NEW ZEALAND
Journal of Sports Medicine
Vol 41 • No 1 • 2014
Official Journal of Sports Medicine New Zealand Inc.

CONTENTS

PUBLISHER
SPORTS MEDICINE NEW ZEALAND
PO Box 6398, Dunedin
NEW ZEALAND
Tel: +64-3-477-7887
Fax: +64-3-477-7882
Email: smnznat@xtra.co.nz
Web: www.sportsmedicine.co.nz

ISSN 0110-6384 (Print)
ISSN 1175-6063 (On-Line)

EDITOR
Dr Bruce Hamilton

ASSOCIATE EDITOR
Dr Chris Whatman

CONTRIBUTORS

David Gerrard

David Gerrard is a sports physician and Professor of Sports Medicine at the Dunedin School of Medicine, University of Otago. He is a former Olympic team physician, a New Zealand Chef de Mission, an Olympic swimmer and a Commonwealth Games gold medallist. He is currently Chair of the WADA TUE Expert Group, Vice-Chair of the FINA Sports Medicine Committee, Chair of the NZ Drowning Prevention Council and former Chair of Drug-Free Sport NZ.

Lynley Anderson

Lynley Anderson is a senior lecturer at the Bioethics Centre, University of Otago. She teaches ethics and professional issues to medical, physiotherapy, and other health professional students as well as post-graduate students at the University of Otago. As a result of her PhD research, Lynley was invited to write the Australasian College of Sports Physician's Code of Ethics. Since then she has written the NZ Physiotherapy Code of Ethics, and the NZ Sports Physiotherapy Code of Conduct.

Peter Burt

Peter Burt is a graduate of the University of Otago in physical education (in kinesiology) and medicine. He worked for several years in general practice and with sports teams including Hawkes Bay rugby and basketball, and various other teams including the Tall Blacks, NZ Maori rugby, NZ Bike, and Commonwealth and Olympic teams in 2006 and 2008. Peter is currently working in the Department of Sport and Exercise Medicine as a researcher in general practice and is studying towards a PhD examining sites of potential vulnerability to professional integrity in sports medicine.

Angela Cadogan

Angela Cadogan is a registered physiotherapy specialist (musculoskeletal) based in Christchurch. Angela has a PhD in musculoskeletal diagnostics (shoulder pain) and works in private practice focusing on the diagnosis and management of shoulder disorders and athletic back and groin pain. Angela was the physiotherapist for the NZ White Ferns women's cricket team for eight years, and continues to work on a consulting basis for NZ Cricket.

Michael Borich

Michael Borich is Vice President and Secretary of Sports Physiotherapy New Zealand and is the current NZ representative to the International Federation of Sports Physical Therapy. He has 34 years physiotherapy experience in private practice along with sports physiotherapy involvement (principally in the sport of rugby) both within NZ and overseas.

Anthony Schneiders

Anthony (Tony) Schneiders is Professor and Discipline Lead-Physiotherapy at Central Queensland University, Australia. He is an executive member of the International Federation of Sports Physical Therapy, Associate Editor (Australasia) for the journal Physical Therapy in Sport and has taught Sports Physiotherapy at postgraduate level since 1999.

Greg Usherwood

Greg Usherwood is a physiotherapist at the School of Physiotherapy, University of Otago. He maintains a clinical caseload, as well as working as a clinical educator for both under-graduate and post-graduate students. He has a master's degree in manipulative physiotherapy. His interests lie in sports physiotherapy and has worked with a variety of different sports and teams ranging from amateur to professional sport.

Steve Williams

Steve Williams is a general practitioner based at the Musselburgh Medical Centre in Dunedin. He has been team doctor for a number of Otago and New Zealand sport teams and is the current team doctor for the Otago Volts cricket team.

Megan Munro

Megan Munro, originally from Scotland, is very passionate about and has great experience in para-sport. She worked as a physiotherapist for the British Military for a number of years, was physiotherapist at the London 2012 Olympic and Paralympic Games and was appointed Lead Physio with Paralympics New Zealand Swimming in August 2013. She has an MSc in Sports and Exercise Medicine where she wrote her thesis in amputee rehabilitation in a military setting. Megan's experience within elite para-sport is a great advantage to New Zealand as she understands athlete's needs and what it takes to succeed.

Justin Ralph

Justin is a physiotherapist at Sports Med Physiotherapy in Hamilton. He has completed his postgraduate diploma in musculoskeletal physiotherapy at AUT and is the lead physiotherapist for the NZ Paralympic Bike Team.

Jake Pearson

Jake Pearson is a sports physician based at Capital Sports Medicine in Wellington and in his training spent time at both UniSports in Auckland and the AIS in Canberra. He is the Medical Director for Paralympics NZ, doctor for the Wellington Phoenix Football Club and Medical Lead for the annual Wellington Rugby Sevens tournament.

Ginny Rutledge

Ginny Rutledge is prinicipal physiotherapist at Wanaka Physiotherapy. She is a provider for High Performance Sport NZ and is Physio/ Medical Coordinator to the NZ Winter Performance Programme. She was lead physiotherapist to the Salt Lake 2002, Torino 2006, Vancouver 2010 and Sochi 2014 Winter Olympics. Her special interests involve minimising injury risk in winter sport athletes who participate in Alpine Ski Racing, Free Ski and Snowboarding.

Tony Page

Tony Page, based at SportsMed in Christchurch, has just recently returned to NZ following three years at the world renowned Olympic Park Sports Medicine Centre in Melbourne. Shortly after returning to NZ he was appointed All Blacks team doctor. Tony has a specific interest in stem cell and autologous injection therapies, diagnostic ultrasound for guided injections, acute football trauma and medical aspects of endurance exercise. He has worked with many major sports teams including the Crusaders, Canterbury RFC and Collingwood Australian Rules FC.

Judith May

Judith May is a sports physician who is currently working at Grace Sports Medicine in Tauranga. Her interests include female issues in sport and endurance sports. She is currently the Medical Director for Triathlon New Zealand. She is a Professional Practice fellow with Otago University teaching the Women in Sport paper for the postgraduate diploma in sport and exercise medicine.

Duncan Reid

Duncan Reid is Associate Professor of Physiotherapy and Associate Dean of Health, Faculty of Health and Environmental Science, Auckland University of Technology. Duncan has had 32 years of clinical experience in musculoskeletal physiotherapy. His main areas of interest are in manual and manipulative therapy especially manipulation to the cervical spine.

Chris Milne

Chris Milne is a sports physician in private pradtice at Anglesea Sports Medicine in Hamilton. He has been Team Doctor for the NZ Olympic and Commonwealth Games teams from 1990 to the present and was Team Doctor for the Chiefs Super Rugby team from 1997 to 2003. A past President of the Australasian College of Sports Physicians he has also served as National Chairman of Sports Medicine New Zealand.

Sharon Kearney

Sharon Kearney is a physiotherapist based in Christchurch. She is one of the directors of Performance Physio along with partner Kevin. Sharon is the physiotherapist for the Silver Ferns Netball Team and is the Lead Physiotherapist for High Performance Sport NZ (HPSNZ).

Sarah Beable

Sarah Beable is currently a registrar training towards the ACSP Fellowship in sports and exercise medicine. She currently works out of Unisports Sports Medicine in Auckland and also the Avantidrome HPSNZ centre in Cambridge in her role as Medical Director for Bike New Zealand. Sarah has been involved with the Silver Ferns as touring doctor in recent years and part of the NZ Medical Team for the upcoming Commonwealth Games in Glasgow.

Nat Anglem

Nat Anglem is a sports physician in Christchurch. His aim is to use models of high performance sport to improve the health and well-being of his patients, as well as their athletic success. He works for High Performance Sport New Zealand within the Wintersport programme.

Norris Roy (Norrie) Jefferson OBE KStJ MBChB (Otago) DMRD FRACR FSMNZ 1914-2013

The recent sad loss of Dr Norrie Jefferson in his 100th year, brought to a close a unique era that spanned the first 50 years of sports medicine in New Zealand. Described as the "Father of New Zealand Sports Medicine" Norrie Jefferson was a pioneer and modest luminary who guided the early relationship between sport, exercise and medicine, today a discrete area of specialist clinical practice.

In 1963, Norrie Jefferson, a consultant radiologist at Dunedin Hospital, chaired the first meeting of a fledgling group of like-minded clinicians who formed the New Zealand Federation of Sports Medicine (NZFSM). This meeting was convened in the Red Lecture Theatre in the Scott Building of the Otago Medical School. A commemorative plaque records that historic meeting. It also records the attendance of colleague doctors Jack Kilpatrick and John Heslop who, together with Professor Sandy Macalister, constituted the first national executive committee of the NZFSM. They were soon to be joined by Professor Phillip Smithells, inaugural Dean of the School of Physical Education, who thereby added the first element of sport science to this interesting mix of minds. These individuals established the fundamentals that have since guided the growth of Sports Medicine New Zealand (SMNZ), and we owe them each, but their Chairman in particular, a debt of sincere gratitude.

Dr Norrie Jefferson, the son of a Methodist minister, attended Wellington College before entering the Otago Medical School for his undergraduate years. He followed this with postgraduate experience at St Mary's Hospital London, gaining specialist qualifications in diagnostic radiology. While working at St Mary's Hospital, Norrie worked closely with another young New Zealand doctor, Mayne Smeeton, who was following a chosen career in anaesthetics. Both Doctors Jefferson and Smeeton were to become influential in the development of sports medicine in this country and serve us at the highest level. Norrie Jefferson returned to New Zealand in 1950 to take up a consultant post in radiology at Dunedin Hospital where he remained until 1956 before a period in private practice and then a decade at Southland Hospital as Director of Diagnostic Radiology, after which he returned to Dunedin Hospital practice in the early 1980s.

At St Mary's Hospital London, in the immediate post-War period, there was a serendipitous meeting between Norrie Jefferson and a staff surgeon named Arthur Porritt. Dr Porritt, also an Otago medical alumnus, was a general surgeon, who as a Rhodes scholar at Oxford, competed for New Zealand at the 1924 Paris Olympics, winning bronze in the 100 metres, the track event immortalised by the movie and music of "Chariots of Fire". Later, a distinguished member of the International Olympic Committee, Arthur Porritt was knighted for his services to medicine and in 1967 returned to New Zealand as our first "home-grown" Governor-General. It had been much earlier that Sir Arthur aroused sufficient interest in sports medicine circles, to create the British Association of Sport and Medicine, with strong encouragement for Norrie Jefferson to do the same in New Zealand. The rest, as we say, is history.

Norrie Jefferson by his own admission was a modest athlete who joined the Leith Harrier Club in 1936. He went on to become President of Otago Athletics in 1955 and President of Athletics New Zealand in 1960. His life-long interest in track and field was acknowledged when was made Patron of Athletics Otago and later accorded Life Membership. It was during this period that Norrie gave considerable support to the iconic coach Arthur Lydiard, whose stable of athletes including Sir Murray Halberg and Sir Peter Snell was rewriting the world middle-distance record books. Norrie provided Arthur Lydiard with medical guidance that enabled Lydiard to establish the foundations of what was subsequently described as the "jogging phenomenon". This premise, that sustained aerobic activity had value in cardiac rehabilitation, was fundamental to the establishment of health through physical activity, a forerunner to the established contemporary concept of exercise prescription.

Those privileged to know and work with Norrie recognised his love of sport and enthusiasm for the place of clinical practice in the care and welfare of athletes. He managed the athletics section of the 1962 Empire Games team to Perth where, as a neophyte international swimmer, I was privileged to meet Norrie for the very first time. Little did I know then, that this relationship would span the next 50 years.

Dr Norrie Jefferson also travelled extensively with New Zealand Paraplegic Teams to Jamaica (1966), Israel (1970) and Germany (1972) and in 1979 he was awarded an OBE for services to disability sport. Public recognition of his extraordinary services to the wider community came when he was made a Knight of the Order of St John, reflective of many years of outstanding service to that organisation.

Norrie receiving his Sports Medicine New Zealand Foundation Fellow Award, Dunedin, 1996.

As our Foundation Chairman, Dr Norrie Jefferson maintained an interest in the activities of SMNZ until health limited his physical capacity to attend meetings. His presence at the 2008 Annual Conference in Dunedin was appropriately acknowledged and he delighted in astute, active dialogue with many conference attendees, reflecting on the continuing contribution of medicine to contemporary professional sport and public health awareness.

