

Starting your own practice

The things to know

Back pain

The important and novel aspects

Tennis anyone?

Interview with the Australian Open
Chief Medical Officer

- Cricket Australia Injury Report 2011
- Appropriate use of diagnostic imaging in sports medicine
- Does supinator play a role in lateral elbow tendinopathy?
- What does perennial ryegrass have in common with pinot noir?
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Here's to a happy and active 2012



Nello Marino is pictured with Sports Medicine Australia's newly endorsed product, the Smoothy golf buggy. For further information visit smoothy.com.au

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 gives an insight into the program to date at this year's National Conference.

With the summer holidays now over and everyone back into the regular routine it's interesting to reflect on how the festive season has changed over time and no longer seems to be the hiatus that I seem to recall it to be. Recognising the danger of sounding nostalgic my casual observation would suggest that people are having less time away from work, as distinct from the workplace, retail sales offers appear to be more extended and there appears to be less time for reflection on recent achievements with one year simply rolling into another.

I'm sure I'm not alone in declaring that 2011 was a big year for SMA as I'm sure it was for most SMA members. Another great Conference of Science and Medicine in Sport in Fremantle, the delivery of an IOC Team Physiotherapy Course for the Oceanic Region, re-signing of major sponsors Asics, Elastoplast, Voltaren, and the welcoming of DJO Global as a new SMA sponsor, record numbers of participants in Safer Sport courses throughout the country, JSAMS top ten ranking in its journal category, not to mention the enormous level of consultation that took place with SMA State Boards relating to the OneSMA proposal which members will have a greater exposure to over the coming months.

That being said there is little room for complacency and we anticipate the 2012 year to take on even greater proportions with the ramping up of OneSMA consultation with the broader membership, increased member engagement opportunities through professional development, and a national conference which will be of proportion not seen since the 1999 Pre-Olympic congress in Sydney. Co-incidentally the Conference will be again held in Sydney and is already starting to take shape with the confirmation of a number of keynote speakers.

You may recall that this year will incorporate three conferences under the be active 2012 banner. The Australian Conference

of Science and Medicine in Sport, The National Sports Injury Prevention Conference and the National Physical Activity Conference which will this year take on an international perspective as the International Congress on Physical Activity and Public Health, arguably the world's pre-eminent conference for physical activity practitioners, researchers and policy makers.

We expect over 1,500 delegates from Australia and the rest of the world to descend upon Sydney for what promises to be a wonderful event. As always the combination of the three conferences will provide an opportunity for interdisciplinary exchange, one of the great features of SMA conferences.

We're delighted to have Professor Karim Khan as the ASMF Fellows Refshauge Lecturer for 2012. Many would be aware of Karim's professional background as a Sports Physician, co-author of *Clinical Sports Medicine* and the current editor of the *British Journal of Sports Medicine*. I've had numerous members, particularly those with clinical backgrounds, express their delight in welcoming back Karim to Australia who was last at the SMA conference in 2005.

We are also delighted to have secured Dr Nick Cavill, from the UK. Nick is acclaimed for his leadership in policy and programs on sustainable transport and the links to physical activity.

Dr Ken Powell is a consultant epidemiologist from the USA and was an epidemiologist at the Centre for Disease Control for 25 years. His background and expertise is diverse and his career has focused heavily on the relationship between physical activity and health. Ken initiated the Center for Disease Control and Prevention's epidemiologic work in the area by leading a consolidation of the scientific literature and setting the public health research agenda as well as consulting to numerous government departments and sitting on high level public health committees.

These are just a small sample of the confirmed keynote speakers to date and we will make a number of other announcements on keynote and invited speakers very shortly. Additional details on all conference keynotes and invited speakers can be found at sma.org.au/be-active/speakers/. The scientific committee are acutely conscious of the need to ensure a well balanced program, particularly following feedback from the Fremantle conference which suggested the program would benefit from a stronger clinical content and we look forward to delivering such a program.

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Study shows exercise can boost your income by up to 9 per cent bit.ly/yrn79v #SMAnews – January 16, 2012

Highlights of the January 2012 issue of the *Journal of Science and Medicine in Sport* are online now. Visit jsams.org #JSAMS – January 11, 2012

Happy New Year! SMA National Office is back to work. For all those determined to get fit this year, starting gradually is the key. – January 10, 2012

With Summer here, learn how to prepare yourself for hot weather conditions to avoid heat injuries when active bit.ly/saMBQJ #SMAnews – December 7, 2011

All went well at weekend's course with Brisbane medicos teaching an advanced course for Olympic physios for 1st time bit.ly/ry4qqo – November 29, 2011

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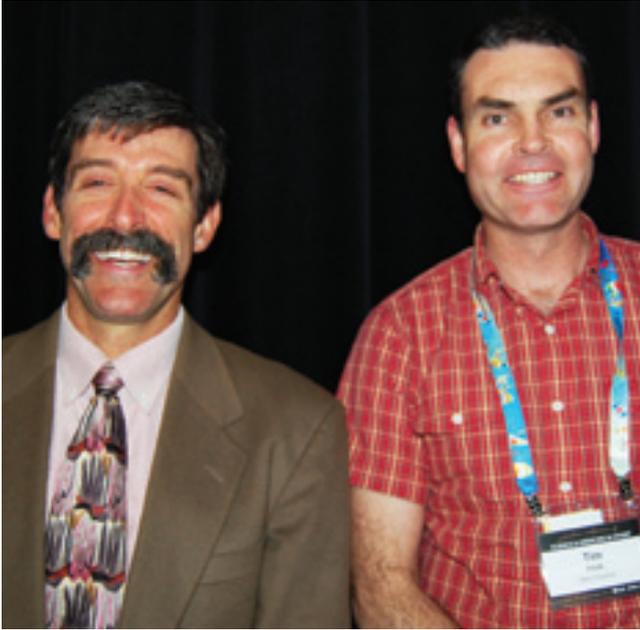
Landmark study shows that physically active primary school students perform better academically theage.com.au/national/educa... #SMAnews – October 10, 2011

So in addition to the wonderful international line-up across all three events, be assured that the event will also feature some of the leading practitioners across all three fields represented by the three conferences, and great opportunities for cross collaboration between these fields. We look forward to seeing you in Sydney in October.

Nello Marino

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A regretful resignation



Tim Pain (right) with ACSMS 2011 keynote speaker, Mark Fenton.

Tim Pain announces his resignation from his position as SMA National President and reflects on SMA's recent past and future.

'You Earn at Your Fate', was once written by Gregory David Roberts. Over many years SMA has certainly earned its reputation as a leader of excellence in enhancing the health of all Australians through safe participation in sport, recreation and physical activity. Most members would see SMA operating as a professional, well oiled machine (for which most part it is) that: produces publications, conducts professional education, runs community programs, provides resource material, promotes participation in sport and physical activity, and also encourages research. This reputation does not come about by good luck, but rather by the hardwork of many of our members and management team, constantly seeking new and improved approaches to delivering on our Mission.

As the SMA National President, I have come to gain a good appreciation of just how much time some members commit so freely to SMA and our cause. This has resulted in some successful achievements in many of SMA's core areas of activity over the recent past, such as: a top-10 rating of the *Journal of Science and Medicine in Sport*; increased participation rates in the Safer Sport Program across Australia; continued attendance growth at the SMA National Conference; and greater media presence helping to increase public awareness of the importance of sport and physical activity on health.

"...it is with some sadness that I recently resigned from the position of SMA National President..."

Further strategies are currently being implemented and we will see more successes achieved in the areas of membership, community service, and structural efficiency, in the coming years.

Having been involved in many of these developments and having full and total awareness of the time commitment necessary to see them completed adequately, it is with some sadness that I recently resigned from the position of SMA National President with still much to be achieved. The role of President is an important one and demands a significant time commitment to fulfil all of its requirements and responsibilities. Due to a combination of both business commitments and the commitments that come from having a young family it has become increasingly difficult for me to continue to dedicate adequate time to performing the role of President at a level that is required, to do it well.

"Michael Kenihan (Vice President) has agreed to serve in the role of presidency and as a current SMA National Executive member he is well across all of the current issues concerning SMA, ensuring that the transition will be smooth and seamless."

Fortunately SMA is an organisation that is served well by many rather than by a few. Michael Kenihan (Vice President) has agreed to serve in the role of presidency and as a current SMA National Executive member he is well across all of the current issues concerning SMA, ensuring that the transition will be smooth and seamless. I thank him for agreeing to step into this role mid-term. He will be ably supported by the National Board and the SMA management team which continues to deliver the highest level of service to the SMA community.

One of the key functions of the National Board is to make long-term strategic decisions that will benefit all of the SMA community. In order for SMA to continue to lead and be adaptable to the challenges that exist in a modern operating environment it is imperative that we constantly seek better approaches to our practices in all key areas of activity. During my term as President one of the areas that the SMA National Board has invested a significant amount of time considering is the current structure of Sports Medicine Australia and whether the current structure will serve us best in a modern working environment or whether an alternative model would be more effective. Following an extensive review and consultation period there was a proposed improvement to the structure

of SMA. This proposed new structure has been termed 'OneSMA', and further consultation on the specifics of the proposal will be conducted in 2012. I have previously outlined the OneSMA structure to membership through several SMA publications and forums, however such an important issue should be highlighted to members as much as is practically possible before they will be asked to make a decision on the structure of SMA at the National AGM later this year.

