a privilege...”

What are the highlights and challenges with working at the Olympics and with the athletes?
It’s always a highlight when one of the athletes comes in with a medal. It may or may not be someone you have worked with, but everyone shares in the joy of seeing an Aussie athlete succeed. The challenges are numerous. Personal challenges include fatigue while broader challenges entail working with an injured athlete a day or two before the biggest event of their life and explaining to coaches why an athlete needs to modify or sit out training. That always proves to be interesting!
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Order online 24/7 and be ready to play in 7 days.

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What advice would you give other sports medicine professionals looking to work with elite athletes or at an elite event?

Go for it. If it’s something you really want to do it is hugely rewarding, however it is not an overnight thing. Olympic cycles last for four years, so most professionals who make the Olympic team have been working with that team for at least three years, sometimes seven or eleven! Like most practitioners, I work with local club and state teams predominantly and travel with National Teams one to two times per year. Make sure you understand what the coaches, athletes and managers are looking for in their service providers so you know your role and boundaries within the team structure. Also keep in mind we are there to help athletes and teams achieve their goals, so flexibility on tour is very important. We cannot predict everything on tour, and meeting and training times can change at short notice, so you will most likely need to move your lunch break around once or twice. It’s OK to do this. The coaches and athletes will appreciate it.

Anything else you would like to add?

I believe support from your family and friends is the number one priority when you make a commitment to be involved with National Teams. It is difficult being away from home and the travel is rarely glamorous, but knowing your family supports you and is proud of you really helps. We are fortunate in sports medicine that we have these opportunities and are able to assist our athletes in becoming the best they can be. Sometimes it’s a small part, sometimes bigger, but seeing the athlete compete well, and achieve their goals is something to be proud of.

Sports Medicine Australia thanks James Trotter for being available for this interview and offers best wishes to our long list of members who are working at the upcoming London Olympics.

SMA would also like to highlight that we have two SMA administration staff attending the Games this year in differing capacities:

**Lynne Morrison**

**SMA position – SMA VIC Finance Manager**

**Olympic position – 2012 Australian Olympic Team Section Manager Water Polo**

Lynne’s appointment as Team Manager for the Australian Women’s Water Polo Team is wonderful reward after many years of input and participation in the sport, and caps off a great career which includes her Australian representation as a water polo athlete.

Her Olympic role provides the key link between the Team Executive and the Headquarters staff, and the athlete and coach. Appointed by the AOC (on recommendation from the National Federation), Lynne will be directly responsible to the Team Executive and ultimately the Chef de Mission for all activities involving the water polo section. We wish Lynne luck at her first Olympics.

**Michael Aylen**

**SMA position – SMA VIC Safer Sport Training Manager**

**Olympic position – 2012 Olympic Basketball Referee**

Michael was nominated along with 29 of the world’s best referees for London 2012. This will be Michael’s third Olympic Games after he also officiated in 2004 and 2008. Michael is the reigning NBL Referee of the Year and has also previously refereed the men’s World Championships in 2006 and 2010. We wish Michael luck for London.
**Weight on their shoulders (and knees, and back, and...)**

**Vox pop**

SMA recently asked be active 2012 conference committee members their opinions on the following question:

**It has been three years since the last be active conference. What do you see as key benefits/outcomes of holding the 2012 be active conference?**

“The world’s leading physical activity experts will be gathering in Sydney for be active 2012. In the three years since the last be active conference, the physical activity landscape has changed dramatically: the hot topics are sedentary behaviours, new methods of measurement, translation into practice, and developing countries. I anticipate that in Sydney we’ll see some really innovative research – and some intellectual biff. Just what I like in a conference.”

Professor Timothy Olds, Researcher, University of South Australia, SA

“Incorporating these three conferences (ICPAPH, ACSMS, NSIPC) under the one banner to be ran simultaneously allows for an extremely interesting, relevant and diverse program. The conference promises a number of international speakers and delegates discussing the latest research with an emphasis on clinical practice. The conference will not only allow for professional development but also provides a great networking opportunity.”

Kylie Andrew, Sports Dietitian, VIC

“At a time when our collective health is declining and chronic diseases are becoming more common a reminder to be more active is poignant. Sitting alongside injury prevention encourages a concomitant focus on safe participation.”

Professor David Hunter, Researcher, The University of Sydney, NSW

Andrew McGough, consultant to the Australian Weightlifting Federation, provides an overview of the injuries sustained in the sport of weightlifting.