In Norrie Jefferson we have lost a man whose vision was fundamental to the genesis of our sports medicine culture, an individual who quietly espoused its values and someone who displayed a passion for sport across the community. His founding philosophy is no less applicable today as it was in 1963 and remains an example to us all.

Farewell dear friend and colleague.

Professor David Gerrard

OBE CNZM MB ChB(Otago) FACSP FSMNZ

(with acknowledgement to Alistair McMurran)

The man who knew too much

June 2014

Son of a running mad father, it is part of our family folklore that when I was just a lad, the ground-breaking running coach Arthur Lydiard visited our Gisborne home. Lydiard was allegedly heard to say that "due to my [gangly] legs, there was no way I was ever going to be a runner". For many years I wondered if this was true, but with the benefits of age and time, it seems he was probably right. These days, companies selling genetic tests of athletic ability would contend that you don't have to wonder anymore, or waste time with a sport you are not "designed" for. In 2014, without talking to a doctor, geneticist, coach or even a parent, you can buy a genetic test on-line and confirm what sort of an athlete, you may or may not potentially be. Genetic screening for athletic performance … is it really the way of the future?

A news article recently claimed that a British Athlete was using a "revolutionary DNA test designed to prevent injury and improve her performance",[1] and at least one country is already reportedly using genetic testing to assist in its talent identification.[2] In the world of High Performance and not-so-high performance sport, this is exactly the sort of article that catches the eye of athletes, coaches, performance staff and occasionally medical teams. Whilst not wanting to cast aspersions on claims of a revolution, the technical ability to evaluate one's genetic make-up has been available for some time – essentially since the completion of the human genome project in 2003. There is however, no denying that over the last few years there are increasing numbers of companies selling genetic tests of athletic potential (perhaps this is the revolution?) – some of the questions we face as practitioners are whether the scientific evidence supports the claims made by these companies and do we risk doing more harm than good by using genetics to potentially guide our sporting habits?[3]

The heritability of individual physical traits is well recognised and increasingly understood. However, less well understood is the relative importance of the myriad of elements involved in athletic performance, and as a result of this complexity it seems intuitively unlikely that from approximately 3 billion DNA base pairs and a genome of 20,000 genes, that selecting a few will accurately predict one's athletic potential. To use one "simple" example to illustrate this: it is well known that psychological factors play a significant role in successful athletic performance, and while many psychological traits may be genetically determined, they are typically not assessed in any genetic screen for performance potential.

One of the best known and comprehensively researched "athletic genes" is the ACTN3 gene found on chromosome 11. The ACTN3 gene is known to code for alpha-actinin-3, a structural protein found in some muscle sarcomeres (typically fast muscle fibres), and which is thought to play a role in optimising force transmission. It is recognised that variations in the R577X polymorphism of this gene result in variable expression of alpha-actinin-3[4] and more recently with variations in testosterone levels in athletes, indicating possible mechanisms by which it may impact upon performance.[5] Subsequently, a consistent association between polymorphisms in the ACTN3 gene (RR Allele) and power performance has been demonstrated[6] - however evidence for a relationship between the ACTN3 gene (XX Allele) and endurance performance is not as impressive.[6-13] Somewhat surprisingly, given the observed associations, the ACTN3 polymorphism was unable to differentiate between the endurance athletes of East Africa, and the sprinters of West Africa.[11] Furthermore, it is now apparent that significant variations exist in the genotype : phenotype associations observed between genders, ethnicities[11, 14] and between elite and "normal" individuals,[8] such that any association observed in one group cannot reliably be extrapolated beyond that population. To further complicate this field, it is well recognised that studies of athletic gene associations are often under-powered and encumbered with significant methodological limitations[15] (for example, a published study on the genetic profile of seven Turkish windsurfers[16]). While studies assessing the relationship between genetics and performance variables are academically interesting and scientifically valuable, when it comes to using genes to predict performance David Epstein, (author of "The Sports Gene: What makes the perfect Athlete", a book somewhat ironically promoted by gene testing companies in support of their cause) concluded that "consumer genetic testing for athleticism is nearly worthless" (p156).[17]

Presumably based on a range of variable quality association studies in limited population groups, numerous companies are marketing the concept of genetic testing individuals to assist in choosing both "best suited" sports and developing specific training approaches based on a genomic profile.[3] Using ACTN3 as an example, the simplistic rationale appears to be that since (in some populations) the ACTN3 RR allele has a higher prevalence in power athletes, if you want to be (or think you might be) a power athlete, then you should check your status before you start. This rationale, of course, seems fundamentally flawed - as a statistically significant association between genes and proportions of athletes competing in different events does not translate into an ability to predict performance for a specific individual. Just as not all individuals with the "optimal" RR combination of ACTN3 alleles will either have the potential to be high level sprinters (they may have some other significant genetic or environmental limitation), or ultimately go on to be a high level sprinter, the absence of the gene does not mean you cannot become just as good a sprinter as someone with the "right" gene mix.[18] To illustrate this - while a significantly greater proportion of sprinters than controls were found to have the "ideal" ACTN3 RR genotype in one large European study, only 50% of elite sprinters actually had that genotype – meaning that half of the sprinters (who were just as good) did not have the "preferred" genotype.[19] While for any particular population group it may be of significant academic interest to know what a particular gene distribution is, with current levels of understanding, there appears to be no predictive value for a specific individual. This lack of predictability is in stark contrast to the less frequently cited midi-chlorian count, which can be tested for in a simple blood test and which is known to directly reflect the power of the Force in individual Jedi Masters (Qui-Gon Jinn tests this in Anakin Skywalker, who along with his son Luke recorded the highest known values). While this is of course science fiction, the

underlying principle is identical and the evidence levels for prediction of individual potential seemingly similar.

In addition to the current inability to accurately predict performance potential with genetic profiling, there are "innate" risks with performing this testing. An individual without the "right" genotype may cease training for their chosen sport, become frustrated and disillusioned. An incorrect genotype provides the perfect stable negative attribute for poor performance, and this has a poor prognosis for future performance – essentially establishing a self-fulfilling prophecy.

Why then, given the vast array of factors involved in elite athletic performance, the lack of individual predictability and the risks that genetic testing carries, would anyone pay to perform this testing?

Succumbing to self-interest, but not-so-subtly disguised in the interests of scientific endeavour, I have undertaken a comprehensive retrospective cohort study of this topic. Enrolling an extensive cohort of two (purists may argue that this is an underpowered investigation, but it is not far below some published studies), I have looked to evaluate the merits of the genetic determination of athletic potential from a commercial company, readily available on-line.[3] The demographics and athletic achievements of the two individuals involved in this study are illustrated in Table One. Both subjects completed the informed consent required by the company involved in the genetic testing (subjects were not required to talk to anyone in particular), the company was blinded to the athletic backgrounds (as they did not ask for it), but the subjects completed the date of birth such that both were deemed 18 years old at the time of testing.

Both subjects consented to the publication of their data in this editorial, but no formal ethical approval was obtained. No funding support was provided for the completion of this "study".

Table 1: Demographics of Subjects

	Subject One	Subject Two
Age	50	48
Highest Athletic Performance	Double Olympic Gold Medal	University Road Relay Team Member
Region of Birth	Northern Hemisphere	Southern Hemisphere
Injury History	Low Injury rate	High Injury Rate
Current Fitness	High Level Age Group	Hack

Unfortunately, editorial deadlines and word counts prevent the full publication of results, which will be presented in the next journal. At this stage however, I can highlight that one of our subjects was found to have a predominantly endurance potential, with a medium V02 max potential, a medium recovery profile and a high risk of personal injury.

In 1956 Doris Day starred in an Alfred Hitchcock thriller, singing "Que Sera Sera", containing the classic lyrics "what-ever will be, will be … the future's not ours to see". While commercial companies using genetic screening for athletic purposes believe they can challenge the scientific accuracy of this lyric, the reality is that there remains a lack of evidence to support claims that genetic screening can accurately predict performance capability. While genetics remains an exciting area for the future, until further data and understanding of the relative importance of the multitude of factors and the genetic determinants of those factors involved in performance is available, there seems no indication for genetic testing young athletes. The name of the Hitchcock thriller, "The Man Who Knew Too Much", is a prescient title given today's commercial possibilities.

References

1 DNA Secrets Helping Athletes Improve, in News.com. 2014.

2 Synovitz, R. and Z. Eshanova, Uzbekistan is using genetic testing to find future Olympians, in The Atlantic. 2014.

3 Roth, S., Critical Overview of Applications of Gentic Testing in Sport Talent Identification. Recent Patents on DNA and Gene Sequences, 2012. 6: p. 247-255.

4 Norman, B., et al., ACTN3 genotype and modulation of skeletal muscle response to exercise in human subjects. *J Appl Physiol* (1985), 2014. **116**(9): p. 1197-1203.

5 Ahmetov, II, A.E. Donnikov, and D.Y. Trofimov, Actn3 genotype is associated with testosterone levels of athletes. *Biol Sport,* 2014. **31**(2): p. 105-8.

6 Ma, F., et al., The association of sport performance with ACE and ACTN3 genetic polymorphisms: a systematic review and meta-analysis. *PLoS One*, 2013. **8**(1): p. e54685.

7 Grealy, R., et al., The genetics of endurance: frequency of the ACTN3 R577X variant in Ironman World Championship athletes. *J Sci Med Sport,* 2013. **16**(4): p. 365-71.

8 Hanson, E.D., et al., ACTN3 genotype does not influence muscle power. *Int J Sports Med*, 2010. **31**(11): p. 834-8.

9 Rodriguez-Romo, G., et al., No association between ACTN3 R577X polymorphism and elite judo athletic status. *Int J Sports Physiol Perform*, 2013. **8**(5): p. 579-81.

10 Ruiz, J.R., et al., ACTN3 R577X polymorphism does not influence explosive leg muscle power in elite volleyball players. *Scand J Med Sci Sports*, 2011. **21**(6): p. e34-41.

11 Yang, N., et al., The ACTN3 R577X polymorphism in East and West African athletes. *Med Sci Sports Exerc*, 2007. **39**(11): p. 1985-8.

12 Lucia, A., et al., ACTN3 genotype in professional endurance cyclists. *Int J Sports Med*, 2006. **27**(11): p. 880-4.

13 Saunders, C.J., et al., No association of the ACTN3 gene R577X polymorphism with endurance performance in Ironman Triathlons. *Ann Hum Genet*, 2007. **71**(Pt 6): p. 777-81.

14 Eynon, N., et al., The ACTN3 R577X polymorphism across three groups of elite male European athletes. *PLoS One*, 2012. **7**(8): p. e43132.

15 Rankinen, T., et al., Advances in exercise, fitness, and performance genomics. *Med Sci Sports Exerc*, 2010. **42**(5): p. 835-46.

16 Ulucan, K., et al., Preliminary Findings of alpha -Actinin-3 Gene Distribution in Elite Turkish Wind Surfers. *Balkan J Med Genet*, 2013. **16**(1): p. 69-72.

17 Epstein, D., The Sports Gene: What makes the perfect athlete. 2013, London: Yellow Jersey Press. 338.

18 Lucia, A., et al., Citius and longius (faster and longer) with no alpha-actinin-3 in skeletal muscles? *Br J Sports Med*, 2007. **41**(9): p. 616-7.

19 Yang, N., et al., ACTN3 Genotype is associated with human elite athletic performance. *American Journal of Human Genetics*, 2003. 73: p. 627-631.

Are we promoting the right attitude to injury in sport?

I'm writing this editorial at the last minute, partly because I've been watching too much of the football world cup and with the recent addition of Wimbledon highlights – it's proving a tough month to be a sports fan. Although FIFA undoubtedly put on a great show, the beautiful game does suffer from a high incidence of what appear to be horrific injuries (the recoveries from which are often nothing short of a sports medicine miracle!). I think the term FIFA uses is "simulation" or more commonly described in our household as a Hollywood! It's probably summed up best by a post online, pointed out to me by a colleague this morning, "What's the difference between footballers and rugby players? Footballers spend 90 minutes pretending to be injured and rugby players spend 80 minutes pretending not to be injured". Similarities do also exist - both games seem to have the odd problem with the bite injury – enough said!