Essentially, OneSMA proposes that the current nine structural entities (eight State Boards and the National Board) that make up SMA join to become one organisation with one governance structure and one management team to service the SMA community at both a national and local level.

“One of the key functions of the National Board is to make long-term strategic decisions that will benefit all of the SMA community.”

The benefits of the OneSMA model are wide and varied however the primary benefits will be that:

- SMA Members who volunteer their time to the organisation will be able to spend more of their time focusing on their area of interest and expertise rather than having to commit time to the governance and operational requirements of the nine separate entities that exist under the current federated structure.
- SMA resources will provide maximum benefit to the SMA community, rather than servicing the current governance and management structures associated with multiple organisations. This will mean that the services that we can deliver to members will be greater at a lower cost.
- Greater stability of membership service delivery with a consistent approach across Australia, whilst still allowing for local nuances due to the unique cultural differences between regional areas of Australia.

It is not unusual for organisations to alter their governance structures, as organisations grow and the environments in which they operate change. In fact this type of structural change is not unique to the requirements of Sports Medicine Australia, with many other similar organisations recently having undergone or are undergoing a similar change to the OneSMA model.

Whilst I will be taking a step back from leading this proposed change, I hope that the members will see the positive benefits associated with this, outweighing any perceived risks.

“The benefits of the OneSMA model are wide and varied...”

I have thoroughly enjoyed my time as National President of Sports Medicine Australia and my involvement with all associated with the organisation including members, staff, and stakeholder groups. Being National President certainly highlighted the fact that Sports Medicine Australia is a very unique organisation with a diverse range of members and also a diverse range of activities that we now undertake, however amongst all of that diversity the common theme is that of solidarity in the belief that if Australians are to be healthy then they need to be participating in sport and physical activity. And as a leading organisation we need to always seek ways to do that better.

Tim Pain



Michael Kenihan (left) with Professor Wendy Brown at ACSMS 2011.

5 mins with... Professor Peter Terry

Professor of Psychology and 2011 ASMF Fellowship recipient



What is your profession?

University Professor and Registered Sport and Exercise Psychologist.

How many years have you been in this profession?

I have been a university lecturer for 27 years. I originally trained as a physical education teacher in London, the city of my birth, then spent two years completing a master's degree in sport psychology at the University of Victoria in British Columbia, before returning to the UK to take my PhD in psychology at the University of Kent.

Where do you work?

I've worked in the Faculty of Sciences at the University of Southern Queensland in Toowoomba for the past 11 years, having previously spent 16 years at Brunel University in England. Since moving to Australia in 2000, I've also worked as a consultant for the Queensland Academy of Sport and a variety of teams, most recently the Australian shooting team.

What does your typical day consist of?

My working week is extremely varied. My university teaching is mostly online now, which suits my often hectic travel schedule but means that I frequently interact with students early mornings or late at night. I spend a day or two each week on research projects and try to reserve Wednesdays for writing. I usually catch up with postgraduate students and academic colleagues on Mondays and Fridays. Then I have to fit in my duties as Deputy Chair of the USQ Academic Board, President of the Asian-South Pacific Association of Sport Psychology, and consultations with clients. I've always spent my professional life in the fast lane and seem to be rather addicted to it.

What is your favourite aspect of your job?

I love the variety and the travel. In 2011 alone, I delivered workshops to coaches in Iran and swimmers in Brazil, assisted Australian teams at world cup and world championship events in Europe, attended conferences in Taiwan, Canberra and Fremantle, and had the opportunity to work with many great research collaborators and students.

What has been the highlight of your career?

By incredible good fortune, I've managed to attend five summer and three winter Olympic Games as a sport psychologist, so it's pretty hard to go past that. However, I'm also proud of having been elected to leadership positions of various professional organisations in Australia and overseas, and I take a bit of satisfaction from the 200-odd publications I've produced too.

When, why and how did you become involved with SMA?

I joined SMA shortly after arriving in Australia because it seemed an obvious thing to do for anyone involved in a sports medicine discipline. I've always found SMA to be an organisation that promotes mutual respect across disciplines and facilitates lifelong learning.

What inspired you to apply for ASMF Fellowship?

I once attended the Fellows dinner as a guest and was incredibly impressed not only by the vast collective experience and wisdom in the room but also by the spirit of collegiality that prevailed. Unlike Groucho Marx, I did want to join a club that might have me as a member.

What are you passionate about?

I'm passionate about my family, my friends and my professional life, in that order. On occasions though, my priorities get a little mixed up and I allow work to take over.

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

An old English teacher of mine always impressed upon me that it's a sign of intelligence to ask questions when you don't understand something. Prior to that, I'd probably thought it was a sign of stupidity. I think that piece of advice generated my enquiring mind. I'm now constantly reminded of how little any of us really know.

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

I'd invite John Eales and Steve Waugh, because they epitomise everything that is great about Australian sport; actor and comedian Dudley Moore to entertain us and because he is shorter than me; and Kim Basinger, for obvious reasons. Sorry I meant to say my partner Victoria, for obvious reasons.

Favourites

Travel destination: Brazil.

Sport to play/watch: Love them all.

Cuisine: Victoria's home cooking.

Movie: A Few Good Men.

Song: One Moment in Time.

Book: Anything by Val McDermid.

Gadget: iPhone.

Check out Professor Peter Terry's latest research on the role of music in sport on page 68.



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Expanding your sports medicine knowledge and your industry contacts are critical parts of building a successful and rewarding career in sports medicine.

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be active 2012

be active 2012 combines three great conferences

- The Australian Conference of Science and Medicine in Sport
- The Australian Sports Injury Prevention Conference
- The 4th International Congress on Physical Activity and Public Health, the world's premier physical activity research and promotion conference.

be active 2012 kicks off in Sydney from October 31 to November 3.

State conferences, seminars, workshops, and evenings

All SMA state branches provide a diverse range of professional development and information sharing opportunities to suit the multidisciplinary nature of SMA members. All sessions are delivered by leaders in their field and provide a great opportunity to connect with a diverse range of practitioners and to share in the latest cutting edge research and clinical practice.

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What does perennial ryegrass have in common with pinot noir?



The South Island of New Zealand is known for its stunning scenery, but it is also becoming notorious for its stunning wines.

Dr J explores whether grass species matter in respect to injury, all whilst discussing the makings of a good wine.

When I was a teenager growing up in Melbourne, my Dad was a bit of a wine buff and introduced me to the major great wine varieties of the world. In the French tradition I tasted these well before I was 18. The most fascinating were the great red wines of France and Dad taught me the difference between the Bordeaux and the Burgundy regions. The first difference I learnt was the shape of the bottles, the second was that the Bordeaux wines were made from a grape called cabernet sauvignon and the Burgundies were made from pinot noir. The third, which made the Bordeaux wines seem

the most impressive of all, was that you weren't meant to drink them straight away, or even for a few years and that they actually tasted better if they were kept on their side in a cool dark cellar for 10 or even 20 years! As an adult I learnt that Burgundy red wines were indeed pure pinot noir, but the grape information about Bordeaux wines was only partially correct, in that whilst the main grape variety was cabernet sauvignon, it was invariably mixed with others like merlot, cabernet franc and malbec. French wines generally didn't bother to include this information on the bottle with the region of Bordeaux and quality of the vineyard being considered the more important information.



Perennial ryegrass has no lateral growth and therefore it doesn't develop a 'thatch' layer that traps football studs. By contrast couch (Bermuda) grass and the other warm-season grasses tend to develop a heavy thatch layer due to stolons (lateral growth) above the soil.

“Maybe with underground heating you could also produce a good pinot noir wine in England as well, but since it might cost a few hundred a bottle it would be unlikely to turn anyone’s head away from those produced in Burgundy.”

As a kid I didn't get nearly as much instruction about grass varieties, but got to play cricket on a lawn in our backyard. Like the fact that many wine drinkers don't care about grape variety as long as the stuff tastes good, the vast majority of lawn or turf users only care about whether the grass looks green and is soft and lush. We take it for granted that grass is plentiful, but when we see subcontinent fielders who seem fearful diving for a catch, we forget that they may have grown up playing cricket on a dustbowl. This also might explain why they are better spin bowlers than most Aussies who grew up with grass everywhere. With the benefit of hindsight I'm sure that the lawn in my family home was a blend of many grasses (including clover) and that perennial ryegrass was one of them. There had to be a cool-season grass in the mix, as the lawn was green all winter in Melbourne, but I remember my Mum having to water the lawn everyday in summer to stop it dying, which would be typical for ryegrass. I think I actually first found out that grasses had 'types' when I visited my cousins' farm in Yarrawonga, a couple of hours further north and with a drier climate, where they had a back lawn of buffalo grass.

This is the same grass we have in our current lawn in our small backyard in Sydney and as a child I would have asked someone something like *“Why is this grass scratchy?”* compared to the one at my own home. I remember the answer being that it was because it was *“Buffalo grass”* and maybe someone explained that the leaves were coarser and that there were hard 'runners' or stolons underneath the leaves but above the soil. My lawn at home didn't have these.