Olympic weightlifting, when performed correctly, is the ultimate sporting example of the combination of mobility and stability, and an expression of the summation of forces through the kinetic chain during the performance of a closed skill.

The sport of weightlifting has been present on the Olympic program since the modern Olympics began. It challenges athletes to lift a weighted barbell overhead in either a single-stage movement – snatch, or a two-stage lift – clean and jerk.

As training in the Olympic lifts becomes more prevalent, it is important that sports physiotherapists become knowledgeable about Olympic weightlifting. Although sports physiotherapists are recognised for their role in the power development training of elite athletes, increasingly they are also training the recreational gym attendee. The rise in popularity of activities such as CrossFit means it is becoming more relevant for sports physiotherapists to have an understanding of Olympic lifts.

Addressing the bar for clean.
“Alterations and compensations in movement patterns and technique pose a threat to athlete health...”

Weightlifting combines many physical challenges:
- Extreme ranges of motion – overhead, pulling from floor, squatting to end range of motion.
- High loads (at elite level, often in excess of double body weight).
- Explosive force development.

Flexibility, strength, coordination, balance, and the development of maximal power all contribute to the ultimate efficiency of the weightlifting athlete’s lift performance.

Weightlifting is recognised for its ability to develop athlete power output. The multi-joint and multi-muscle patterning required during the pulling, squatting and jerk phases of the Olympic lifts have also been considered relevant to many other sporting activities, particularly jumping and throwing (Channell & Barfield 2008). Thus the Olympic lifts and their derivatives (e.g. hang pulls, hang cleans, power snatches, power cleans, push presses, power jerks) are commonly used to develop athlete power within weightlifting and conditioning programs across many sports.

Injuries and weightlifting

The literature indicates that injuries to the low back, knees and shoulders are the most common in weightlifting (Faigebaum et al 2008, Junge et al 2009, Raske & Norlin 2002). However, it is important to note that the sport of weightlifting ranks as one of the safest, with 0.0035 injuries per 100 participant hours in school sports (UK-Australian Weightlifting Federation).

Raske and Norlin (2002) reported on injury incidence and prevalence among elite weightlifters. The authors cite a relatively low injury incidence within the sport when compared to several other sports at the elite level. Injuries within the weightlifting population examined varied and included both acute and non-traumatic injuries (clavicular osteolysis, lumbar spondylosis, knee OA/PFJS, shoulder instability/impingement, stress fractures, acute ligament injuries, meniscal tears, muscle ruptures).


In simple terms, both weightlifting lifts comprise pulling and squatting phases. Both lifts result in overhead barbell support. During the snatch lift this overhead position is achieved as...
a continuation of the pulling phase. For the clean and jerk, the barbell is "cleaned" to the shoulders (as a continuation of pull), and then 'jerked' from the shoulders to the overhead position. Alterations and compensations in movement patterns and technique pose a threat to athlete health (Mottram & Comerford 2008, O'Sullivan 2005).

**Pulling**

The goal of this phase is to generate enough power to achieve barbell height sufficient to then get ‘under’ the bar for the squat phase. From a position of trunk inclination (neutral spine), hip/knee flexion and ankle dorsiflexion, the athlete stabilises the trunk while extending the lower limb and trunk (‘triple extension’ – includes ankle plantar flexion) into an upright posture (Janz et al 2008, Waller et al 2007), pulling the barbell from the floor in a vertical trajectory.

The low back is particularly vulnerable during the pull phase. An inability to maintain a neutral lumbo-pelvic posture may overload the lumbar spine and the trunk extensors. Contributing factors can be any one, or a combination of, the following:

- Limitations in flexibility (ankle dorsiflexion, hamstrings, glut max/hip external rotators) can easily compromise the lumbo-pelvic posture (creating a posterior tilt, lumbar flexion).
- Limited contribution from the hip extensors (glut max) resulting in an over-reliance on the trunk extensors (the athlete actively flexes the lumbar spine to allow a mechanical advantage for trunk extensor contribution to the ‘triple extension’).
- Trunk extensor strength and endurance deficits.

**Squatting**

To ‘catch’ the barbell for either the clean or the snatch, the lifter must drop ‘under’ the bar and control it (eccentrically) in a squatting position. The ability to squat high loads through full range is a necessity (Comfort & Kasim 2007).

Full range squatting tests an athlete’s flexibility, strength, and control. The squat phase and pattern of the snatch is also influenced by the overhead barbell position, creating further flexibility and control requirements. The squat phase of the clean does not contend with overhead postures, but is challenged by higher barbell loads, which can expose athlete deficiencies and create alterations in athlete technique (Kipp et al 2011).