Either way neither attitude to injury seems to be a great look for our budding amateurs (especially juniors) running around on the weekend and one wonders at the influence it has on them and their coaches. When my youngest first started playing football (soccer to be clear) his main concern pre game was whether or not he had to hug all his team mates if he scored! I also remember being amazed at the number of expert simulations I witnessed in an under 11 game of football when working briefly for the Fulham football academy in the UK – youngsters certainly pay attention to what their idols are up to. So what impact on amateur sport the recent stories of All Blacks playing on with fractured ribs and the follow up story in the NZ Herald recalling all the tough All Blacks that have played on injured over the years – the torn scrotum of one All Black captain likely the most famous/infamous! These stories are obviously mostly media hype, especially these days given the expert sports medicine advice available to the elite – but maybe that's missed by average Joe amateur?

The attitude towards injury and injury prevention in elite sport has certainly been a focus of attention recently with the appearance in the papers and on television of stories discussing the possible long term impact of concussion. Again I have no doubt the elite (in this country anyway) are well looked after in this space but injuries in elite sport are in the minority and there needs to be a focus on injury management and prevention in amateur sport – especially junior sport as the best way to increase your risk of injury is to get injured in the first place. High performance athletes have vast resources at their disposal to manage injuries and implement injury prevention strategies – and the great work done at the high performance level possibly gives those in the amateur game unrealistic expectations. In amateur sport the coach is often the sole resource and depending on the sport and the level of competition the quality of this resource could vary massively. In New Zealand we rely heavily on volunteer coaches and evidence suggests many of these coaches are exposed to very little training/education. This includes training related to technical aspects of the sport as well as management of injuries.

The importance of the coach in injury prevention and management in amateur sport, especially at the junior level, has been highlighted in several recent studies.[1] There is evidence it is often coaches who emphasise early sports specialisation and this has been linked in increased overuse injuries in youth athletes.[2] The influence of the coach on developing the ability of the player is possibly matched by the influence the coaches attitude to injury has on the player. We are fortunate that there are many excellent resources available to amateur coaches in this country – many made available by the sports themselves and/or ACC – the rugby and netballsmart programmes come to mind. However the buzz term currently seems to be "knowledge translation" – the need for real world implementation of injury prevention research – obviously key being the acceptance and adopting of key practices by coaches.[3]

Given the important role of coaches in training players and delivering safety initiatives to players it has been noted that very few studies have investigated coach injury prevention practices and safety promotion attitudes.[1] Coaches are in a unique position to teach safe playing techniques/strategies, promote injury prevention and guide appropriate injury management. For this reason several authors have emphasised coach education is fundamental to sports injury prevention and risk management.[1]

A recent report by the Australian sports injury prevention task force noted a key strategy for injury prevention was to maximise the role and influence of the coach to create a positive culture around sports injury prevention and management – this obviously relies on the coach being educated and having the right attitude. A recent study reported that the attitudes of netball coaches can influence the success of an injury prevention programme[4] and another highlighted a lack of player/coach knowledge of knee injury prevention strategies in female soccer.[5] More needs to be done in this area and it would be interesting to see how the attitudes and knowledge of our local amateur coaches (especially in junior sport) stack up. With this in mind colleagues and I are about to undertake a small pilot study looking at attitudes and knowledge of injury in secondary school coaches, with the hope of extending to a bigger study in the near future – so watch this space. In the meantime if you have any strategies for preventing simulation or reducing the incidence of biting injuries in football let FIFA know – they might have to adapt the 11 plus a little further!

References

1 Saunders, N., et al., Coaches' perspectives on implementing an evidence-informed injury prevention programme in junior community netball. *British Journal of Sports Medicine,* 2010. **44**(15): p. 1128-1132.

2 Nyland, J., Coming to terms with early sports specialization and athletic injuries. *Journal of Orthopaedic & Sports Physical Therapy,* 2014. **44**(6): p. 389-390.

3 Richmond, S., C. McKay, and C. Emery, Knowledge translation in sport injury orevention research: an example in youth ice hockey in Canada. *British Journal of Sports Medicine,* 2014. **48**(12): p. 941-942.

4 White, P.E., et al., Ensuring implementation success: How should coach injury prevention education be improved if we want coaches to deliver safety programmes during training sessions? *British Journal of Sports Medicine,* 2014. **48**: p. 402-403.

5 Orr, B., et al., Female soccer knee injury: Observed knowledge gaps in injury prevention among players/parents/coaches and current evidence (the KNOW study). *Scandinavian Journal of Medicine & Science in Sports*, 2013. **23**(3): p. 271-280.

JANUARY - JUNE 2014

Starting with the January issue which was an IOC sponsored Injury Prevention and Health Protection issue concentrating on the Sochi Winter Olympics. In the opening editorial entitled 'The importance of sports medicine at the Sochi Games', Catherine Stefan and Lars Ingebretson commented that snowboard and freestyle skiing would be under close scrutiny given their relatively high injury rate compared with other winter sports. Later in the same issue there was an excellent article on head injuries amongst World Cup alpine freestyle skiers and snowboarders. This was a seven year cohort study from Norway. The authors found that the majority of head and face injuries were concussions and that one in four of these injuries was severe. Freestyle skiers were the most at risk and women had a higher injury incidence than men across all disciplines. The authors comment that future prevention strategies should address severe injuries, promote adequate recognition and medical attention for all head injuries, and target freestyle and snowboarding athletes in particular.

Later in the same issue was an article entitled 'The role of sports physiotherapy at the London 2012 Olympic Games'. Written by Marie-Elaine Grant and colleagues, this article comprehensively reviewed the role of sports physiotherapy at the London Olympics. They categorised 1778 encounters and muscle injuries made up 33% of these, with joint injuries contributing a further 25%. Therapeutic techniques used included soft tissue techniques in 23%, mobilisation techniques in 22%, taping in 9%, cryotherapy in 7% and exercise prescription in a further 6%. They commented that the most common cause of athletes' injuries was overuse, which was responsible for 44% of the presentations.

Issue 2 for 2014 could be called the CTE issue. Chronic traumatic encephalopathy, an uncommon sequela of concussion, is much in the news these days. As I write this, Kieran Reid has been ruled out of the first All Black test of the year on account of concussion, and Craig Clark, former Chiefs captain, has announced his retirement on account of chronic sequelae of concussion. Nevertheless, it would appear that chronic traumatic encephalopathy is a relatively uncommon condition. The best systematic review was published in this issue by Gardner, Iveson and Paul McCrory. They examined the data from 158 published case studies and found critical differences between the older descriptions of CTE (the classic syndrome) and more recent descriptions (i.e. the modern syndrome). These differences in the age of onset, natural history, natural features, pathological findings and diagnostic criteria suggest that modern CTE is a different syndrome. They advise caution in reading too much into the data from the earlier studies and recommend further research to clearly define the clinical phenotype of the modern CTE syndrome and establish the underlying aetiology.

In the same issue was a further article entitled 'Chronic traumatic encephalopathy: how serious a problem is it?' Written by Charles Tator, a neurosurgeon from Toronto, the overwhelming impression is that we are, in Tator's words, "just at the beginning of our appreciation of this entity due to the paucity of research and the inability to diagnose CTE during life". There may well a role for the more advanced imaging, e.g. MR spectroscopy, but the field is still widely open for debate, and not the open and shut situation as the media would have us believe.

Further on in the same issue was an article entitled 'Big hits on the small screen: an evaluation of concussion related videos on YouTube'. This article had contributions from John Sullivan and Tony Schneiders of the Otago School of Physiotherapy and Paul McCrory was a co-author. This observational study found 434 videos meeting the inclusion criteria and evaluated the 100 with the largest view counts. The authors commented that there was a need for healthcare and education organisations to explore YouTube as a medium for the dissemination of quality controlled information on sports concussion.

Early in this issue were three editorials specifically addressing the issue of concussion in rugby union. Each of these is well worth a read and the final response from Martin Raftery on behalf of the International Rugby Board lends support from the IRB to provide a unified, consistent collision sport approach. There will be plenty more in this area, so watch this space.

The next issue was devoted to Exercise is Medicine and started with an editorial documenting how exercise is medicine was incorporated into the health system in South Carolina. The authors, Trilk and Philip, commented that in 2002 whilst the deans of 64% of medical schools reported that it was the responsibility of medical schools to educate students about physical activity, only 6% of medical school leaders reported having a core course or required curriculum addressing this issue. Having just returned from a 30+ year reunion of our old medical school class, anecdotally I can comment that many of my classmates have taken up exercise or developed an interest in exercise prescription since leaving the academic environment. This bodes well for the future.

Exercise is not only useful for physical disorders but for mental illness. An article by Jaya Kody and colleagues explored exercise for anxiety disorders. Their systematic review included eight RCTs. They found that exercise appeared to reduce anxiety symptoms in panic disorders but was less effective than antidepressant medication. Also, exercise combined with occupational therapy and lifestyle changes reduced the Beck Anxiety Inventory outcome. For social phobias, exercise provides additional benefits when combined with group cognitive behavioural therapy.

Screen time is a big concern of health researchers, and a paper by van de Laar and colleagues from Maastricht in the Netherlands found that self-reported time spent watching television was associated with increased arterial stiffness in young adults in their 30s. Later in the same issue, Yildirim and colleagues looked at what helps children move more during breaks and at lunchtime at school. They found that the perceived school play environment (whatever that is) and perceived social support

from teachers was associated with higher moderate to vigorous physical activity during break time.

The fourth issue was dedicated to care of the female athlete and included a consensus statement on the Female Athlete Triad. This statement by De Souza and colleagues follows on from earlier consensus meetings on the Female Athlete Triad and was intended to serve as a supplement to the ACSM revised position stand published in 2007. From my perspective, a lot of its recommendations would appear to have been supplanted by a subsequent statement on relative energy deficiency in sport published under the auspices of the IOC in Issue 7 of BJSM in April (see below).

Labral tears of the hip are a diagnostic challenge and examination features were reviewed by Michael Reiman and colleagues from North Carolina. As one would expect from an American group, the emphasis is largely on imaging, although they do mention the contribution of the impingement position of hip flexion, adduction and internal rotation. They comment that only when patient history, objective testing, clinical examination, special testing and imaging are combined can a clinician elucidate the multidimensional diagnosis of ALT (acetabular labrum tears). One cannot help but think that if an Australasian group was writing this article there would have been more emphasis on the clinical and less on the imaging findings, given that in some studies as many as 30% of athletes have been shown to have labral tears and their clinical significance is often unclear.

Issue 5 mainly concentrated on running injuries. Barefoot running is an activity that has attracted much recent study following the article by Lieberman several years ago. Many runners have been advised to run barefoot as a treatment mode for injuries, strength and conditioning. However these authors, including the well-known Tim Noakes and his group from the University of Cape Town, state that, crucially, long term prospective studies have yet to be conducted. The link between barefoot running and injury or performance remains tenuous and speculative. From my perspective as a runner of 40+ years' experience, I would comment that it is potentially less hazardous in those of light bodyweight and with normal or near normal biomechanics. However, for a lot of heavier individuals or those with abnormal biomechanics, footwear has a definite role to play.

Czuppon and colleagues examined the variables associated with return to sport following ACL reconstruction. Their systematic review looked at 16 articles and found weak evidence of the following variables being important: Higher quadriceps strength, less effusion, less pain, greater tibial rotation, higher Marx activity score, higher athletic confidence, higher pre-operative knee self-efficacy, lower kinesiophobia and higher pre-operative self-motivation. These findings are hardly surprising but help us in giving a prognosis to people.

Lateral ankle sprains are amongst the commonest injuries we see and manual joint mobilisation is frequently carried out. Loudon and colleagues carried out a systematic review and found that manual joint mobilisation diminished pain and increased dorsiflexion range of motion in acute injuries. For subacute or chronic injuries these techniques improved ankle range of motion, decreased pain and increased function.

Whilst on the subject of physiotherapy research, it is worth commenting that clinical trials in sports physiotherapy have been less commonly performed than in medicine. This is hardly surprising given the funding constraints.