“The winemakers have worked out the places and the ways to grow the best grapes to give outstanding bottles of pinot noir. There is a challenge for turfgrass science and sports injury prevention experts...”

I first started to get really interested in grass varieties when I was in my early thirties. We had been doing AFL injury surveillance for enough years to work out that a player was significantly more likely to tear an ACL playing in a match in the 'northern states' compared to Victoria. The first thought was that maybe the grounds were harder because of the warmer weather up north, but after a year or two of measurement the data coming back was that, if anything, Melbourne grounds were at least as hard as those further to the north. It started to dawn on us that the grass types were different at the different venues around Australia and that maybe this could explain why ACL injuries are more likely in the north. We also observed

that there were far more ACL injuries early in the season, especially in the pre-season competition. I had grave fears in the year 2000 as the AFL season was starting a month early to accommodate the Olympics in September that year, thinking that there would be even more ACL injuries than usual. However, the opposite occurred and, in hindsight, for very interesting reasons. The entire pre-season competition in the year 2000 was played at Waverley Park, a ground which was condemned but, in the absence of cricket, was available during February 2000. Because it didn't host any cricket and, also, because it was situated in the Melbourne rainbelt, Waverley Park used an exclusively ryegrass surface whereas almost all of the other grounds had a summer base of couch (Bermuda) grass that was oversown with ryegrass in the autumn. Even matches played much earlier than usual in summer on ryegrass failed to give rise to the handful of ACL injuries we expected in the preseason competition every year.

“In Australia we have the highest published rate of ACL injuries in the world, with Tasmania clearly having the lowest rate, followed by Victoria.”

In the 2000s there were major trends in the Australian and world wine industry occurring. People were abandoning Chardonnay and Riesling as their preferred white varieties for Sauvignon Blanc and of the red varieties, Pinot Noir was starting to be held with the same reverence as Cabernet and Shiraz blends. The focus of wine growing in Australia was moving southwards, with the Yarra Valley, Tasmania and New Zealand starting to become the new shining lights of Antipodean wine production. In 2009 I was visiting Linköping in Sweden to give a talk, which included my research on grass varieties and ACL injury risk, to Jan Ekstrand's research group. My wife Jess and I were staying at Jan's house and he stopped off at a government-run (isn't everything in Sweden?) liquor outlet to get us a bottle of wine for dinner. He declared himself a big fan of Australian wines which the government monopoly importer was kind enough to offer Swedish citizens at a very attractive price. However, he sheepishly admitted to me that he had become an even bigger fan of New Zealand wines, although he was worried that this might sound like an outsider confessing to him that he preferred Norway over Sweden because of the superior fjörds. I actually agreed with him and also admitted that in general I thought that the New Zealand wines were blowing away many of the traditional Australian offerings, but suggested that he lean on the Swedish alcohol importer to start trying some wines from Tasmania, especially their

pinot noirs and sparkling wines. Like the gold standard sparkling wines from Champagne, the Tassie ones are usually a mix of Chardonnay and Pinot Noir grapes. White sparkling is usually pinot noir with the skins peeled off whereas in pink sparkling, which is even harder to do well, the skins are left on for a period of fermentation to give the wine a pinkish tinge. The Blanc de Blancs variety of sparkling wine (Chardonnay only without the pinot noir) is easier to grow in many regions of the world, as the Chardonnay grape is very agreeable to most temperate climates around the world. Chardonnays grown in a warmer drier climate like Margaret River can be outstanding but with a different character to the cooler more humid climates like Burgundy in France (or New Zealand). In the movie *Sideways*, the main character Miles Raymond, who is a shocking wine buff, stated famously that he refused to drink Merlot but loved pinot noir, partly because the grape was so thin-skinned and fussy (fitting in with the character's own personality). The fussiness meant that whilst it could be grown in less than ideal climates, it was highly prone to disease and poor output, but in a cool-cold temperate climate with year-round high rainfall and humidity and a long but medium warm summer, it produced a flavour that perhaps was better – in some subjective opinions – than all other wine varieties. The outstanding climate in Europe is of course the northern Burgundy region of France, but elsewhere there are climates which mimic these ideal characteristics, with the small islands of Tasmania and the south island of New Zealand perhaps being equally ideal. Because of the fussiness of the grape, no good bottles of pinot noir (nor sparkling wine) are cheap, but world experts are starting to feel there is better value to be had in Tasmanian and New Zealand pinots as their iconic status hasn't yet reached that of Burgundy, even though the quality actually may have.

“Most groundsmen who manage a football playing surface of natural grass are not working to the key performance indicator of trying to prevent players from tearing ACLs, but instead are trying to make the surface as green, soft and lush as possible.”

Perennial ryegrass is thought of as an English grass, but it grows in many countries of the world and ironically, it is probably the climatic conditions I have just described with respect to pinot noir that ryegrass is most suited to. Although almost all EPL grounds use perennial ryegrass as the primary species, the fact that they almost all use underground heating to keep it alive and able to withstand

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Central Otago pinot noir is the closest rival to the traditional great wines of Burgundy. Some of the Bay of Fires sparklings from northern Tasmania cost as much as a bottle of non-vintage Moët, but there are many wine experts who will tell you that it represents better value for money.

the traumas of a football match in winter, suggests that the English winter is not in fact the ideal growing conditions for this grass. Maybe with underground heating you could also produce a good pinot noir wine in England as well, but since it might cost a few hundred a bottle it would be unlikely to turn anyone's head away from those produced in Burgundy.

“Like the fact that many wine drinkers don’t care about grape variety as long as the stuff tastes good, the vast majority of lawn or turf users only care about whether the grass looks green and is soft and lush.”

Most groundsmen who manage a football playing surface of natural grass are not working to the key performance indicator of trying to prevent players from tearing ACLs, but instead are trying to make the surface as green, soft and lush as possible. It turns out that if you are doing this in Tasmania or the south island of New Zealand or in central France, the grass you should be using is perennial ryegrass, without any blend of other grass species at all as the rye will grow so well. If you are looking after a ground in a slightly warmer climate, then a couch (Bermuda) base in summer, plus a rye oversow in winter as it gets cooler, is probably the preferred combination. In a really warm climate (e.g. north Queensland), you might use couch grass and not need to oversow it with ryegrass at all. As the weather gets colder, underground heating is needed in winter

to keep the grass alive. If the climate is humid (wet) ryegrass might still be the best option, but if it is drier then Kentucky Bluegrass is preferable and often it is best to mix these two grasses together.

Does grass species matter with respect to injury? In my opinion the answer with respect to ACL injury is definitely yes, although it is hard to prove due to all of the confounders involved in the genesis of an ACL injury.

“I... also admitted that in general I thought that the New Zealand wines were blowing away many of the traditional Australian offerings...”

The strongest evidence is the raw epidemiological data and it gets stronger when you add a few close up pictures of the different types of grass, showing that ryegrass leads to a lot less grip than the warm-season grasses (and even Kentucky Bluegrass). In Australia we have the highest published rate of ACL injuries in the world, with Tasmania clearly having the lowest rate, followed by Victoria. The AFL ACL data map follows the same trend as the general population. New Zealand, France and England, all of which tend to have ryegrass on their football grounds, have far lower rates of ACL injury than Australia. In Europe, southern Europe, with a Mediterranean climate that uses warm-season grasses as a base, the rate of ACL injuries is double that of northern Europe, where ryegrass



is the preferred grass. In the USA, where Kentucky Bluegrass is used a lot more because of the colder drier winters, there doesn't seem to be a north-south bias for ACL injuries.

“It started to dawn on us that the grass types were different at the different venues around Australia and that maybe this could explain why ACL injuries are more likely in the north.”

The fascinating conclusion I have come to with respect to climate is that where pinot noir grapes thrive, perennial ryegrass thrives,

and ACL injury rates tend to be lower. The winemakers have worked out the places and the ways to grow the best grapes to give outstanding bottles of pinot noir. There is a challenge for turfgrass science and sports injury prevention experts to get together and try to replicate the low ACL risk characteristics of cool-climate ryegrass surfaces around the world and try to eliminate the plague of ACL injuries that is seen in places like mainland Australia.

Dr J

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



Grapes and vines in the Chateauneuf du Pape region of southern France, which climate-wise is more similar to the Barossa region in South Australia. Syrah (shiraz) is preferred here to Pinot Noir due to the warmer Mediterranean weather.

Injury Report 2011: Cricket Australia



Cricket Australia conducts an annual ongoing injury survey recording injuries in contracted first class players (male). This report analyses injuries (defined as any injury or other medical condition that either: prevents a player from being fully available for selection in a major match; or during a major match, causes a player to be unable to bat, bowl or keep wicket when required by either the rules or the team's captain) occurring prospectively at the state and national levels over the last decade, commencing in the 1998–99 season concluding in the 2010–11 season.