Symmetry is most important to the squatting technique. Contra-lateral deficits (strength, endurance, flexibility) may lead to ipsi-lateral overload. This is most obvious when the pelvis shifts towards one side in the deeper ranges of the squat, to avoid flexibility or strength limitations (Kritz et al 2009, Paoli et al 2009).

Lumbar spondylolysis, lumbar extensor strain, intervertebral disc changes, femoro-acetabular impingement, quadriceps tendinopathy, PFJS, patella tendinopathy, and fibro-femoral joint/meniscal injury are all possibilities and do occur in the weightlifting population secondary to technique issues during the squat phase of the lifts.

The following alterations/compensations in the squatting phase of the lifts can result in overload and injury (Neitzel & Davies 2000):

- Posterior pelvic tilt – sensitive to lower limb flexibility deficits (hip internal rotation, hip flexion, ankle dorsiflexion), inadequate glut or trunk extensor strength. Can cause overload of lumbar spine and extensors.
Weight shift – occurs if asymmetry of flexibility and/or strength/control of movement through range. Causes increased flexibility and strength expectation on side to which weight shift occurs. Hip adduction/internal rotation, ankle dorsiflexion, knee medial deviation, knee anterior displacement – any or all of these compensations may occur.

Anterior knee displacement – increases loads at the PFJ and within the extensor mechanism of the knee (patella and quadriceps tendons) through squatting range (Escamilla et al 2009). Often a compensation for limitations at hip and also with weight shift to that side.

Medial knee deviation – affects the tibio-femoral joint (femoral internal rotation relative to tibia, valgus loading) and anterior knee alignment (PFJ, quadriceps/patella tendons) (Bell et al 2008). This compensation is commonly associated with ankle dorsiflexion deficits and hip range/strength limitations, and is often another by-product of weight shift.

Anterior pelvic tilt – may result in overload of the posterior vertebral structures and often a result of either limitations in trunk stability (both clean and snatch squat phases – athlete ‘locks’ into anterior pelvic tilt to stabilise trunk), or upper limb and shoulder flexibility (snatch squat).

“Understanding the peculiarities of the sport of weightlifting and its physical demands assists successful sports physiotherapy management within this population.”

Overhead positions
These are achieved in one stage during the snatch and via the jerk during the clean and jerk.

In the jerk, from the clean position with the barbell across the front of the athlete’s shoulder, the barbell is ‘jerked’ overhead – shoulder and elbow extension without pressing the weight; power and drive is generated from the lower limbs and trunk and the weight is caught in a split-leg position. Then the athlete returns to a typical stance position with the barbell overhead. The main considerations for optimal control of the jerk is suitable control of the lower limb (avoiding medial knee deviation) and trunk stability during the plyometric lower limb counter-movement necessary to create the drive for the lift.

Failure to control the barbell overhead in the snatch (barbell falls behind the lifter’s centre of gravity) may result in trauma to either the shoulders (instabilities, impingements) or elbows (medial collateral ligament tears).

The optimal posture for the overhead positions requires a stable pelvis and trunk, thoracic extension, scapula external rotation, posterior tilt and upward rotation, and scapula and humeral stability (via scapula stabilisers and rotator cuff) (Forthomme et al 2008).

“As training in the Olympic lifts becomes more prevalent, it is important that sports physiotherapists become knowledgeable about Olympic weightlifting.”

Flexibility limitations of the hip flexors (often in the presence of inadequate glut max contribution to hip extension), thoracic extension, lat dorsi/shoulder internal rotators, pectoralis minor, long head of triceps, posterior cuff/capsule can all influence scapula and shoulder position in the overhead postures. Similarly deficits in pelvic, trunk, scapula and cuff stabilisers (in overhead ranges) will affect the athlete’s ability in the overhead positions and may lead to injury (Kibler & Sciascia 2008).

Forward trunk lean, thoracic stiffness into extension and scapula mal-position (downward rotation, internal rotation, anterior tilt) may result in compensations at the shoulder and wrist joints to achieve balance in the overhead positions (Ellenbecker & Cools 2011). Shoulder instabilities (SLAP, anterior, posterior) and impingements (primary and secondary), neck overload, and wrist impingements are not uncommon injury presentations within the weightlifting population (Raske & Norlin 2002).

Conclusion
A super heavyweight lifter undertakes squat training through the full range with loads of up to 300kg and for the explosive lifts (cleans, jerks and snatches) they use weights ranging from 150 to 230kg, all through repetitions. Lifters train for some forms of squat and Olympic lift patterns six days a week, sometimes twice a day.