Kamper and colleagues wrote an editorial looking at five decades of research and provide tips to improve the evidence generated by clinical trials in physiotherapy. In particular, they emphasise rigorous research methods, particular attention to eligibility criteria, source of participants and similarity of groups at baseline plus concealed allocation and intention to treat analysis would enhance the quality of publications.

In addition, they comment on the need for blinding of assessors and adequate follow up. These comments could equally apply to medical articles on musculoskeletal injury, where the number of participants enrolled is usually less than 100 and we are often left with extrapolating data from similar injuries where no RCTs exist.

Issue 6 was devoted largely to patellofemoral pain. In September 2013 a Third International Patellofemoral Pain Research Retreat was held in Vancouver. The authors were Witvrouw and colleagues, including Jenny McConnell and Kay Crossley. The statement included issues such as the natural history of patellofemoral pain, trunk and distal factors that influence patellofemoral pain, innovations and rehabilitation including hip muscle retraining and movement retraining. Also since 2011, the date of the last research retreat, a randomised clinical trial has identified that conservative intervention including therapeutic exercises may prevent development of patellofemoral pain in an active population. This is potentially the most important development, as patellofemoral pain is about 10% of all sports medicine practice.

Later in the same issue there is an article entitled 'Is patellofemoral osteoarthritis a common sequela of patellofemoral pain?' From previously published data, it would appear that patellofemoral pain and patellofemoral osteoarthritis exist along the continuum of disease. Particularly in our older patients with anterior knee pain, we need to avoid expectations of a "cure" and educate patients to recognise and monitor their joint health status and actively manage their joint loading and symptoms. Traditional teaching is that patellofemoral OA is common following patellar tendon ACL reconstruction. However, a paper by Culvenor and colleagues found evidence of significant patellofemoral OA following hamstring reconstruction as well. This cross sectional study was based on 70 participants who had undergone hamstring reconstruction 5-10 years previously and is worth bearing in mind, as it tends to challenge the traditional dogma.

Issue 7 published in April 2014 in conjunction with the IOC World Conference on Prevention of Injury and Illness in Sport in Monaco was the largest ever issue of the journal. Running to nearly 200 pages, most of it, i.e. over 100 pages, was devoted to abstracts from this conference.

However, there were also some must-read articles in this issue. The first of these was from athletics and included illness and injury definition plus data collection procedures for use in epidemiological studies. This consensus statement written by Juan-Manuel Alonso, Medical Director for the IAAF, and colleagues, provides an excellent framework for epidemiological studies in athletics. The formula can easily be extrapolated over to other sports and should be read by all of those people who contemplate performing epidemiological studies in the sporting population.

Secondly in the same issue was the IOC Consensus Statement entitled 'Beyond the Female Athlete Triad: Relative Energy Deficiency in Sport (RED:S)'. This paper by Margo Mountjoy and colleagues looks beyond the standard Female Athlete Triad and defines this new syndrome of relative energy deficiency in sport. It encompasses a constellation of physiological impairments including metabolic rate, menstrual function, bone health, immunity, protein synthesis plus cardiovascular health caused by relative energy deficiency. The vast majority of athletes affected by the condition are female but in certain sports, e.g. cycling, ski jumping and weight class sports, significant numbers of male athletes are also affected. The authors propose a traffic light system and make recommendations for sport participation and training based on where the athlete sits within the spectrum. Later in the same issue was a position statement on youth resistance training. These authors support the use of resistance training on the proviso that qualified professionals design and supervise training programmes that are consistent with the needs, goals and abilities of younger populations.

Also in the same issue, Jill Cook and Craig Purdam wrote an excellent article on the management of tendinopathy in competing athletes. Tendinopathy is a condition which takes many months to settle and in-season management is a challenge. They comment that tendons respond to load on a daily basis and waiting for tendon pain as an indication of overload may be a dance with the devil. For the symptomatic athlete they recommend actively reducing tendon pain with medications such as NSAIDs and occasional doxycycline, green tea or omega-3, although the evidence for these interventions is relatively limited. Surgical intervention is usually carried out in the off season but occasional reports describe a rehabilitation period of as short as six weeks post-operatively.

Finally in this issue was a superb article entitled 'Managing the health of the elite athlete: a new integrated performance health management and coaching model'. Written by Dijkstra and colleagues, it uses the programme adopted by UK Athletics in preparation for the London Olympic and Paralympic Games. The medical and coaching teams are managed by qualified and experienced individuals operating in synergy towards a common performance goal. These people are accountable to the Performance Director and, ultimately, to the Board of Directors. In essence, this is what we have adopted and modified for New Zealand conditions under the able leadership of Bruce Hamilton, your editor, who was appointed Medical Director for High Performance Sport New Zealand just over a year ago. In that time our systems have got demonstrably better under his guidance and leadership. The programme will be further strengthened with the appointment of a fulltime Rehabilitation Director in the coming months.

Issue 8 was concerned with implementation science and harnessing digital technology to achieve better outcomes in sport. This was exemplified by an article by Evert Verhagen and colleagues entitled 'How BJSM embraces the power of social media to disseminate research'. This was the topic of a major seminar at the Monaco conference. The authors comment that in most online communities, 90% of users are lurkers who never contribute, 9% of users contribute a little and 1% of users account for almost all of the action. As a digital dinosaur, even I can appreciate how social media can aid in our mission.

Cricket has been much in the news recently for all the wrong reasons. An article by Sarah Morton and colleagues looked at risk factors and successful interventions for cricket-related low back pain. They looked at 12 studies and found that the presence of acute MRI bone stress was a risk factor for developing lumbar stress fractures. Additionally, they found moderate evidence for increased shoulder counterrotation (associated with a mixed bowling action) and decreased anterior abdominal fascial slide to be associated with low back pain in cricketers.

The first dictum of medicine is primum non nocere, i.e. firstly do no harm. Ionising radiation has been used to clarify the diagnosis in various injuries, but John Orchard and colleagues report on three game-changing studies for imaging in sports medicine. These were published in the Lancet and BMJ and the authors comment that these papers should result in a review of imaging guidelines by clinicians and advisory bodies. A good clinician should be weighing up the risks of ionising radiation in imaging referral decisions. This is, in fact, what we have been doing for many years. In particular, the evaluation of low back pain in young gymnasts in a high performance environment resulted in many bone scans and CT scans being performed. Today's young gymnasts are more appropriately imaged by MRI scan, which does not expose them to any ionising radiation. Nevertheless, there will still be clinical scenarios in which a combination of a bone scan followed by a CT scan is associated with greater sensitivity and specificity. This point is made by Bruce Forster, consultant radiologist from UBC in Vancouver. Both of these articles should be read in conjunction with one another to get a good appreciation of the issues involved.

My pick for most valuable article in this particular series would be that relating to managing the health of the elite athlete. It is a tour de force of this topic and shows just how far we have come since I graduated in 1980, where many of my senior medical teachers regarded any medical intervention in elite athlete care as being rather an indulgence and taking away from our true medical mission. This is indeed a sign of progress.

Metal Bars: A Case Study

Lynley Anderson[1]
Peter Burt[2]

[1] Senior Lecturer, Bioethics Centre, University of Otago

[2] Researcher, Department of Sport and Exercise Medicine, University of Otago

Sports clinicians can face ethically challenging situations in their clinical practice. At times, what they consider to be clinically and ethically appropriate may not match with what their patient, team or coach would agree with. In the real-life case that follows, a sports physiotherapist refuses to comply with a player request that could result in harm to opposition players. We discuss any further action that may be required to prevent such harm, but recognise this action may affect the physiotherapist's ongoing role with the team. We also present a range of resources that might assist a sports clinician to make robust decisions.

The Case

A physiotherapist (working with a team playing a contact sport) is approached by a player to ask if he will strap metal bars onto his forearm. The player does not have an injury and the only purpose of the bars is to enable the player to inflict harm on members of the opposing team. The physiotherapist is asked to do the strapping so that the addition of the bars will have the appearance of a legitimate treatment of an injury and therefore attract little attention.

The physiotherapist refuses to have any part in this activity but the player says he will get someone else to do it. The player asks the physiotherapist to keep quiet about it. The physiotherapist informs the coach and manager, but they shrug it off and ignore the physiotherapist's concerns.

Introduction

Setting out to deliberately harm others through the use of metal bars hidden in strapping is probably one of the most egregious forms of premeditated violence in sport. The physiotherapist in this case has refused to comply with the request, and we strongly support his position. The physiotherapist has been asked to be complicit in an activity that has the potential to cause significant harm to others, and while he has refused to take part and has informed the coach and manager, we ask whether he has an obligation to do more to prevent harm to others.

Because the coach and manager are disinterested in what the physiotherapist reports, to prevent the activity, the physiotherapist will have to take this information to someone outside of the team. Taking action beyond the team may have negative implications for the physiotherapist, including a break down in his employment relationship and his ongoing role with the team, club or franchise. Although the physiotherapist's fears are personally significant, the implications associated with this action going ahead cannot be ignored. While we consider the physiotherapist has made the right choice, we recognise that taking such a stand is not straight forward due to the influences present in the sporting environment.

Influences of the Environment

While from the outside it might appear obvious that the physiotherapist should decline to get involved, there are a number of characteristics within the sporting environment that may make it difficult to do so. These characteristics have the potential to influence clinical decision making as was evidenced by the actions of the physiotherapist and doctor in the "Bloodgate" scandal.[10,21,6,4] In the Bloodgate case, a physiotherapist and a doctor, both of high standing, actively participated in cheating to help their team win a rugby game. Speculation centred on whether their actions were the result of their personal flaws, or a product of the sporting environment that places a high priority on team success. Sociologist Eliot Friedson (1970) suggests that the environment in which a professional practices is the most important factor in determining their professional standards.[8] This is not to say that their professional training is unimportant, rather the environment in which they practice has the greatest potential to distort a clinician's objectivity and clinical decision making. When considered separately, many characteristics might appear insignificant, however it is their cumulative effect that is concerning. For example, the physical settings for clinical practice in sport (on sidelines, airports, and in hotel rooms) commonly lack the cues present in traditional clinical practice.[3] A strong sense of camaraderie may develop between the clinician and athlete due the time spent travelling, eating, and socialising together[11] and may encourage the adoption of behaviours they might otherwise reject.[15,18,19,13,24,23,26,6] There may also be a lack of professional support in the sporting environment leaving sports clinicians professionally isolated. Instead, the clinician is surrounded by sporting administration and team personnel who may make the health and wellbeing of players a priority.[25] The features described can make it difficult for a professional to hold onto his or her professional and personal integrity, and may encourage them to adopt behaviours they might otherwise reject.

Sport Violence Ethics and the Law

The player request involves the potential for serious harm to opposition players, and some might argue that the physiotherapist's responsibilities should be limited to his own team members and not to the welfare of the opposition. We do not agree. There is a general obligation on all of us to prevent harm to others. There are examples specific to health care where a health professional has become aware that a patient is threatening to harm another individual. In those circumstances we consider there is a duty to take some kind of action to prevent that harm from occurring. We therefore consider that the physiotherapist has a duty to act to prevent the potential harm.

Legal academic Paul Farrugia[1] writes on sporting violence and the law. He states that sport frequently involves a level of violence that would not be tolerated in the rest of the community. This tolerance is predicated on the benefits of sport to society, and the implied consent that each player has given. For example, if a player signs up to play rugby, he or she signs up to all that sport entails including the rough and tumble that is part of rugby. Breaches of the rules, such as punches and illegal tackles are generally dealt with internally by the sport. However, this does not preclude action in the courts, although within New Zealand and Australia referral to the courts is uncommon. Nevertheless, Farrugia states that 'participation in contact sport is not a licence to abandon the restraints of civilisation' and some actions, he states, cannot be consented to. Actions that are

so violent or egregious and which would be considered to lie beyond the rules should 'be accountable before a court of law'. That threshold may well have been met if injury occurred as a result of metal bars strapped to a players forearm. While the player took the action, a physiotherapist who assisted the player may also face charges. However, even if legal action did not ensue, if caught, the player and physiotherapist may face disciplinary action by the sporting code and that may or may not include some sort of ban from future involvement in the sport.