Notable findings

- A continuation of the long-term trends of similar injury incidence to the previous decade but steadily *increasing injury prevalence* were demonstrated.
- An entrenched feature of the cricket calendar is now greater variability in the type of cricket played and rapid transit back and forth between the various forms.
- Most injury categories have stayed relatively constant in prevalence (i.e. those which have increased in 2010–11 did so only marginally).
- The Australian team suffered ongoing high injury prevalence in 2010–11 of 15.5 per cent of players being injured, with the primary culprits being increasing absolute match schedule and workload, increasing workload variability (due to a rise in T20 cricket with no decline in Test cricket) and, to a lesser extent, a greater reliance on pace bowling (compared to spin bowling) in the Australian team. The first two factors (increased scheduling and variability) are now probably entrenched permanently and to combat will probably require paradigm shifts in rules of the game, player specialisation and player selection.
- The AMS (Athlete Management System) was used extensively by doctors and physios from all states again in season 2010–11, more so than in previous seasons.

Results

Injury exposure calculations

Since 1998–99 the Australian team has contracted 25 players annually prior to the start of any winter tours. The Australian squad for each subsequent season has been greater than 25 players, as it includes (from the date of their first match until the new round of contracts) any other player who tours with or

plays in the Australian team. State teams can contract up to 20 other players on regular contracts (outside their Australian contracted players) and up to 5 players on ‘rookie’ contracts. As with the Australian team, any other player who plays with the team in a major match during the season is designated as a squad member from that time on. To date, players who have been contracted to play Twenty–20 matches only for a state have been included as regular players according to the international definition.

Table 1 – Squad numbers per season

Squad	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Australia	30	28	31	28	30	31	28	40	40	40
New South Wales	35	31	28	27	37	40	35	38	38	38
Queensland	28	27	30	30	31	32	32	33	28	32
South Australia	27	32	22	30	26	27	30	29	28	31
Tasmania	28	26	24	22	27	32	29	27	28	30
Victoria	31	31	29	27	36	31	25	26	32	33
Western Australia	30	29	30	30	37	34	32	34	32	35

Table 2 – Team matches under survey from 2000–01 to 2009–10

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Champions League T20									11	9
Domestic First Class	62	62	62	62	62	62	62	62	62	62
Domestic One Day	62	62	62	62	62	62	62	62	62	62
Domestic T20					14	26	32	34	34	40
International T20				1	3	1	11	6	10	12
One Day International	22	39	25	26	35	36	20	23	39	29
Test match	14	12	11	14	17	5	6	15	13	9
All matches	160	175	160	165	193	192	193	202	231	223

Table 2 shows that the number of matches under survey reached its highest level in season 2009–10, with 2010–11 being the second highest season. The format of the Sheffield Shield since 1998–99 has consistently been that each of 6 teams plays 10 matches each, one home and one away against each of the other teams (60 team matches), followed by a final (2 team matches) at the end of the season. The matches are all scheduled for 4 days, with the final being scheduled for 5 days. The major change in Shield scheduling in recent seasons has been to compact the match schedule (particularly prior to Christmas) to allow for a discrete ‘window’ for the Big Bash tournament. The average number of days between Shield games has therefore decreased (see Table 15).

Since 2000–01, the domestic limited overs (one day) competition has followed the same home and away format as the Sheffield Shield (although it will reduce for season 2011–12). The domestic T20 competition (currently the KFC Big Bash) commenced in season 2005–06 as a limited round of matches but has been expanded in each subsequent season. Season 2009–10 included a further expansion to the calendar as Champions League Twenty–20 matches were played for two Australian state teams. As seen from Table 3, in limited overs matches, the number of team days is generally the same as the number of team matches scheduled, with the exception of washed out games which count as zero days of exposure.

Table 3 – Team days played under survey 2000–01 to 2009–10

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Champions League T20									11	9
Domestic T20					14	24	30	34	34	40
Domestic One Day	62	62	62	60	60	62	60	62	62	62
Domestic First Class	228	220	242	234	228	232	236	234	240	228
International T20				1	3	1	11	6	10	12
One Day International	21	39	25	24	35	36	20	23	39	27
Test match	61	51	50	58	78	22	28	72	58	41
Total	372	372	379	377	418	377	385	431	454	419

Table 4 – Overs bowled in matches each season

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	10 Year Average
Champions League T20									210	175	192
Domestic T20					241	470	570	659	615	730	547
Domestic One Day	2,835	2,697	2,883	2,729	2,751	2,877	2,606	2,751	2,846	2,546	2,752
Domestic First Class	9,833	9,224	10,311	9,871	9,645	9,967	9,713	9,974	9,745	9,297	9,758
International T20				20	58	20	171	121	152	224	110
One Day International	980	1,700	1,094	1,057	1,577	1,488	805	959	1,657	1,226	1,254
Test match	2,243	2,073	2,000	2,159	2,756	890	1,136	2,833	2,116	1,419	1,962
Total	15,891	15,694	16,288	15,835	17,027	15,711	15,001	17,299	17,341	15,617	16,170

As per the international definitions¹⁰⁻¹³, hours of player exposure in matches is calculated by multiplying the number of team days of exposure by 6.5 for the average number of players on the field and then multiplied by the number of designated hours in a day's play. However, as envisaged in last year's report and subsequent publication²¹, this report will use a new unit of match injuries (per 1,000 days of play, Table 3) which more fairly compares T20 cricket to other forms of the game. This is used as the denominator for Table 6 in the injury incidence section.

Table 4 shows that workload in terms of number of overs bowled has stayed fairly steady in first class domestic cricket over the past 10 years. The overall number of overs bowled reached an all-time high in season 2009–10, but fell back during 2010–11 as there were more shortened matches in the Domestic first class season and fewer Test matches. T20 cricket itself has not substantially increased overall bowling workload. However, two 'knock-on' effects of T20 cricket have probably been highly significant (but are somewhat hard to measure) – increased variability in workloads and increased compression of first class fixtures to accommodate the T20 calendar (Table 15).



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Table 5 – Player days of exposure available¹

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Champions League T20									361	234
Domestic T20					441	739	887	1,021	1,029	1,263
Domestic One Day	1,739	1,675	1,651	1,564	1,842	1,911	1,755	1,843	1,824	1,817
Domestic First Class	6,435	5,936	6,477	6,157	7,193	7,265	6,981	7,008	7,131	6,918
International T20				27	82	27	227	199	335	361
One Day International	608	1,061	685	640	960	1,056	536	743	1,302	984
Test match	1,707	1,352	1,374	1,562	2,095	572	736	2,169	1,933	1,419
Total	10,489	10,024	10,187	9,950	12,613	11,570	11,122	12,983	13,915	12,996

Player days per team per season are calculated by multiplying the size of the squads (for each match) by the number of days for matches (Table 5).

Injury incidence

Injury incidence results are detailed in Table 6–Table 10. Injury match incidence is calculated in Table 6 using the total number of injuries (both new and recurrent) as the numerator and the number of days of play (Table 3) as the denominator. Injury match incidence is probably a flawed way to examine injury risk, because the genesis of fast bowling injuries is often prior workload patterns²⁰. For example, in 2009–10, there were reportedly no bowling injuries from the Champions T20 League. However, the two teams involved (NSW and VIC), which needed to return to start first class cricket immediately, suffered a high prevalence of fast bowler injuries for the season, perhaps due to having the most compressed season(s) and unorthodox lead-in

(a T20 tournament rather than the traditional two and three day practice matches). In a similar fashion, the home summer ODI competition traditionally has the highest injury rate of the Australian calendar, yet we now understand that the reason for this is fatigue from the prior Test matches in the lead up to the ODI schedule. One day cricket played over an extended period (e.g. in World Cups) generally leads to fewer injuries than Test cricket.

Table 6 analyses match injury incidence by a new unit, injuries per 1,000 days of play. These units were not recommended by the international definitions, but enable a more direct comparison between T20 cricket and the other forms. From this, it can be seen that Domestic T20 matches have a similar bowling injury incidence than other forms of domestic cricket in terms of injuries per day of play as well as injuries per 1,000 overs bowled. The international and Champions League T20 figures follow a similar trend although are not yet as accurate due to the small sample size.

Table 6 – Injury match incidence (new and recurrent injuries/1,000 days of play)

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	10 year average
Champions League T20									0.0	222.2	100.0
Domestic T20					71.4	208.3	200.0	117.6	117.6	400.0	204.5
Domestic One Day	96.8	161.3	290.3	183.3	283.3	209.7	233.3	306.5	451.6	322.6	254.1
Domestic First Class	175.4	95.5	90.9	94.0	57.0	112.1	156.8	149.6	95.8	149.1	117.6
International T20 *				0.0	3,333.3	0.0	5,555.6	0.0	100.0	166.7	214.3
One Day International	142.9	359.0	160.0	291.7	85.7	222.2	200.0	173.9	256.4	370.4	231.8
Test match	114.8	58.8	240.0	34.5	89.7	90.9	142.9	83.3	51.7	122.0	98.3
All matches	150.5	129.0	147.8	111.4	100.5	143.2	182.8	157.8	152.0	207.6	148.7

* Sample size for International T20 each year is very small hence wildly varying results.