A subtle clinical presentation may have heightened significance under training conditioning. Understanding the peculiarities of the sport of weightlifting and its physical demands assists successful sports physiotherapy management within this population.

Andrew McGough
MSportsPhyt. Andrew is an APA Sports Physiotherapist and Associate of the Australian College of Physiotherapists with an interest in all forms of resistance training. He is principal of Clem Jones Centre Physio and Rehab in Brisbane, Queensland.

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Thyroid disease in the underperforming athlete

Australasian College of Sports Physicians (ACSP) President, Dr David Hughes looks at thyroid disease and how it is often left undetected and untreated.

Case 1

An elite level triathlete presents with a story that could easily be construed as an athlete looking for a medical excuse for poor training discipline. She tells me she is about 4kg heavier than what she expects to be. She knows that her weight fluctuates at different times of her training cycle. When she is having a break from training, her weight usually creeps up to 64 or 65kg. Once she is back into her full structured nutrition regime and a heavy training cycle, the weight invariably reduces until she stabilises at 59kg. This year has been different. The weight crept up to 67kg. Despite her usual strict nutritional regime and a maximal training load, her weight only reduced to 63kg and then gradually began to drift back up to 64kg, despite the fact that her training load is as high as it has ever been. Her performance times are slightly down but she feels otherwise well with no specific symptoms. It is hard for me to feel excited. Everything in her physical examination is normal and she still looks very fit. The only thing that raises my antennae is that she is such a clear and unemotional historian. No histronics, no dramatics, no fuss. Just a clear certainty in her mind, that something is not right.

After performing a thorough physical examination including examination of the thyroid, I am none the wiser. I perform a few blood tests including thyroid function tests. Most of the tests are normal including normal full blood picture, normal inflammatory markers, normal liver and renal function tests. Free T4, the active form of thyroxine in the serum, is normal at 13 pmol/L (8.2–22). Thyroid stimulating hormone however is slightly elevated at 7.5 mU/L (0.5–4.4). Subsequent tests for thyroid antibodies come back positive. This indicates that the athlete has developed an autoimmune reaction against thyroid cell protein. Ultrasound reveals hypoechogeticity, heterogeneity and increased blood flow, typically seen in autoimmune thyroiditis.

This athlete has subclinical hypothyroidism. The condition is characterised by absent or very subtle symptoms, normal serum levels of Thyroxine (T4) and elevated levels of thyroid stimulating hormone.

After much discussion about treatment options, the patient is commenced on a very minimal dose of thyroxine (25 µg on alternate days). Over the subsequent three months, her weight and exercise performance returns to normal. Subsequent blood tests demonstrate a euthyroid state and normal levels of thyroid stimulating hormone.
Case 2
A 22 year old professional rugby league player presents on referral from his coach. The player has been playing at the top level for several years and has a good understanding of training and nutritional issues. The athlete’s body weight has been stable for the past couple of years. During the off season, the player has continued to train fastidiously but despite being in a hypertrophy phase of training, is struggling to maintain his body weight. The player is puzzled by the fact that he has lost 5kg in recent months, despite strenuous efforts with resistance training and increased protein intake. The player denies feeling anxious and has no awareness of palpitations. He does feel however that he is less tolerant of exercise in the heat and has been sweating excessively. He also reports a few episodes of light-headedness and fainting at training, which he has never experienced before. He has recently noticed abnormal breast swelling. The coach is concerned that the weight loss is due to poor dietary habits, alcohol abuse or use of recreational drugs.

On examination the player has an elevated resting pulse rate of 88 beats per minute. His heart rhythm is regular. His skin is warm and slightly sweaty and he has a diffusely enlarged thyroid gland. He has mild tremor. Tendon reflexes are unusually brisk. There is moderate gynaecomastia. The remainder of the physical examination is normal.

Investigations reveal a T4 level of 49.5 pmol/L (8.2–22) and TSH of 0.008 mU/L (0.5–4.4). A nuclear medicine scan utilising radioactive iodine shows excessive uptake in the thyroid.

The player has Graves’ Disease, an autoimmune disease which causes overstimulation of the thyroid gland. The player is commenced on carbimazole 10mg, three times daily. Carbimazole reduces the production of thyroid hormones. The player’s weight, exercise tolerance and heat tolerance returns to normal over the subsequent three months. Twelve months later with monitoring of thyroid hormone levels, the carbimazole is reduced to 5mg three times daily. The medication is ceased altogether after 18 months and annual thyroid checks thereafter reveal a euthyroid state.