Professional Obligations

The physiotherapist also has professional obligations spelled out in within his professional ethical codes. There are two particular documents that guide clinical practice for sports physiotherapists in New Zealand; The Physiotherapy Board of New Zealand's Code of Ethics (2011), and the 2014 Sports Physiotherapy Code of Conduct. A review of both indicates that complying with the action requested by the patient would be considered unacceptable. The relevant clause in the Physiotherapy Board of New Zealand Code of Ethics states that:

'Physiotherapists must:

- act with honesty and integrity in all professional activities'

(Physiotherapy Board 2011)

The new Sports Physiotherapy Code of Conduct states that:

'Physiotherapists will:

- Act with honesty and integrity and promote fair play in sport.
- Not violate the rules of a particular sport in order to obtain an unfair advantage'

(Sports Physiotherapy New Zealand 2014)

These statements indicate that the physiotherapy professional body would, in all likelihood, not react favourably to a physiotherapist who assisted in this kind of activity. If the action of a physiotherapist came to the attention of the Physiotherapy Board, under the Health Practitioner's Competency Assurance Act (2003), 65(2), the Board may refer this action to its Professional Conduct Committee. If the Professional Conduct Committee finds a breach, they may choose from a range of responses including requiring competency reviews, restrictions on practice, through to suspension or cancellation of an annual practicing certificate. They may also refer the matter on to the Health Practitioner's Disciplinary Tribunal, who has the power to impose similar limitations but can also impose fines and costs). (HPCA Act 81-82)

It appears that a physiotherapist who assists a player to strap metal bars to his forearm to cause harm to opposition players may well be putting his professional livelihood at risk.

Responding to the Initial Request

As stated earlier, the physiotherapist in this scenario refused to be part of this action, however there are some immediate steps the physiotherapist might consider taking. At the point of request, the physiotherapist has an opportunity to educate the player about the rules and integrity of the sport, and the potential of harm to others, with the hope that this discussion might lead the player to abandon his plan. While this approach may not achieve the desired outcome, it does model behaviour that encourages fair play, respect for the opposition, and regard for the rules and integrity of the sport. If the player, despite being told of the implications, still plans to proceed, the physiotherapist should inform the player that he has now been placed in a difficult position, and will need to consider his obligations. This may also discourage the player from going ahead with his plans.

Confidentiality of the Physiotherapist-Patient Relationship

Some might argue that if this discussion between physiotherapist and athlete occurred in the context of a therapeutic relationship, this it should be kept confidential. This is generally true - what is discussed within a therapeutic relationship should be kept confidential as expressed in the Health Information Privacy Code (HIPC). However, the HIPC also allows for situations where confidentiality may be broken including where the patient poses a serious threat to themselves or others (HIPC Rule 11). In these cases any disclosure must be made to someone who can do something about that threat. The HIPC goes on to state that 'even if disclosure is warranted, it should only be to the extent necessary to prevent or lessen the threat.' Ordinarily the coach might be identified as such a person who is able to meet both of those aims, but this option has not proven to be successful so the physiotherapist may decide to speak to someone else.

The referee is an obvious person who can act immediately to prevent harm coming to opposition players. Referees have the authority to check that players clothing complies with the rules of the sport. Basketball, rugby league and rugby all prohibit the use of clothing that could harm players and they allow the referee to check for and exclude such clothing (FIBA 2012; IRB 2013; RLIF 2013). By informing the referee of the offending activity, the physiotherapist could be said to have discharged his duty to protect others. Prior to any disclosure, advice may be sought from senior colleagues and others. Such discussions should be documented.

Viability of Ongoing Role as Team Physiotherapist

Informing outside parties, and in particular, going over the coach's head potentially poses a threat to the physiotherapist's ongoing relationship with team management. Known as 'whistleblowing', the activity of informing others may lead to negative outcomes for the whistleblower, and the physiotherapist would need to be prepared for this especially, as in this case, where the coach and manager do not share his concerns.[5,14]

When a health professional is being asked to be complicit in activities that will harm others, and where management and coaching staff accept this, is indicative of a problem with team culture. The ongoing provision of physiotherapy services may no longer be realistic or tenable after this event and the physiotherapist will need to decide whether this is a team with which they want to be associated.

Recommendations and Support

This case highlights the importance of setting and maintaining professional standards and boundaries when establishing a new relationship between a health professional and team members. Attempting to re-establish higher professional standards after previously demonstrating a willingness to breach them may be difficult, therefore a clinician engaging with a team will need to consider where to place their limits.

Requests that challenge professional standards may occur at any time, including in the 'heat of battle' where there is little warning or opportunity to consider or discuss. It is important that the health professional has established a range of supports to assist in such a situation.

Prior to beginning with the team we recommend the physiotherapist (or indeed any health professional) talk with senior management about expectations and

boundaries. The physiotherapist would be advised to remind team management of their professional obligations as expressed in their code of ethics and conduct. A similar discussion could also be held with team members.

For sports physiotherapists facing a similar situation, we suggest the following four tools as a way of encouraging sound and robust ethical decisions. These include:

1 Knowledge of the expectations expressed within professional codes of ethics and conduct.

2 Consideration of potential areas of conflict and where their own limits are (in association with expectations set out in professional standards).

3 Having a close group of sports health professional colleagues who are willing to discuss ethically challenging cases openly. The discussions need to be reflective and thoughtful and that the group must respect confidentiality.

4 Have a working knowledge of the support structures within Sports Physiotherapy New Zealand, and Physiotherapy New Zealand and know how to access that support when required.

5 Have an effective working relationship with the team doctor.

Conclusion

The present case highlights the complexity of the setting in which the sports physiotherapist practices and the compromising position they can be placed in when such requests are made. We consider that the physiotherapist in this situation has made the right decision, but while it looks like a cut and dried case, in reality these cases are far from straightforward. The physiotherapist must decide what further action to take, who to inform and whether any on-going relationship with the team is feasible.

Having a clear role and establishing expectations with the team management and players at the beginning of the working relationship may assist the physiotherapist in creating a culture where his role is respected. However, in spite of these efforts, demands may still be placed on the physiotherapist that he finds difficult to deal with. In these circumstances the physiotherapist who has good resources ready and available and strategies in place for such eventualities will be able to navigate such requests with confidence.

Acknowledgements

Dr Jeanne Snelling, Dr Neil Pickering, Sandy Elkin

References

1 Farrugia, Paul J. "Consent Defence: Sports Violence, Sadomasochism, and the Criminal Law." *Auckland UL Rev*. 8 (1996): 472.

2 Ackford, P. Quins scandal opens the door to world of sinister practices. The Sunday Telegraph, 2009; p.Newspaper Article.

3 Australasian College of Sports Physicians, 2008. Code of ethics http://www.acsp.org.au/

4 Anderson, L. Bloodgate: were the punishments fair? *British Journal of Sports Medicine*, 2011.

5 Brown, J. & Olsen, J. "6. Whistleblower mistreatment: identifying the risks." Whistleblowing in the Australian public sector 2008; 137.

6 Devitt, B. M. & Mccarthy, C. 'I am in blood Stepp'd in so far...': ethical dilemmas and the sports team doctor. *British Journal of Sports Medicine*, 2010; **44**, 175-178.

7 Fédération Internationale de Basketball Amateur, 2012. http://www.fiba.com/downloads/Rules/2012/OfficialBasketballRules2012.pdf [Accessed 09.03.14].

8 Freidson, E. Profession of medicine: a study of the sociology of applied knowledge. University of Chicago Press 1988.

9 Health Information Privacy Code. Wellington: New Zealand Government Print, 1994.

10 Holm, S. & Mcnamee, M. Ethics in sports medicine. *BMJ*, 2009; **339**, b3898.

11 Huizenga, R. 1994. You're okay, it's just a bruise: a doctor's sideline secrets about pro football's most outrageous team, New York, St. Martin's Griffin.

12 International Rugby Board, 2013. http://www.irblaws.com/index.php?law=4 [Accessed 09.03.14].

13 Johnson, R. The unique ethics of sports medicine. *Clinics in Sports Medicine*, 2004; **23**, 175-82.

14 Mansbach, A., Ziedenberg, H., & Bachner, Y. "Nursing students' willingness to blow the whistle." *Nurse Education Today*, 2013; **33**.1 69-72.

15 Opie, H. The team/doctor/athlete legal relationship. *Sports Medicine, Training and Rehabilitation*, 1991; **2**, 287-299.

16 Physiotherapy Board New Zealand, 2011. http://www.physioboard.org.nz/docs/NZ_Physiotherapy_Code_of_Ethics_final.pdf [Accessed 09.03.14].

17 Sports Physiotherapy New Zealand, 2014. to be updated

18 Pipe, A. Reviving ethics in sports: time for physicians to act. *The Physician and Sportsmedicine*, 1998; **26**.

19 Polsky, S. Winning medicine: professional sports team doctors' conflicts of interest. *The Journal of Contemporary Health Law and Policy*, 1998; **14**, 503-29.

20 Privacy Act. Wellington: New Zealand Government Print, 1993.

21 Rugby Football Union. 2009. image of the game report [Online]. Available: http://www.rfu.com/News/2009/September/NewsArticles/300909_Image_of_game_report.aspx.

22 Rugby League International Federation, 2013. http://rlifmedia.dyndns.org/docs/Rugby League International Laws of the Game - Sept 2013.pdf [Accessed 09.03.14].

23 Salkeld, L. R. Ethics and the pitchside physician. *Journal of Medical Ethics*, 2008; **34**, 456-7.

24 Stovitz, S. D. & Satin, D. J. Professionalism and the ethics of the sideline physician. *Current Sports Medicine Reports*, 2006; **5**, 120-4.

25 Waddington, I. 2010. Client control and the limits of professional autonomy: the case of sports medicine and the use of performance-enhancing drugs. Playthegame.org [Online]. Available: http://www.playthegame.org/knowledge-bank/articles/client-control-and-the-limits-of-professional-autonomy-the-case-of-sports-medicine-and-the-use-of-p.html.

26 Waddington, I., Smith, A. An Introduction to Drugs in Sport : Addicted to Winning?, 2008; Hoboken, Taylor & Francis.

LYNLEY ANDERSON, ANGELA CADOGAN,
MICHAEL BORICH, ANTHONY SCHNEIDERS

A Code of Conduct for Sports Physiotherapists in New Zealand

The Sports Physiotherapy special interest group of Physiotherapy New Zealand has recently developed and released the Sports Physiotherapy Code of Conduct (SPCC). The SPCC is unique both nationally and internationally. Within New Zealand this is the first physiotherapy special interest group to have such a code written and adopted specifically for their particular area. The SPCC does not displace the overarching code of ethics for all physiotherapists in New Zealand; the cornerstone for ethical guidance for physiotherapists will always remain the Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct. However the SPCC seeks to explain and apply the principles found in that code to the sports area. The SPCC document may also be unique in the world, because as far as we understand, this is the first document providing ethical guidance for sports physiotherapists internationally.

Sports physiotherapy, like sports medicine, is a complex area of clinical practice. The involvement of coaches, managers, sponsors and fans can place expectations and demands on physiotherapists that are not always easy to respond to. For example, coaches may insist on returning players before they are ready, sponsors may insist on the use of products that do not meet player's needs, and for their sponsored players to be seen on the field or court, and athletes themselves can place pressure on physiotherapists to take shortcuts in clinical care. At times the objectives of the team may conflict with the health and wellbeing of the athletes and sports physiotherapists may find themselves in complex situations with little guidance. While some of these ethical concerns will be present in other clinical areas of physiotherapy practice, it is the nature of the sports setting that can make this a fraught place to work. There are also some particular concerns such as fair play, and the use of performance enhancing drugs that are exclusive to sport and so require attention within a specific code.

Events overseas also spurred the code writers to take action. The Bloodgate saga in the UK – where a highly regarded sports physiotherapist got involved in cheating by providing blood capsules to fake a blood injury in rugby, and then falsified documents – demonstrated that even top level physiotherapists are vulnerable to the challenges of the sporting environment. This was concerning – a senior physiotherapist at the pinnacle of his career had been struck off for poor behaviour (later reinstated). This raises questions about how others – particularly those at the beginning of their career – are able to negotiate this complex area.