Table 7 – Bowling match incidence (new and recurrent match injuries/1,000 overs bowled)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	Average
Champions League T20									0.0	11.4	5.2
Domestic T20					0.0	2.1	1.8	3.0	0.0	6.9	2.7
Domestic One Day	1.1	1.9	2.1	1.5	1.1	1.4	2.7	3.6	3.9	4.3	2.3
Domestic First Class	1.5	1.5	0.9	1.0	0.2	1.1	2.2	2.3	1.2	2.3	1.4
International T20				0.0	0.0	0.0	5.8	0.0	6.6	4.5	3.9
One Day International	0.0	1.8	0.0	1.9	0.6	2.0	0.0	1.0	3.6	4.1	1.7
Test match	1.8	1.4	3.5	0.0	0.7	1.1	0.0	0.7	0.5	1.4	1.1
All matches	1.4	1.6	1.4	1.0	0.5	1.3	2.0	2.2	1.8	2.9	1.6

Table 8 – Injury seasonal incidence by team (injuries/team/season)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	10 year average
Australia	15.5	29.3	14.0	14.8	16.2	26.2	25.0	14.9	13.4	21.7	18.8
New South Wales	18.5	10.2	18.8	5.8	8.9	15.0	9.2	20.8	19.3	22.7	14.9
Queensland	25.3	15.7	20.4	17.9	15.0	20.6	36.3	19.1	8.6	26.3	20.5
South Australia	17.6	19.0	18.8	9.7	17.3	12.7	17.5	17.4	20.3	20.7	17.1
Tasmania	16.9	20.5	13.2	19.7	21.7	14.8	11.6	11.8	16.9	12.0	15.9
Victoria	20.5	21.1	17.7	13.4	15.9	20.4	29.0	20.5	17.8	15.4	19.2
Western Australia	16.6	21.0	14.2	23.6	11.9	12.4	16.3	17.0	6.6	23.1	16.3
All teams	18.3	19.8	16.4	15.0	15.1	17.4	20.2	17.3	14.8	20.4	17.5

Table 9 – Injury seasonal recurrence rates (recurrent injuries/all injuries)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	Average
Recurrence rates	8.5%	7.3%	10.0%	3.0%	7.1%	8.9%	17.3%	15.8%	7.6%	12.4%	9.0%



Seasonal incidence (Table 8 and Table 10) is calculated by the number of injuries multiplied by 1,500 (for a squad of 25 players over 60 days), divided by the number of player days of exposure (Table 5). This has reached a new peak in 2010-11 but, unlike prevalence, this may reflect year to year bounce as there is not a gradual upward trend over seasons.

Table 9 reveals that the injury recurrence rates stabilised in 2009-10 after increasing over the prior two seasons.

Table 10 reveals that seasonal incidence by body part has generally been consistent over the past eight seasons. Some injury categories have fallen slightly in incidence in recent seasons including shoulder tendon injuries and wrist and hand fractures although most categories have stayed fairly constant.



Table 10 – Injury seasonal incidence by body area and injury type

Injury type	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Fractured facial bones	0.3	0.0	0.1	0.2	0.2	0.1	0.1	0.3	0.1	0.1
Other head and facial injuries	1.0	0.2	0.1	0.2	0.1	0.3	0.1	0.1	0.0	0.1
Neck injuries	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.1
Shoulder tendon injuries	0.9	1.1	0.0	0.2	0.9	0.6	0.5	0.2	0.3	0.3
Other shoulder injuries	0.7	0.3	0.4	0.9	0.8	0.5	1.5	0.3	0.3	0.3
Arm/forearm fractures	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Other elbow/arm injuries	0.0	1.1	0.1	0.2	0.6	0.3	0.9	0.3	0.2	0.7
Wrist and hand fractures	1.7	1.1	1.0	1.2	0.8	0.5	1.3	0.9	1.3	2.5
Other wrist/hand injuries	0.1	0.6	0.7	1.2	0.4	0.5	0.4	0.9	0.6	1.3
Side and abdominal strains	1.8	0.5	1.1	1.4	0.6	1.7	1.7	1.4	1.8	1.2
Other trunk injuries	0.4	0.2	0.4	0.0	0.6	0.6	0.1	0.1	0.3	0.3
Lumbar stress fractures	0.7	1.4	0.8	0.2	0.4	1.0	0.3	0.6	0.6	1.2
Other lumbar injuries	0.9	2.1	1.8	1.1	1.7	1.0	1.6	1.2	1.1	1.7
Groin and hip injuries	0.9	3.2	1.4	0.8	1.2	1.6	1.1	0.9	0.6	1.6
Thigh and hamstring strains	2.6	1.9	2.9	2.6	1.3	2.1	4.4	4.8	2.9	2.5
Buttock and other thigh injuries	0.1	0.2	0.7	0.0	0.0	0.8	0.5	0.4	0.4	0.5
Knee cartilage injuries	1.4	0.6	0.4	0.9	1.8	0.9	0.7	0.4	1.2	0.8
Other knee injuries	0.6	0.5	0.3	0.0	0.6	0.4	0.3	0.3	0.5	0.2
Shin and foot stress fractures	0.3	0.8	0.3	0.6	0.1	0.5	0.5	0.9	0.1	0.6
Ankle and foot sprains	1.1	1.0	1.6	0.8	0.5	1.0	1.2	1.1	0.4	1.2
Other shin, foot and ankle injuries	2.0	1.8	1.6	1.8	0.6	1.4	1.3	1.2	0.9	2.4
Heat-related illness	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical illness	0.9	1.1	0.5	1.1	1.5	1.2	1.3	0.3	0.2	0.7
Total	18.3	19.8	16.4	15.0	15.1	17.4	20.2	16.8	14.1	20.4



Injury prevalence

Injury prevalence rates follow a similar pattern to injury incidence, but although incidence has stayed constant over the past few seasons, prevalence has gradually increased. The disparity between the two can be partially attributed to the increased number of matches, with the 'average' injury artificially becoming more severe over recent years because there are more matches to miss (injury prevalence = injury incidence x average injury severity). Injury prevalence rates (Table 11–Table 13) in season 2009–10 were slightly higher

than the long-term average, which is an expected outcome given the steadily increasing amount of match exposure at domestic level. The Australian team had a prevalence rate that was higher in 2010–11 than in any previous seasons.

Pace bowlers remain the position most susceptible to missing time through injury (Table 12). In season 2009–10, 24 per cent of fast bowlers were missing (on average) through injury at any given time. It continues to be a priority to further research possible risk factors for pace bowlers in order to control their injury rates.

Table 11 – Comparison of injury prevalence between teams

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	Average
Australia	6.7%	8.1%	11.8%	5.6%	7.7%	10.0%	11.0%	15.8%	15.5%	18.2%	11.0%
New South Wales	5.4%	6.7%	15.1%	3.1%	5.7%	5.8%	6.4%	8.1%	17.7%	20.3%	9.4%
Queensland	16.6%	8.8%	14.5%	15.1%	7.3%	12.3%	18.5%	12.0%	8.8%	19.9%	13.4%
South Australia	14.5%	9.4%	10.1%	2.1%	9.0%	7.9%	4.9%	9.2%	15.6%	11.0%	9.4%
Tasmania	8.8%	8.7%	3.3%	12.1%	21.7%	9.4%	9.5%	9.6%	10.8%	8.9%	10.3%
Victoria	12.6%	9.9%	13.7%	7.5%	11.7%	18.1%	19.6%	9.9%	12.7%	11.6%	12.7%
Western Australia	6.9%	10.5%	9.1%	11.9%	9.2%	9.6%	11.1%	8.7%	3.3%	18.8%	9.9%
Average	9.7%	8.7%	11.4%	8.1%	9.7%	10.3%	11.4%	11.1%	12.8%	15.9%	10.9%

Table 12 – Injury prevalence by player position

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11	Average
Batsman	4.7%	3.9%	6.7%	9.8%	6.3%	5.5%	7.7%	6.6%	6.8%	10.2%	6.9%
Keeper	0.6%	0.8%	3.9%	3.2%	2.9%	0.5%	1.7%	3.0%	8.6%	8.2%	3.6%
Pace Bowler	19.4%	16.5%	18.2%	9.3%	14.4%	18.6%	19.1%	17.9%	21.5%	24.9%	18.2%
Spinner	1.1%	3.6%	7.1%	4.2%	8.8%	4.1%	10.7%	5.3%	4.6%	10.8%	5.9%