Overview of thyroid function
The thyroid gland is a highly vascular gland found in the anterior aspect of the neck, just inferior to the larynx, extending from the level of C5 to the level of T1. Normal thyroid morphology is of two elongated lobes, one on the left and one on the right, connected by a medium isthmus. The major thyroid hormone secreted by the thyroid gland is thyroxine, also called T4 because it contains four iodine atoms. To exert its effects, T4 is converted to tri-iodothyronine (T3) by the removal of an iodine atom. This occurs mainly in the liver and in certain tissues where T3 acts, such as in the brain. Thyroxine is an important hormone which acts on every cell in the body and is concerned with the regulation of metabolism. It has profound effects on the metabolism of protein, fat and carbohydrate. Thyroxine increases sensitivity to catecholamines and increases the basal metabolic rate. Fluctuations in thyroxine levels will affect thermoregulation, energy expenditure and tolerance of environmental temperature. Thyroxine also has influences on central neurotransmitters such as serotonin and GABA.

“Common symptoms of hypothyroidism include depression, slow heart rate, weight gain, fatigue, cold intolerance and constipation.”
Thyroid secretion of thyroxine is regulated by thyroid releasing hormone (TRH) and thyroid stimulating hormone (TSH). TRH is synthesised and stored in the hypothalamus. TRH acts on the anterior pituitary gland to stimulate the release of TSH from that gland. TSH in turn stimulates the release of thyroxine from the thyroid. Regulation of thyroid hormone works on a feedback loop which acts like a thermostat. If thyroxine levels in the blood drop, the hypothalamus releases more TRH and the anterior pituitary gland secretes more TSH which in turn increases the thyroxine produced by the thyroid. Conversely, if circulating thyroxine levels are too high, there is inhibition of TRH secretion by the hypothalamus and inhibition of TSH secretion by the anterior pituitary gland. This causes circulating thyroxine levels to decrease.

"Common symptoms of hyperthyroidism include irritability, anxiety, rapid heart rate, weight loss, sleeplessness, sweating, heat intolerance, gynaecomastia in men and diarrhoea."

“Common symptoms of hyperthyroidism include irritability, anxiety, rapid heart rate, weight loss, sleeplessness, sweating, heat intolerance, gynaecomastia in men and diarrhoea.”

Hyperthyroidism is a condition where there is too much circulating thyroxine. Common symptoms of hyperthyroidism include irritability, anxiety, rapid heart rate, weight loss, sleeplessness, sweating, heat intolerance, gynaecomastia in men and diarrhoea. The most common cause of hyperthyroidism is Graves’ Disease, an autoimmune disease where antibodies cause overstimulation of the thyroid. Hyperthyroidism can also be caused by a single nodule. Common symptoms of hypothyroidism include depression, slow heart rate, weight gain, fatigue, cold intolerance and constipation. The most common cause of hypothyroidism is an autoimmune disease called Hashimoto’s thyroiditis where circulating antibodies attack the thyroid gland.

Thyroid disease affects approximately 5 per cent of the population, is more common in Caucasian populations and is far more common in women than men. The incidence of thyroid disease increases with age.

Subclinical hypothyroidism

Subclinical hypothyroidism is a manifestation of early, mild thyroid failure. It occurs in 4 to 20 per cent of the adult population, the variability being related to issues such as gender, body mass index, iodine intake, age and race. As with all thyroid disease, it is more common in women and the incidence increases with age. Individuals are predisposed by familial and genetic risk factors. A history of thyroid disease, other endocrine disease or systemic autoimmune disease increases the risk of an individual developing subclinical hyperthyroidism. Subclinical hypothyroidism is more common in iodine-sufficient population groups and iodine supplementation in the diet has been suggested as a possible risk factor.
While the circulating thyroxine remains normal in subclinical hypothyroidism, the thyroid is actually under performing and the elevated TSH indicates that the thyroid hormone regulating system is operating in a compensated state. Subclinical hypothyroidism is considered to be a progressive condition in most instances, although it may be reversible in situations where the TSH is relatively low (< 10 mU/L). The annual rate of progression from subclinical hypothyroidism to overt hypothyroidism is approximately 4 per cent in women with raised TSH and presence of anti-thyroid antibodies.