In response to the concerns of the sports physiotherapy community, and with the support of Physiotherapy New Zealand, a decision was made to develop the SPCC. A working party was set up that included senior sports physiotherapy people, Angela Cadogan, Tony Schneiders and Michael Borich, and the primary author Lynley Anderson, and this group met on a regular basis. The SPCC was informed by data and experience gathered as part of the development of the Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct and the Australasian College of Sports Physician's Code of Ethics both of which had Lynley Anderson as the primary author. The SPCC was written by the working party, with legal input provided by Jeanne Snelling.

The first draft was then sent out to stakeholders for consultation. Stakeholders included all sports physiotherapy special interest group members, other special interest group chairs, the Executive of Physiotherapy New Zealand, the New Zealand Physiotherapy Board, Heads of Physiotherapy Schools, Accident Compensation Corporation, Sports Physicians and doctors, and sporting organisations. Feedback was provided electronically, and the working party met to collate the responses, and make changes to the document in response to that feedback. The final document was adopted earlier this year.

The SPCC document gains its status through endorsement by Physiotherapy New Zealand. Status is also gained via the Code of Health and Disability Services Consumers' Rights (Code of Rights). Right 4 of the Code of Rights states that 'Every consumer has the right to have services provided that comply with legal, professional, ethical and other relevant standards'. This means that if a complaint has been received by the Health and Disability Commissioner about the actions of a sports physiotherapist, then the Commissioner may use the SPCC to determine if a breach has been made by the physiotherapist.

As with any code, the SPCC will require regular review in order for it to remain current and to meet the needs of this group of practitioners. We hope that the code will standardise behaviour across the group, express the values held by this community of physiotherapists, and guide and support them in their everyday work.

The SPCC is available to all on the website of Physiotherapy New Zealand.

References

'Bloodgate' physio Stephen Brennan struck off'. (2010) http://www.bbc.co.uk/news/uk-england-london-11302876

Anderson, L., & Jackson, S. (2013). Competing loyalties in sports medicine: Threats to medical professionalism in elite, commercial sport. International Review for the Sociology of Sport, 48(2), 238-256.

Anderson, L., & Bowyer, L. (2012). Engaging the professional community: rewriting a code of ethics for NZ physiotherapists. Physical Therapy Reviews, 17(3), 190-196.

Health and Disability Commission. (1996). Code of health and disability services consumers' rights. Wellington: Health and Disability Commission.

Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct (2011) http://www.physioboard.org.nz/docs/

Australasian College of Sports Physicians Code of Ethics (2008) http://www.acsp.org.au

Sports Physiotherapy Code of Conduct

Reprinted with the Permission of Sports Physiotherapy New Zealand

AUTHORS

Lynley Anderson (University of Otago), **Angela Cadogan** (Sports Physiotherapy New Zealand), **Michael Borich** (Sports Physiotherapy New Zealand), **Anthony Schneiders** (Sports Physiotherapy New Zealand), **Jeanne Snelling** (Law Faculty, University of Otago)

PREAMBLE

The objective of the Sports Physiotherapy Code of Conduct (SPCC) is to provide a comprehensive set of guidelines for the professional behaviour expected of physiotherapists providing sports physiotherapy services.

The SPCC applies to any physiotherapist providing sports physiotherapy services including immediate care, injury assessment and management, rehabilitation, exercise prescription, injury prevention or enhancement of sporting performance in individuals involved in any level of exercise or sport.

The SPCC acknowledges the varied work environments of a sports physiotherapist. Sports physiotherapists work in recreational sports and leisure industries, as physiotherapists working with athletes at all levels, within sporting organisations as a physiotherapy/medical coordinator, or in physiotherapy clinics.

A patient/client in this setting is the individual receiving sports physiotherapy services, or, the group of people for whom the sports physiotherapist is contracted or otherwise engaged to provide sports physiotherapy services.

RELATIONSHIP BETWEEN THE "Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct" AND THE SPCC.

The same ethical principles that apply to the practice of all physiotherapists in New Zealand also apply to those physiotherapists who provide sports health care.

The Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct produced by the New Zealand Physiotherapy Board (NZPB) and Physiotherapy New Zealand (PNZ), is the code for all physiotherapists in New Zealand (see www.physioboard.org.nz).

Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct

1. Physiotherapists respect patients/clients and their whanau and families.
2. Physiotherapists act to promote the health and wellbeing of the patient/client, while acknowledging, respecting and facilitating patient/client autonomy.
3. Physiotherapists respect confidentiality, privacy and security of patient/client information.
4. Physiotherapists treat people fairly.
5. Physiotherapists practice in a safe, competent and accountable manner.
6. Physiotherapists act with integrity in all dealings.
7. Physiotherapists strive for excellence in physiotherapy standards.
8. Physiotherapists communicate effectively and cooperate with colleagues, other health professionals and agencies, for the benefit of their patients/clients and the wider community.
9. Physiotherapists take responsibility to maintain their own health and wellbeing.
10. Physiotherapists accept responsibility to uphold the integrity of the profession.

The SPCC does not alter the Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct, but interprets and explains these principles as they relate to the sporting environment.

A SPORTS PHYSIOTHERAPIST'S LEGAL OBLIGATIONS

The SPCC should be read in conjunction with all legislation, standards and codes relevant to the provision of physiotherapy services in New Zealand.

This code is not intended to vary the legal obligations and duties of sports physiotherapists. It is the responsibility of the sports physiotherapist to identify the particular legal obligations and responsibilities applicable to their work situation.

FORMAT AND STYLE

The term 'will' is used to indicate that the associated statement sets a minimum standard that sports physiotherapists will achieve. The term 'should' reflects a standard that sports physiotherapists aim to promote and nurture.

1. GOOD PATIENT CARE

Commentary: Good patient care in sport requires a range of clinical, interpersonal and management skills. The nature of the physiotherapy-patient relationship is critical to achieving positive outcomes. Sports physiotherapists should be aware of how the environment in sport may impact upon the ability to provide quality care. Sports health care sometimes requires balancing the health and welfare of the patient with the desire for sporting success. An understanding of the special physical and mental demands placed on patients through their participation in sporting activities is required.

Standard of Clinical Practice

The sports physiotherapist will:

i. Acknowledge the best interest of the patient as the underlying value that should guide management in the sporting environment.

ii. Provide a standard of clinical care that is consistent with the current best practice in sports physiotherapy, within the resource and systems constraints of the sporting environment.

iii. Be aware that he or she is not obliged to provide treatment if, in his or her professional judgement, the treatment would either not benefit or would harm the patient, or is considered unethical (assist the patient to seek a second opinion if requested).

iv. In an emergency, be prepared to assist in the care of others if required.

v. When providing physiotherapy services at sports events, hold up-to-date competencies in basic life support (including use of Automated External Defibrillator, Cardiopulmonary resuscitation and airway management) and first aid.

vi. Provide appropriate handover of patient information to relevant medical personnel to ensure continuity of care.

vii. Recognise the particular vulnerabilities and physiological and developmental characteristics of children in sport, and the short and long-term risks (physical and psychological) of training regimes and competition on children.

viii Recognise the particular needs and vulnerabilities of athletes with disabilities.

The sports physiotherapist should:

ix. Advocate for children if children are being placed at high risk of harm from their participation in sport.

x. Be aware of the psychological and emotional aspects of sport including: training, competition, sporting success/failure, injury (and recovery from injury) and retirement. Have baseline knowledge of the key warning signs of depression, significant anxieties and eating disorders and, refer patients appropriately.

*Commentary: **Sports physiotherapists may be the first person to observe mental health issues in a patient. Depression and significant anxieties may first present with sleep problems, extreme fatigue, loss of motivation and energy, anger and/or sadness, over-thinking, withdrawal from sport and life. Eating disorders may include anorexia, bulimia, binge eating,***

purging, abuse of laxatives and or diuretics, or other inappropriate compensatory behaviour including excessive exercise. Eating disorders are more common in sports that emphasise the athletes' appearance, or those sports with weight classes. Patients identified as having eating disorders or mental health issues or should be referred to their GP or, within a team environment, to the appropriate health professional.

2. RELATIONSHIPS WITH PATIENTS

Sports physiotherapists will:

i. Communicate effectively with patients (including parents and guardians of minors) about the nature, prognosis, and implications of an injury on training and competition, the risks of continued participation and possible consequences for recovery, the treatment options and any relevant injury prevention strategies.

ii. Not exploit any patient/client whether physically, sexually, emotionally, or financially. Sexual contact of any kind with any patients/clients is unacceptable.

Commentary: Sexual contact of any kind with athlete-patients is unacceptable. If a sports physiotherapist has an existing relationship with an athlete or team management prior to taking on the physiotherapy role, he or she should be aware that this relationship may create a conflict of interest. (see PNZ, Clear sexual boundaries in the patient-physiotherapist relationship)

iii. Act in a considered and professional manner during all team social activities, especially where alcohol is consumed.

Commentary: A sports physiotherapist is part of the team by virtue of their professional role. As a health professional within that team, the sports physiotherapist should consider how their individual actions in a team social setting reflects on themselves and the physiotherapy profession, and impacts on future physiotherapy patient relationships and may endorse particular team behaviours. Insofar as a sports physiotherapist has a role in ensuring patient health and welfare, the abuse of any substances should be discouraged.

3. EMPLOYMENT STRUCTURE AND RELATIONSHIPS

Commentary: Where a sports physiotherapist is employed or otherwise engaged by a team or sports governing body, multiple responsibilities and obligations may result. Particular duties or responsibilities may be specified within an employment contract that will conflict with the ethical obligations expected of physiotherapists. A problem can arise where meeting one obligation will result in the neglect of others. The most common divided loyalty for a sports physiotherapist is where the needs of the employer conflicts with the health needs of the patient. Before agreeing to provide services to a team the sports physiotherapist should be aware of whom they will be expected to provide care for.

When employed/engaged by a sports organisation the sports physiotherapist will:

i. Act with honesty and integrity in all professional activities and act in good faith with their employer/contractor.

ii. Recognise his or her duty of care to the patient as the first concern and that contractual or other responsibilities are of secondary importance.

iii. Not be party to an employment contract that forces or encourages him or her to abandon a commitment to patient welfare.

iv. Be aware of the contractual and regulatory requirements of funding authorities in the provision of sports physiotherapy services.

The sports physiotherapist should:

v. Seek legal advice prior to signing an employment contract.

vi. Ensure that decisions regarding the supply of health products to the patient or team are, where possible, evidence based. Advocate constructively for patients where sponsors' demands or products negatively impact on patient welfare.

vii. Discourage sponsorship of the sports medical team that is in conflict with good health (e.g. alcohol or tobacco sponsorship)

4. CONFIDENTIALITY AND PRIVACY

Commentary: Confidentiality of health information about athletes is an area of concern for sports physiotherapists, particularly when the physiotherapist is employed or otherwise engaged by a team or sporting franchise. Employment contracts may require physiotherapists to share health information, in particular injury and injury treatment information with the coach or management. In these situations a sports physiotherapist may face a dilemma, either to share health information in accordance with contractual obligations (and employer expectations) but against the wishes of the athlete, or, respect the wishes of the athlete, but be in breach of contractual obligations.

Failure to respect confidentiality of personal health information about a patient may result in unintended consequences including a patient deciding not to disclose relevant information to the sports physiotherapist, creating unnecessary risk to the health of the individual or others. Sports physiotherapists should take particular care to protect confidentiality when using social media.

The sports physiotherapist will:

i. Maintain patient confidentiality, except where legal requirements direct otherwise, or a strong ethical justification exists.

ii. Seek permission from the patient prior to each disclosure of health information to a third party (unless it is believed on reasonable grounds that such disclosure is one of the purposes for which the information was obtained and the patient is aware of the intended recipient(s)). Inform the patient of the advantage of sharing health information with coaches and team management to promote effective injury management and return to play.

iii. Where necessary, educate coaches, trainers, team management and sports governing bodies of the need for confidentiality between the sports physiotherapist and the patient.

Commentary: Sports teams or sporting bodies commonly require athletes to sign a health information release form at the beginning of the season or on joining a team. A health information release form signed by an athlete does not discharge the sports physiotherapist from the responsibility for seeking permission to each disclosure of health information about the patient to a third party. In complex situations a sports physiotherapist should seek advice from other health professionals associated with that patient's care, or other appropriate sources.

iv. Be sensitive to and respect the cultural and personal values of patients, especially where carrying out assessment or treatment in shared facilities.

v. Where assessment or treatment must be carried out in a public environment, patient privacy will be maintained to the level it can be reasonably achieved.