Table 13 – Comparison of injury prevalence by body area

Body region	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Fractured facial bones	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.2%	0.1%	0.0%
Other head and facial injuries	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Neck injuries	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Shoulder tendon injuries	1.4%	0.6%	0.1%	0.1%	0.8%	0.7%	0.4%	0.5%	0.5%	0.0%
Other shoulder injuries	0.6%	0.1%	0.5%	0.8%	1.0%	0.5%	1.1%	0.2%	0.3%	0.5%
Arm/forearm fractures	0.0%	0.0%	0.0%	0.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Other elbow/arm injuries	0.0%	0.5%	0.0%	0.1%	0.2%	0.0%	0.4%	0.6%	0.7%	0.6%
Wrist and hand fractures	0.9%	0.6%	0.8%	0.7%	0.6%	0.2%	0.5%	0.2%	0.8%	1.4%
Other wrist/hand injuries	0.0%	0.2%	0.1%	0.7%	0.1%	0.1%	0.6%	0.1%	0.3%	0.5%
Side and abdominal strains	0.7%	0.1%	0.7%	0.8%	0.3%	0.6%	0.8%	0.8%	0.9%	1.3%
Other trunk injuries	0.1%	0.0%	0.1%	0.0%	0.3%	0.1%	0.0%	0.0%	0.9%	0.1%
Lumbar stress fractures	1.1%	1.8%	2.1%	0.2%	0.9%	1.6%	0.8%	0.8%	1.8%	2.7%
Other lumbar injuries	0.3%	0.6%	0.8%	1.0%	1.1%	0.6%	0.5%	1.3%	1.0%	1.2%
Groin and hip injuries	0.8%	0.7%	0.8%	0.3%	0.6%	1.0%	0.7%	0.4%	0.3%	1.2%
Thigh and hamstring strains	0.7%	0.8%	0.7%	0.7%	0.3%	1.1%	1.6%	1.8%	1.5%	1.1%
Buttock and other thigh injuries	0.0%	0.0%	0.4%	0.0%	0.0%	0.8%	0.1%	0.4%	0.1%	0.1%
Knee cartilage injuries	1.2%	1.1%	0.5%	0.5%	1.7%	1.0%	0.6%	0.3%	1.3%	1.5%
Other knee injuries	0.1%	0.1%	0.2%	0.0%	0.6%	0.3%	0.4%	0.5%	1.5%	0.4%
Shin and foot stress fractures	0.2%	0.5%	0.0%	0.5%	0.2%	0.4%	0.4%	1.0%	0.2%	1.0%
Ankle and foot sprains	0.5%	0.3%	1.5%	0.2%	0.5%	0.6%	1.6%	0.5%	0.3%	0.7%
Other shin, foot and ankle injuries	0.8%	0.5%	1.4%	0.6%	0.2%	0.4%	0.5%	0.8%	0.3%	1.3%
Heat-related illness	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Medical illness	0.2%	0.2%	0.5%	0.6%	0.3%	0.2%	0.3%	0.1%	0.2%	0.3%
Total	9.7%	8.7%	11.4%	8.1%	9.7%	10.3%	11.4%	10.4%	12.8%	15.9%

Changes to demographics and season schedule over time

Table 15 attempts to illustrate one of the major scheduling effects of the development of the T20 competition and its effects on first class cricket. This table uses NSW as an example, but is almost certainly representative of all major

Australian cricket teams. It shows that the median number of days between Shield games has dropped from a high of 16 days between games in 1999–2000 to 6.5 days between games in 2010–11. Median was chosen rather than mean because there is a very high number of days break between the Shield games either side of the window for the Big Bash.

Table 14 – Compaction of NSW Shield games by season

Season	96–97	97–98	98–99	99–00	00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11
Median days b/w Shield games	10	15	11	16	10	10	7	10	8.5	8	8.5	9	10	8	6.5
No of games with <10 day break	4	4	4	3	3	3	6	4	5	6	5	5	4	5	8



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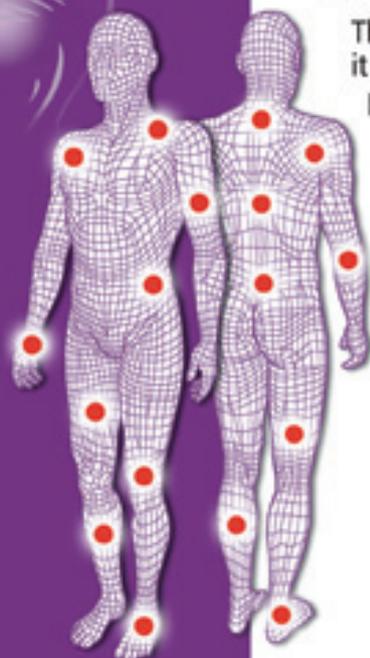
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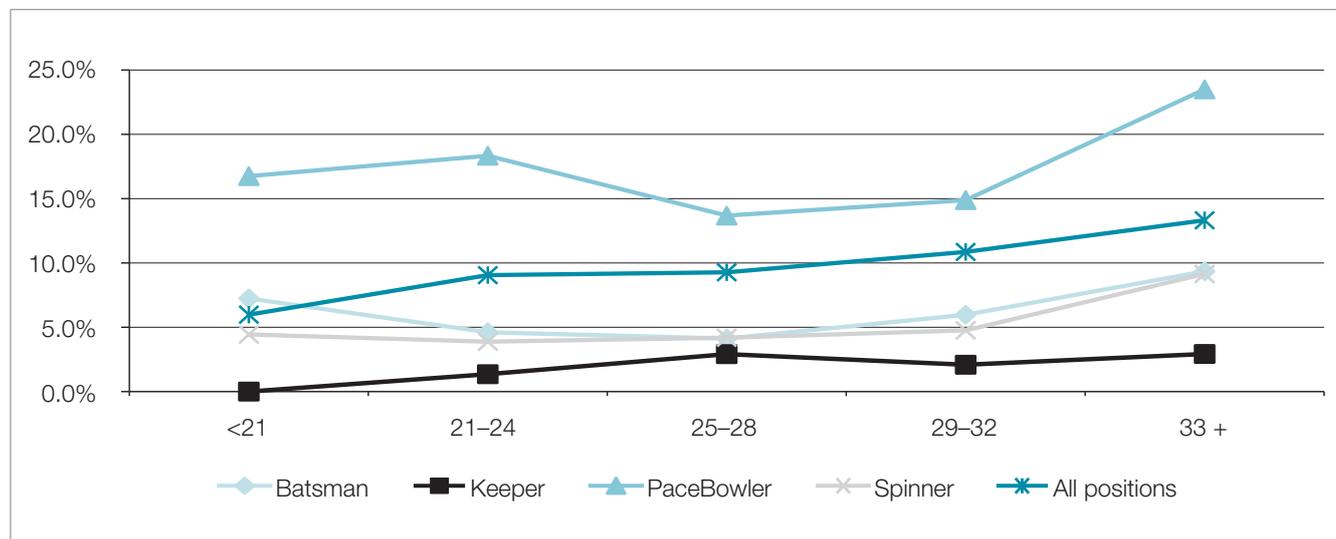


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Figure 1 – Injury prevalence by position by age in first class cricketers



Fast bowler injury prevalence is high, particularly early in their careers (due to stress fractures, Figure 1) and late in their careers (due to degenerative changes, Figure 1). The NSW squad in recent years, used again as an example in Table 16 (although perhaps an exaggerated one) has a mix of young and ageing bowlers, with few in the middle ground of late 20s which is the time when bowlers are least injury prone. As can

be seen from Table 15 in the decade from 95–96 to 04–05 there were no matches played by fast bowlers under 21 in the NSW fixtures.

From Table 16 and Figure 1 it can be seen that the demographic changes to the NSW squad, for example, have probably contributed to the NSW team having higher injury prevalence than the historical levels (Table 12).

Table 15 – Matches played by NSW pace bowlers by season (comparison of age brackets)

Age	95–96	96–97	97–98	98–99	99–00	00–01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11
<21											5	8	9	1	18	22
21–24	20	18	28	29	30	32	40	39	2	5	34	29	5	30	34	36
25–28	27	27	36	36	27	43	38	41	56	43	21	46	27	42	26	22
29–32	15	18	5	5	2	6	14	14	20	38	28	33	61	48	38	19
33+				6	3				1	1	3		17		17	30
Total	62	63	69	76	62	81	92	94	79	87	91	116	119	121	133	129

Proportion of games affected by injury to one or both teams

Table 16 – Percentage of teams in first class games suffering an injury over the past 13 seasons

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Matches with an injury	35	22	26	19	18	21	27	30	23	31
Matches with no injury	41	52	47	57	61	46	41	47	52	40
Percentage of games affected by injury	46.1%	29.7%	35.6%	25.0%	22.8%	31.3%	39.7%	39.0%	30.7%	43.7%

To give further evidence to the point of view that will shortly be argued regarding the necessity of substitutes in cricket, Table 17 reveals that a high percentage of matches in the past decade, but particularly in 2010–11, have been affected

by injury. The traditional viewpoint that substitutes are not necessary in cricket because the game has a low injury rate can be discounted, as 44 per cent of games in 2010–11 were affected by injury to one or both teams.

Analysis of specific injuries

Lumbar stress fractures

Table 17 – Key indicators for lumbar stress fractures in the last 10 seasons

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Number reported	5	9	6	1	3	8	2	5	4	10
Incidence	0.7	1.4	0.8	0.2	0.4	1.0	0.3	0.6	0.6	1.2
Prevalence	1.1%	1.8%	2.1%	0.2%	0.9%	1.6%	0.8%	0.8%	1.8%	2.7%

Lumbar stress fractures are generally gradual onset injuries, most often occurring to the pars interarticularis part of the L4 and L5 vertebra and on the non-bowling side. They are also more common in younger bowlers and are prone to recurrence. These injuries extract the greatest toll on cricketers in terms of missed playing time per injury. Whereas cricket fast bowlers have perhaps the highest incidence of lumbar stress fracture of any type of athlete, the rate of these injuries in non-bowlers (batsmen and wicket-keepers) appears to be no higher than in the general population.