As in Case 1, the symptoms of subclinical hypothyroidism can be vague and non-specific and the condition can remain undiagnosed for a prolonged period of time. Issues that are most likely to present in the athletic population include decreased exercise tolerance, weight gain and lethargy. Some studies of subclinical hypothyroidism have shown subtly compromised cardiac function with impaired left ventricular filling during exercise. Dyslipidaemia is a common finding in individuals with subclinical hypothyroidism.

“The team clinician needs to maintain an index of suspicion for thyroid dysfunction where the athlete presents with unexplained underperformance, intolerance of temperature extremes and subtle weight fluctuations.”

Treatment of thyroid disease in the athlete

Hypothyroidism is treated with synthetic thyroxine replacement medication. Getting the balance right can be problematic and involvement of an endocrinologist is advisable. In the situation of Case 1 with subclinical hypothyroidism, the symptoms are subtle and the treating clinician needs to be careful that they do not ‘over-treat’ the condition. Remembering that thyroxine not only affects fat metabolism but also affects protein metabolism, one needs to be careful that in attempting to normalise fat metabolism, one does not cause excessive protein metabolism with muscle loss. Athletes who suffer from hyperthyroidism, as in Case 2, often have difficulty maintaining lean muscle mass because of the increased protein metabolism. Weakness and heat intolerance are also markers of excessive thyroxine levels. The athlete will not thank the clinician for over-treatment with thyroxine replacement therapy.

In Case 2, the hyperthyroid athlete responded extremely well to carbimazole and within months had regained his normal body weight and normal exercise tolerance. He was delighted with the outcome. Carbimazole is not however without its risks. The athlete can develop rashes and pruritus which can generally be treated satisfactorily with antihistamines. The most serious side-effects however relate to bone marrow suppression. This can occur at any time during treatment and patients are strongly advised to see their physician with any symptoms of infection, particularly sore throat.

“Thyroid disease affects approximately 5 per cent of the population, is more common in Caucasian populations and is far more common in women than men.”

Summary

Thyroid disease is common in the general population. It affects females more than males and incidence increases with age. Subtle thyroid dysfunction which may go undetected in the general population, may present in the athletic population as non-specific underperformance. The team clinician needs to maintain an index of suspicion for thyroid dysfunction where the athlete presents with unexplained underperformance, intolerance of temperature extremes and subtle weight fluctuations. Both hypothyroidism and hyperthyroidism have a negative impact on athletic capacity and the treating clinician needs to carefully monitor clinical symptoms and thyroid function markers, to achieve a euthyroid state and to avoid overtreatment. Involvement of an endocrinologist is recommended in the treatment of the athlete with thyroid dysfunction.

Dr David Hughes  
President  
Australasian College of Sports Physicians
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Australasian College of Sports Physicians (ACSP)

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Upcoming events:

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Exercise & Sports Science Australia (ESSA)

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Sports Dietitians Australia (SDA)

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16 Nutrition for Exercise & Sport Course – ACT (Canberra)
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August

18 Nutrition for Exercise & Sports Course – Victoria (Melbourne)
25 Nutrition for Exercise & Sports Course – New South Wales (Sydney)

For more information visit www.sportsdietitians.com.au
Sports Doctors Australia (SDrA)

News:
SDrA has organised for its members to receive the British Journal of Sports Medicine electronically and will be involved in a ‘cover issue’ in July this year.

Upcoming events:
The main focus of SDrA activity has been for the be active 2012 conference, October 31 – November 3. The aim has been to have a significant clinical component that will be of benefit to sports medicine practitioners on a daily practice basis.
For more information visit www.sportsdoctors.com.au

Sports Physiotherapy Australia (SPA)

News:
- SPA (COD representative and APA CEO, Cris Massis) recently had a series of meetings with SMA CEO, Nello Marino and SMA President, Michael Kenihan. The aim was to investigate ways by which SMA and APA can work better together in the future. Potential ventures include:
  - Combined professional development opportunities.
  - Co-development of a course for up and coming health professionals looking to work within elite sporting teams.
  - Joint membership for SMA and APA for certain groups.
- SPA would like to give a big thank you to Ivan Hooper for his dedication and hard work within the role of Chair of SPA National Committee for the last two years.
For more information visit www.physiotherapy.asn.au
The Journal of Science and Medicine in Sport

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   July 2011
   Papacosta, E.; Nassis, G.P.

3. Exercise during pregnancy: A review of patterns and determinants
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   Gaston, A.; Cramp, A.

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8. Maximising performance in triathlon: Applied physiological and nutritional aspects of elite and non-elite competitions
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   Bentley, D.J.; Cox, G.R.; Green, D.; Laursen, P.B.

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