Commentary: The nature of some sports settings may make it difficult to provide privacy for the patient.

vi. Not provide health information about a patient to the media without the consent of the patient (and/or team management where required) and will consider how information provided might impact on the athlete or team.

5. SCOPE OF PRACTICE

Sports physiotherapists will:

i. Be aware of the limits of their clinical competence and sports-specific knowledge at varying levels of competition and refer to, or seek advice from an appropriately skilled professional as required.

ii. Work within their scope of practice, and ensure that they maintain their knowledge and skills through regular continuing professional development.

Commentary: In some situations, sports physiotherapists may be expected to work, outside the usual scope of practice generally understood to be that of a physiotherapist. These situations may include suturing, fracture and dislocation care, and administering medications. Sports physiotherapists must be aware of their legal obligations, and the regulations of the New Zealand Physiotherapy Board. It is the responsibility of individual sports physiotherapist to ensure they have received relevant training and education and have obtained the necessary competencies to work at this level.

Providing Medications in the Absence of a Doctor (Standing Orders)

Commentary: Patient safety and wellbeing are of utmost importance when receiving physiotherapy services. Prescription and dispensing medications

is not within the scope of practice of a physiotherapist, however a sports physiotherapist may, under certain formal structures, supply or administer medications under instruction from a doctor in that doctor's absence. This activity is set out in the Medicines (Standing Orders) Regulations, 2002, and is further explained in the NZ Ministry of Health document entitled 'Standing Orders Guidelines, 2012'. Sports physiotherapists wishing to supply or administer medications must familiarise themselves and comply with the requirements specified in these documents. Standing orders must not be an activity of first choice if better options are available (e.g. travelling with a doctor or using a doctor in another centre). A relationship of trust with the prescribing doctor is necessary to ensure safe patient care.

When working under 'standing orders'

Sports physiotherapists will:

- Be aware of and comply with all legal obligations.
- Maintain appropriate competencies (including those specified by the issuer) for this work.
- Ensure patient safety is paramount, if in doubt – seek assistance. Any referrals to other services must be documented and the prescribing doctor informed.
- Recognise that any deviations from the standing order are not permitted (this includes providing medication to those not specified within the standing order).
- Keep contemporaneous documentation of care and advice given.
- Debrief with the prescribing doctor on return
- Understand that over the counter medications must be included in a standing order. If no standing order exists direct the patient to consult a pharmacist or doctor.

6. RISK TAKING

Commentary: ***Risk-taking in sport is the responsibility of the patient where that patient understands the nature and extent of the risk, is competent to make a decision, and the decision is freely made.***

The sports physiotherapist will:

i. Inform the patient (as far as possible) of the potential harm associated with returning to sport following injury including the likelihood and severity of further injury and the implications of injury on quality of life and future career. Advocate for the patient where the patient is being pressured into taking high levels of risk.

ii. When advising athletes about return to sport following injury, discourage choices to participate in sport where a patient's condition creates a high likelihood of a severe outcome (loss of life or severe incapacity). This advice should be documented.

iii. Not knowingly facilitate a return to sport following injury where there is a high likelihood of a severe outcome for the patient (loss of life or severe incapacity). A sports physiotherapist is under no obligation to assist a patient to return to sport following an injury if the sports physiotherapist considers the risk is unacceptable.

7. MAINTENANCE OF PATIENT RECORDS

Commentary: ***Maintenance of patient records can be difficult during training or games, however for reasons of patient safety and to meet professional expectations the sports physiotherapist will:***

i. Ensure maintenance of accurate, legible and contemporaneous records of treatment provided, advice given, and the results of investigations. (PNZ position statement)

ii. Be aware of legal requirements about collection, storage, and disclosure of personal health information about patients, and ensure appropriate transfer or storage of patient's records upon completion of care. [See the Health Information Privacy Code]

8. FAIR PLAY IN SPORT

Banned Performance Enhancing Substances:

The sports physiotherapist will:

i. Be familiar with current anti-doping policies (including the current list of banned substances) and the rules of the WADC (World Anti-Doping Code).

ii. Not engage in any activity that encourages or enables the use or administration of any prohibited substance or doping method (as defined by the World Anti-Doping Code) unless an athlete has a current Therapeutic Use Exemption (TUE).

iii. Cooperate fully with the athlete testing programme and not impede doping control officials, or encourage/assist athletes to impede or evade doping control procedures and processes. Discourage the potential use of banned performance enhancing substances and banned doping methods.

Honesty and Integrity:

Sports physiotherapists will:

i. Act with honesty and integrity and promote fair play in sport.

ii Not violate the rules of a particular sport in order to obtain an unfair advantage.

iii. Not fix or attempt to fix a match (or any part of a match), or use of reveal inside information for the purposes of betting.

9. EFFECTIVE RELATIONSHIPS

Commentary: ***Good quality care for patients often requires collaboration with a health care team.***

Sports physiotherapists will:

i. Maintain effective, collaborative and professional relationships with other medical/healthcare professionals (including physiotherapists, sports physicians, sports doctors, GP's) involved in the patient's care.

ii. Maintain respectful relationships and behave in a professional manner with non-medical/health care personnel (including coaches, managers, support and administration staff, match officials etc.).

iii. Not undermine relationships between another sports health care provider and their patient.

REFERENCES

- Physiotherapy New Zealand: physiotherapy.org.nz
- New Zealand Physiotherapy Board: physioboard.org.nz
- New Zealand Physiotherapy Board: Aotearoa New Zealand Physiotherapy Code of Ethics and Professional Conduct, 2011.
- Medicines (Standing Orders) Regulations, 2002 http://www.legislation.govt.nz/regulation/public/2002/0373/latest/DLM170107.html
- Standing Order Guidelines 2012. http://www.health.govt.nz/publication/standing-order-guidelines
- World Anti-Doping Code, 2009: wada-ama.org/en/World-Anti-Doping-Program/Sports-and-Anti-Doping-Organizations/The-Code/
- Therapeutic Use Exemption, 2011: wada-ama.org/en/Science-Medicine/TUE/
- PNZ, Clear sexual boundaries in the patient-physiotherapist relationship (2012)
- Health Information Privacy Code (HIPC)

FUNDING

The Sports Physiotherapy Code of Conduct was developed with the support of Physiotherapy New Zealand.

ACKNOWLEDGEMENTS

Physiotherapy New Zealand

Physiotherapy Board of New Zealand

International Federation of Sports Physical Therapy

Sports Physiotherapy Australia

High Performance Sport New Zealand

Karen Nimmo (Clinical Psychologist)

Thanks also to the many athletes, physiotherapists, medical professionals and sporting organisations who provided feedback during the consultation process.

30th December 2013

2014 NZ Sports Medicine and Science Conference

14-15 November • Shed 6, Wellington, New Zealand

Keynote Speakers

THOMAS BEST

Dr Thomas Best is a professor of Family Medicine, OSU College of Medicine and a professor in the department of Biomedical Engineering. He serves as the team physician Columbus' professional dance troupe BalletMet. Prior to joining the OSU Sports Medicine staff in 2005, Thomas spent ten years on the faculty of the University of Wisconsin College of Medicine as well as team physician for the Wisconsin athletic department. Thomas' clinical interests include muscle/tendon injuries, osteoarthritis, concussion, endurance athletes and evidence-based medicine.

STUART PHILLIPS

Prof Stuart Phillips is a Professor of Kinesiology from McMaster University, Canada. Stuart has BSc and MSc degrees from McMaster. He graduated with a PhD from the University of Waterloo in Human Physiology in 1995. He returned to McMaster in 1997 to assume a faculty position and is now a Professor in the Department of Kinesiology and an Adjunct Professor in the School of Medicine at McMaster University.

HANS TOL

Dr Hans Tol is a Dutch trained Sports Medicine Physician specialising in medical management of tendon and muscle injuries. Currently he is a Sports Medicine Physician and Coordinator of Clinical Research at Aspetar, Qatar Orthopaedic and Sports Medicine Hospital. Hans is a senior associate editor of the British Journal of Sports Medicine and has published extensively in international peer-reviewed journals.

ERIK WITVROUW

Dr Witvrouw is a researcher and senior physiotherapist at Aspetar Orthopedic and Sports Medicine Hospital, Doha, Qatar. His research focuses on musculoskeletal injuries in general, and knee problems in sports medicine in particular.

For further information, please go to:

www.sportsmedicine.co.nz

or contact

smnznat@xtra.co.nz

Teres Major Strain: Not a minor

Greg Usherwood[1]
Steve Williams[2]

[1] Physiotherapist, School of Physiotherapy, University of Otago

[2] General Practitioner, Dunedin

Introduction

The teres major (TM) muscle is part of the posterior shoulder musculature and acts to medially rotate, adduct and extend the arm.[1] TM muscle strains are uncommon injuries and there are very few reported cases in the literature.[4,6,7,8,9,10,11,12] Of reported cases, baseball pitchers appears to be the most frequently cited in the literature,[6,8,10,11] although there have also been documented reports in sports such as ice hockey,[4] tennis[12] and water skiing.[7,9] To our knowledge there have been no cases of TM strains reported in cricket players. We present a case study of a professional cricket player with a strain to his TM muscle.

Case Report

A 25 year old male right arm medium pace first class cricketer presented with acute onset right posterior shoulder pain which developed after bowling a delivery. The pain was such that he did no further bowling in the match, but he was able to bat with some discomfort. He was initially treated by the team physiotherapist for a sprain of the subscapularis muscle. Four weeks later he attempted to return to bowling but the right posterior shoulder pain was still present.

The pain was most noticeable at ball release when bowling. Pain was also experienced when throwing and when doing "lat pull downs" at the gym. On examination he had a full range of shoulder movement, there was no painful arc and no glenohumeral laxity was noted. On palpation there was no tenderness over the AC joint or bicipital groove, however he was tender in the region of the proximal triceps. But he had no pain with resisted triceps testing. Rotator cuff testing was normal as were O'Brien's and Crank test. The presentation appeared somewhat atypical but indicated injury of the posterior structures possibly a muscle strain of the triceps or teres major, or a posterior labral injury. Given the failed return to bowling and the ongoing symptoms, he was referred for non-arthrogram MRI of the shoulder.

Teres Major Muscle

Origin	Dorsal surface of inferior angle and lower third of lateral border of scapula
Insertion	Crest of lesser tubercle of humerus
Action	Medially rotates, adducts and extends the glenohumeral joint
Innervation	Lower subscapular C5, 6, 7

MRI revealed a grade II strain of the TM/latissimus dorsi (LD) muscles. With the MRI findings and ongoing symptoms, we instigated a further period of relative rest. After one week he resumed strengthening exercises consisting of scapular stabilising exercises and progressing to incorporate strengthening of internal rotators, adductors and progressive rotator cuff exercises. Over a two week period plyometric and functional sport specific exercises were introduced. The athlete's progress was