Studies have previously associated a 'mixed' action with the development of lumbar spine injuries, particularly stress fractures^{22–24}. There is still no published data to show that coaching intervention can prospectively lower the lumbar stress fracture risk for a player, although it is assumed that this is the case.

Many more contracted fast bowlers in Australian cricket have suffered lumbar stress fractures as juniors prior to joining the first class pool of players. There appears to be neither a long-term reduction nor increase in the incidence over the last decade at first class level, although junior figures are unknown. It is presumed that biomechanical intervention has been helpful for fast bowlers but has not been able to eliminate lumbar stress fractures. Although not measured specifically by this survey, the biggest contribution of modern medical management has been that very few Australian bowlers are forced into retirement due to chronic back injuries. This was not the case in the past and is still not the case today in parts of the world (e.g. Indian subcontinent). Because stress fractures lead to a long layoff period for fast bowlers, further study is required to determine whether more aggressive management could still deliver the good long-term results we currently achieve.

Side strains

Table 18 – Key indicators for side strains in the last 10 seasons

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Number reported	13	3	8	9	5	13	13	13	16	10
Incidence	1.8	0.5	1.1	1.4	0.6	1.7	1.7	1.4	1.8	1.2
Prevalence	0.7%	0.1%	0.7%	0.8%	0.3%	0.6%	0.8%	0.8%	0.9%	1.3%

Side strains are a classic cricket fast bowling injury. 'Side strains' appear to be a unique type of muscle strain²⁵²⁶. They are only reported in cricket bowlers and javelin throwers, who use a somewhat similar technique. Side strains also affect the non-bowling side of the body and

are generally acute onset injuries. They may have a related entity ('side impingement') that is distinct and which has a more insidious onset. Side strains are more common early in the season (pre-Christmas) and are somewhat less prone to recurrence than other injuries. By legend, they have been

seen as a 'rite of passage' injury, in that a genuinely fast bowler should suffer one side strain in his career. However, they can be recurrent and occasional side strains lead

to chronic pain (where they are sometimes, with the use of nuclear medicine, re-diagnosed as stress fractures of the ribs).

Thigh and hamstring strains

Table 19 – Key indicators for thigh and hamstring strains in the last 10 seasons

	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	2008–09	2009–10	2010–11
Number reported	18	12	21	17	11	16	33	43	25	12
Incidence	2.6	1.9	2.9	2.6	1.3	2.1	4.4	4.8	2.9	2.5
Prevalence	0.7%	0.8%	0.7%	0.7%	0.3%	1.1%	1.6%	1.8%	1.5%	1.1%

Hamstring, quadriceps, calf and adductor strains all affect cricketers, as they do many other types of running athletes. According to the international survey definitions, hamstring strains are grouped with quadriceps strains to form a category of 'thigh and hamstring strains', of which the majority are hamstring strains. Again it is bowlers who are most prone to injury, but occasionally they occur in batsmen either whilst running between the wickets or fielding. All muscle strains can affect both sides of the body, but the mechanics of bowling leads to a predisposition for muscles strains to affect a particular side, in bowling. In the non-bowling side, shortly before delivery the leg undergoes acceleration, whereas the bowling leg undergoes deceleration. Hence hamstring injuries are more likely on the non-bowling side, whereas quadriceps injuries are more likely on the bowling side. Recent research has found that a past history of lumbar spine stress fracture is a risk for lower limb muscle strains, particularly calf strains, in fast bowlers²⁷.

Medical illness

Because cricket is often played in hot weather conditions it might be expected that dehydration was a common condition. This would be particularly expected in cricket played in Asian countries where not only are heat and humidity extreme, but gastrointestinal illness is also common and could be a contributory factor towards dehydration. Cricket is also in the minority of sports which do not readily allow for substitution due to injury or illness (with the exception of fielding). Despite these theoretical concerns, in practice it appears that most dehydration is mild to moderate and is successfully treated by oral rehydration. In competitive cricket and/or in very hot conditions, it is sensible preparation to have

intravenous rehydration facilities available nearby, should they be medically indicated (in line with WADA/ICC guidelines).

In terms of specific rates of heat illness in elite cricket, almost no cases reach the threshold of forcing a player to miss a game or be unable to bat or bowl due to the condition.

Recommendations

- **Traditional workload preparation for fast bowlers to play first class cricket needs to be preserved as much as possible.**
- **More radical solutions to counter the effects of the modern schedule should be contemplated.**

Factors which would have been considered 'radical' in the past but which can be placed on the table for debate include: (1) allowing medical staff to be involved in team selection, to the extent of advising on rotation or that a minimum number of bowlers be selected; (2) formally encouraging more bowler-friendly pitches for Australian matches to minimise the likelihood of long stints of bowling on 'dead' tracks; (3) investigating whether fielding rotation policies could decrease the overall workload of fast bowlers on days in the field.

- **Further research is required to determine other risk factors for injury such as increased (or decreased) gym training or running and workload restrictions of teenage fast bowlers, to determine whether they are contributory factors to the increase in injury prevalence now being observed.**
- **Substitute player(s) should be allowed in first class cricket.**

Arguments for this include:

*** The high rate of injury in first class games**

In > 30 per cent of first class games a team will have at least one player suffer an injury that either prevents continued participation in the game or causes him to miss the following game.

*** Increasing fast bowler injury prevalence**

Fast bowlers are clearly not coping with the new make-up of the cricket calendar, which is here to stay given the eight year forward planning of the Future Tours Program and the popularity of the T20 tournaments.

*** Risk of injuries worsening if players push through pain**

Serious injuries do occasionally occur in cricket and the expectation that a player should always push through pain for the benefit of the team could in rare cases be catastrophic.

*** Risk of players being lost to Test cricket as T20 is a full-time career option**

Because of the lucrative contracts being offered by T20 franchises, it is an increasing option for players to 'retire' from first class cricket to become T20 specialists. If the rules of first class cricket remain as arduous as they currently are, T20 cricket will be seen by more players as 'money for jam' and the talent pool for Test cricket will diminish (along with perhaps the popularity of this form of the game).

*** Benefits for amateur cricket – 12th man can become more involved**

Allowing the 12th man, plus perhaps other substitutes, to be fully involved in the game as specialist players would encourage more amateur players to enjoy cricket. No other team sport in the world makes a player suffer the indignity of being a substitute with no prospect for meaningful participation in the game.

*** Redress balance of first class game in favour of bowlers**

The changes to modern first class cricket have been criticised for swinging the balance of the game too far in favour of batsmen, such as improvements in protective equipment and bat size, covering of wickets and shortening of the boundary dimensions. Fast bowlers suffer far too high an injury burden in cricket and rule changes should occasionally also favour the bowlers and swing the balance back into a fairer contest between bat and ball.

*** Give Australia a competitive advantage**

Other than by lobbying the ICC, Australia does not have the option to change the rules of Test cricket. We do have the

option to change the rules for the Sheffield Shield. The major argument against doing this is that Sheffield Shield cricket would not replicate Test cricket as much with a substitute player. A major argument in favour is that if Australian cricket unilaterally introduces a substitute rule, it is highly likely that there would be a favourable impact on injuries to the pool of Australian fast bowlers. If there are fewer injuries in our squad bowlers, we have greater choice in selection for the national team, which would help provide a competitive advantage.

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References, as indicated within the article, are available at sma.org.au/publications/sport-health/

Back pain: the important and the new



Sports and interventional pain physician, Dr Bruce Mitchell discusses the important and novel aspects in back pain.

It was at a past World congress on low back and pelvic pain where I first heard the term: 'Lumpers and Splitters'. Let me declare I am an ultra-Splitter. The Lumpers are those that put all low back and pelvic pain as one homogenous group. They claim all of the data shows that nothing works on this homogenous group (except in some exceptions; their chronic pain clinic). They can back their arguments with a couple of meta-analyses, stating that if you apply these interventions to an undifferentiated group of low back pain (LBP) patients, nothing beats a placebo. The moral of this story is: don't believe meta-analyses!

“In the absence of red flags, imaging and investigation in the non-athletic population with lumbar somatic pain are not necessary and can be counterproductive...”

I usually start off talks on pain with a picture of an asylum from the mid-late 19th century. Once through those doors, you rarely came out. Various global terms were used to label the 'unfortunates' that went through those doors, but they included schizophrenics, obsessive-compulsives, those suffering mania and depression, the deaf, the dumb and 'social misfits'. Some of the greatest minds of their time teased out different diagnoses amongst these 'unfortunates' and developed treatments for the individual groups, some of which last to this day (in some form), others of which

have been replaced with better and more humane methods. They still cannot cure or control all of the mental illnesses, but I would guess the current psychiatric/psychological community make a significant difference to 98 per cent of people. I think it's safe to say those original psychiatrists would have considered themselves 'Splitters'. Also, safe to say, that the current debates in pain, especially LBP, reminds me of those asylums from the 19th century; contrasting those trying to put people in there, with those trying to get people out.

In this article I will talk about pain, the different types of pain, how they are diagnosed and treated, and the relevance of imaging.

Pain

There are four types of body pain:

1. Visceral pain
2. Radicular pain
3. Neuropathic pain
4. Somatic pain

Some would correctly argue that radicular pain is a sub-type of neuropathic pain. However, the presentations, natural history and treatments of each are sufficiently different to justify their separation. Visceral pain (from the internal organs) is beyond the scope of this article and will not be discussed further. Radicular, neuropathic and somatic pains are diagnosed by the quality of the sensation, not by examination or by imaging (1; 2).

Radicular pain

This pain is due to irritation of a spinal nerve root or Dorsal root ganglia. It is believed this irritation is more chemical than mechanical. The most common cause is an acute disc prolapse, protrusion, or tear of the annulus, with leakage of the nucleus material into the epidural space. Radicular pain is a narrow band which shoots from the trunk into the limb. In the case of lumbar radicular pain, the sensation will usually start in the buttock. It is a continuous, narrow, non-dermatomal line from its start to its finish and is described as a knife like, 'lightening' pain, or an electric shock.

People often, mistakenly, use the term radiculopathy interchangeably with radicular pain. Radiculopathy is the finding, on examination, of neurological signs consistent with compromise or damage to a spinal nerve root, such as a lost reflex, or weakness of extensor hallucis longus (L5). While they may co-exist, they are separate conditions. True radicular pain is usually associated with a very positive straight leg raise (zero to ten degrees) and a positive cross-over sign (lifting the unaffected leg reproduces the pain).

“People often, mistakenly, use the term radiculopathy interchangeably with radicular pain.”

Radicular pain is a self-limiting condition and will usually resolve within three to twelve months. However, the pain is usually so awful that people cannot wait out its natural course. Caudal or trans-foraminal epidural steroid injections (not inter-laminar) treat this condition very well and can control the pain until it resolves. Surgery also works very well for this condition, whether it is nucleoplasty, micro-discectomy, laminectomy or fusion (if the segment is unstable).

Neuropathic pain

Neuropathic pain is due to nerve damage or central sensitisation. The nerve damage is rarely overt. Neuropathic pain is described as a burning, tingling or buzzing sensation. There may also be localised electric shocks in the area.

The neuropathic pain may be associated with areas of allodynia or hyperalgesia, but these are not necessary to make the diagnosis. The diagnosis is based on the quality of the pain being as described above. Freynhagen found that in 8,000 people with LBP, 37 per cent had predominantly neuropathic pain (3). These people do NOT cope well with hands-on therapy, which will often flare their pain for several days.

“...in 8,000 people with low back pain, 37 per cent had predominantly neuropathic pain...”

Treatment of neuropathic pain is with medication; initially one of the tri-cyclic anti-depressants (TCADs). The most common one used is amitriptyline, although some practitioners prefer nortriptyline. If using amitriptyline, it is essential to start with very small doses in the chronic pain patient. The author will often start at 2.5mg at night in women less than 50kg. If the TCADs do not work, then anti-epileptic medication is the next step, often gabapentin or pre-gabalin. Occasionally the older (and cheaper) anti-epileptics are adequate. There is reasonable data supporting tegretol in trigeminal neuralgia.

It is not unreasonable, and there is some evidence supporting a series of epidurals in someone with neuropathic back or leg pain with evidence of a compromised nerve root on examination or imaging. If short term relief is obtained, then a surgical opinion is warranted. If none of the above options are adequately controlling the neuropathic pain, then a Ketamine infusion or Neuromodulation should be considered.

“While they may co-exist, they are separate conditions.”

Central sensitisation

This occurs at three different levels:

1. Primary Afferent Neuron (PAN)
2. Spinal cord level
3. Brain stem

The Primary Afferent Neuron (PAN) is a secretory organ with naked receptors on its tip. Baseline secretion of neuropeptides from the PAN cause low-grade vasodilation and chemotaxis. Absence of these secretions causes loss of tissue turgor, dry tissues, thinning dry skin and loss of hair. A PAN's naked receptors are activated by stretch, chemical irritation and thermal irritation. All of these cause vasodilation, stretching the PAN, activating its mechanoreceptors as well as creating a feed forward loop. Once activated, the PAN sets off a neurogenic inflammatory cycle. After 2–3 hours of stimulation, gene transcription occurs, which increases the sensitivity of the PAN. There may be permanent changes in the dorsal root ganglion (DRG) once gene transcription occurs (the concept of preventative analgesia comes from this). Once these changes occur, there is lowering of the activation threshold in the PAN and then development of hyperalgesia and allodynia in the PAN's receptive field.

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At the spinal cord level, central sensitisation occurs via three mechanisms:

1. Transcription independent (secondary messenger cascades from the PAN). Each PAN inserts over several different spinal levels, hence once the sensitisation occurs here, the area concerned grows rapidly.
2. Transcription dependent (gene upregulation within the DRG).
3. Death of the inhibitory interneuron (permanent). The PAN and the wide dynamic range (WDR) neuron compete at the DRG. The gate theory is alive and well here. The WDR activates the inhibitory interneuron to suppress input from the PAN, the PAN inhibits this interneuron. When over stimulated, the inhibitory interneuron dies, allowing unfettered access for the PAN to the DRG.

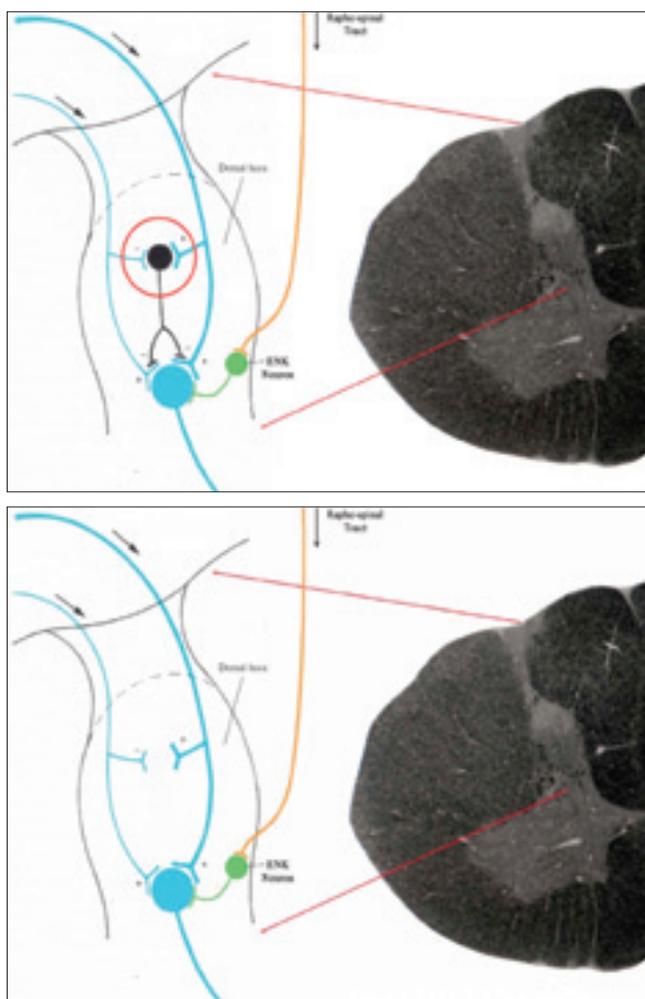


Figure 1: Death of the inhibitory interneuron (diagram courtesy of Dr Frank Wellard).

Pain is perceived in the brain, with different parts of the brain responsible for the pain experience:

- The somatosensory cortex discriminates pain, where it is and what it is.
- The insular cortex organises the response to pain.
- The cingulate gives an affective response.
- The amygdala causes fear, based on past responses.
- The prefrontal cortex, based on past experience, says this not a good idea, it is a cognitive response.

There are strong connections between the amygdala and prefrontal cortex, with the prefrontal cortex being good at suppressing the amygdala. Inadequate control here leads to irrational fears. But the body needs to be able to have an emergency response, such as when you wake up on the wrong side of the road with a truck coming at you: you need to react. In this situation, the brain stem activates and floods noradrenaline (NADR) throughout the brain, causing an activation of the autonomic nervous system and an increased release of cortisol. This flooding of the brain with NADR shuts down the prefrontal cortex. It is a very rapid feed forward mechanism designed so that the organism doesn't think, it reacts.

“The concept... that someone can drive a car into a tree at 100KPH, or fall ten metres onto concrete, and suffer one injury, which should be resolved after six weeks, is blatantly ridiculous.”

Chronic pain can sensitise this system both in the brain stem and amygdala, causing a chronically hyper-aroused system. The effect on the patient is they can't concentrate, they feel emotional, they can't focus and they make 'gut' reactions to situations. Sound like any of your patients?

Somatic pain and somatic referred pain

Somatic pain is generated from a somatic structure (joint, muscle, tendon, disc). It is described as a deep, dull ache, pressure or a sharp pain. It is deep and hard to localise. It can jump from area to area, but tends to be a constant pain. If the pain is severe, it is not uncommon for the pain to spread down the leg. Indeed most people presenting with LBP and leg pain will have somatic referred pain, NOT radicular pain.

“It was at a past World congress on low back and pelvic pain where I first heard the term: ‘Lumpers and Splitters’.”