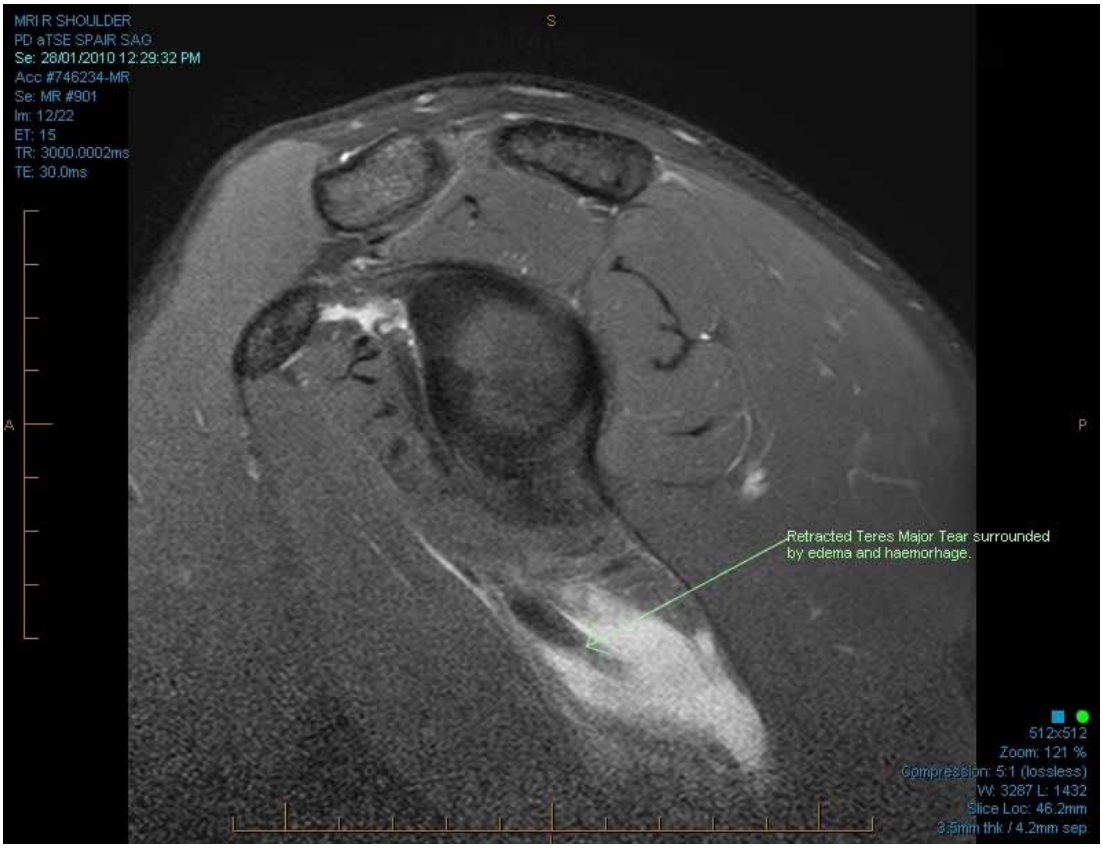

Figure One: Sagittal T2 MRI image of the right shoulder revealing increased signal intensity and fluid collection in the TM and LD muscles.

assessed with his ability to complete sports specific exercises without shoulder pain and he returned initially to throwing followed by graduated levels of bowling. Nine weeks from the original onset of symptoms he returned to competitive cricket and bowled pain free.

He remained pain free although six months later he was attending an out of season training camp in Australia which involved increased volumes and intensity of throwing and bowling. He completed the camp but noticed the gradual onset of similar right posterior shoulder pain. This resolved over two weeks with no formal treatment and there has been no further recurrence.

Discussion

Injuries to the TM muscle are uncommon, and to our knowledge there have been no case studies involving cricket players. Among sixteen professional baseball pitchers with TM and/or LD injuries fifteen returned to the same level of play. Mean time to return to throwing was 35 days and 62 days to pitching. Nine of the sixteen injuries were season-ending.[10] This cricketer returned to play at approximately 63 days, which may have been earlier had he not had an early failed return to play. Studies investigating muscle activity during throwing and baseball pitching have not looked at the TM muscle specifically, but have investigated the LD muscle.[3,5] These two muscles have a similar action, medially rotating, adducting and extending the gleno-humeral joint. These muscles are primarily involved in generating force in the acceleration phase of throwing, but are also involved in decelerating the arm at the end of the cocking phase.[3,5] During the 'ball release' phase of the bowling action in cricket the arm can be observed moving into flexion and adduction (this is when most pain was experienced by the athlete). Teres major and LD are likely to be in action. Unfortunately, in comparison to muscle activation studies in baseball there is a paucity of literature with regards upper limb muscle activation during the bowling action.[2]

Likely factors involved in the development of this injury were that the athlete had a greater bowling and throwing workload than normal, and was perhaps not conditioned for this. The athlete was a fringe first class player so was not getting regular 4 days cricket games. Therefor the amount of bowling that he was doing in this game was much greater than what he was used to playing in club cricket. This case highlights the need for monitoring of bowling and throwing loads.

To what extent throwing by the athlete contributed to the injury is unclear. This highlights an area of future research to study upper limb muscle activity during the bowling action. With an increasing emphasis on fielding in modern day cricket (with throwing a key component of this), consultation with throwing coaches in professional baseball may be beneficial for establishing correct techniques and appropriate throwing loads to avoid injury.

Key lessons from this case include the importance of an accurate diagnosis and clear initial management plan, the identification of likely risk factors for the injury and the risk of returning without completing a comprehensive rehabilitation programme.

References

1 Bartlett RM, Stockill NP, Elliott BC, Burnett AF. The biomechanics of fast bowling in men's cricket: A review. *J Sports Sci.* 1996; **14**:403-424.

2 Broome HL, Basmajian JV. The function of the teres major muscle: An electromyographic study. *Anat Rec* 1971; **170**:309-310.

3 Gowan ID, Jobe FW, Tibone JE, Perry J, Moynes DR. A comparative electromyographic analysis of the shoulder during pitching. *Am J Sports Med.* 1987; **15**:586-590.

4 Grosclaude M, Najihi N, Ladermann A, Menetrey J, Ziltener JL. Teres major muscle tears in two professional ice hockey players: case study and literature review. *Orthop Traumatol Surg Res* 2012; **98**:122-125.

5 Jobe FW, Moynes DR, Tibone JE, Perry J. An emg analysis of the shoulder in pitching. *Am J Sports Med.* 1984; **12**:218-220.

6 Leland MJ, Ciccotti MG, Cohen SB, Zoga AC, Fredrick RJ. Teres major injuries in two professional baseball pitchers. *J Shoulder Elbow Surg* 2009; **18**:e1-e5.

7. Lester JD, Boselli KJ, Kim PD, Ahmed CS. Isolated rupture of the teres major tendon: A case report and literature review. Orthopedics 2012; 33:1-5.

8. Malcolm PN, Reinus WR, London SL. Magnetic resonance imaging appearance of teres major tendon injury in a baseball pitcher. Am J Sports Med 1999; 27:98-100.

9 Maldjian C, Adam R, Oxberry B, Chew F, Kelly J. Isolated tear of the teres major: A waterskiing injury. *J Comput Assist Tomo* 2000; **24**:594-595.

10 Nagada SH, Cohen SB, Noonan TJ, Raasch WG, Ciccotti MG, Yocum LA. Management and outcomes of latissimus dorsi and teres major injuries in professional baseball. *Am J Sports Med* 2011; **39**:2181-2186.

11 Schickendantz MS, Kaar SG, Meister K, Lund P, Beverley. Latissimus dorsi and teres major tears in professional baseball pitchers: A case series. *Am J Sports Med* 2009; **37**:2016-2020.

12 Takase K. Isolates rupture of the teres major muscle. *JOSPT* 2008; **38**:439.

Athletes with limb deficiency: Physiotherapy-specific issues

Megan Munro[1]
Justin Ralph[2]

[1] Lead Para Swimming Physiotherapist
[2] Lead Para Bike Physiotherapist

True or False?

- Paralympic swimmers only have one classification.
- Amputee swimmers are not allowed to race wearing a prosthetic limb.
- Lower limb amputee cyclists may ride with or without their prosthesis.
- Lower limb amputee cyclists are at higher risk of overuse injuries in comparison to able-bodied athletes.

Following on from the last article discussing the medical issues of athletes with a limb deficiency, this article will focus on the physiotherapy-specific issues encountered when dealing with athletes with a limb deficiency, specifically with regards to the events of swim and bike. Swim and bike are two of the key focus Paralympic sports in New Zealand and physiotherapy input within these sports is now well established with lead physiotherapy roles, and these specialised providers will share some of their specific observations and expertise in their areas.

Swimming freestyle, butterfly and backstroke require relatively greater upper limb strength and function whilst breaststroke places relatively higher demands on the lower limb. A swimming athlete will therefore be variably affected depending on whether they have an upper or lower limb deficiency (or both) and their preferred stroke/s. This is reflected in a swimmer's race classification where an athlete can be given a different classification for breaststroke compared to the other strokes depending on their impairment.

Para swimmers are not allowed to race with prosthetic limbs on, even if they are adapted for swimming, however some may choose to train with them on. There are various modifications/ equipment swimmers can use to help them start according to their ability. For example for a below elbow amputee, a belt could be tied around the diving block for the athlete to hook their limb around if they cannot grip the bar.

The main difference between amputee and able-bodied swimming is the asymmetry that exists which can lead to more strain on the unaffected side or longer limb, and cause muscle imbalances and injuries. The most common injuries are shoulder, neck, and mechanical low back pain. Amputee swimmers will pull through or kick with their intact or longer limb more powerfully which can lead to overuse injuries on that side. The more altered the swimming biomechanics are, the more potential there is to run into problems. For example, a complete amputation of an arm at shoulder level, will generally involve an athlete swimming more on their side,[2] which means they could spend prolonged periods of time in a slightly rotated position. The higher the amputation level, the greater the biomechanical disadvantage. Lower limb amputees may have increased lateral movement of the pelvis so core and gluteal strengthening should be emphasised in their dry land program. Standing on and diving off the blocks or pushing off from the wall may also pose difficulties for amputee swimmers. This again can be addressed in dry land training by improving balance and proprioception and stability muscle activation/control.

Strength and conditioning or dry land training should be tailored towards the mechanical differences in stroke. The dry land program should complement the swimmer's water training and consist of shoulder/scapula stability, core and gluteal exercises alongside a mobility/ flexibility program particularly for the shoulders and upper and lower back. Similar to able-bodied swimmers, amputee swimmers need to work on having good scapulo-thoracic stabilisers, avoid anterior and posterior shoulder capsule tightness and have optimal thoracic mobility to ensure they don't develop 'swimmer's shoulder'.[3] Training volume should be considered if an athlete is persistently experiencing

overuse problems. It is also important not to forget about optimising the shorter limb because in elite races the affected limb, no matter how short or weak, could be the difference between a gold or silver medal. Working closely with the limb centres is important as a good fitting limb (particularly lower) will improve day to day mobility and ability to train in the gym and pool.

Para swimmers may not do as much dry land strength and conditioning work compared to able-bodied athletes due to lack of knowledge of how to adapt the exercises to their ability. This is something Paralympics NZ Swimming is working on as most exercises can be adapted to still improve strength, control and flexibility if you are an amputee; you often just need to use a little imagination and think outside the box.

Bike athletes with a lower limb amputation can choose to either ride with or without a prosthetic limb and they are then classified according to this as well as their functional level on the bike. Prosthetic limbs used by cyclists are different from their everyday ones and are made specifically for cycling within certain regulations.

Lower limb amputees are at high risk of certain overuse injuries primarily around the lumbo-pelvic and hip region. This is due to an increased work load through the non-amputee leg, altering the position of the lumbo-pelvic region and in turn the hip joint as an athlete rides the bike. It has been measured that up to 80% of the work load is performed through the non-amputee leg in an athlete riding with a prosthetic limb and in an athlete riding without a prosthetic the work load of the non-amputee side can approach 100%.[1] It is also important to take into account any leg length discrepancies, such as a shorter femur on the amputee side. This significantly alters the biomechanics of the pedal stroke predisposing the athlete to an injury again around the lumbo-pelvic and hip region.

Although assessment and treatment principles and methods are very similar to able-bodied athletes there are some specific considerations to take into account. It is important to assess the level of amputation, function of the amputee leg, and whether the athlete rides with or without their prosthesis (and if they ride without, where the stump is fixed to on the bike). Assessing the trunk stabilising musculature is of high importance as it is a key element to help provide a stable base for the athlete in the bike saddle from which they can pedal while helping to compensate for the amputee side. Depending on the level of amputation there can be functioning muscles or partially functioning muscles, which are prone to overuse as they attempt to assist through a pedal stroke.

In many cases, the nature of physiotherapy and the way in which it is delivered to Paralympic athletes is no different to that provided to able-bodied athletes. The primary focus is to support the athlete and coach to deliver peak performance when it matters, and the key to this is an understanding of how each individual athlete's disability impacts on their training and subsequent performance. In some cases this is of little significance but in others is can be a major factor. Therefore it is important to perform a detailed subjective assessment prior to treating disabled athletes. These athletes will usually welcome questions related to their disability and are very used to answering them.

References

1 Childers W.L, Kistenberg R & Gregor R.J. Pedaling asymmetry in unilateral transtibial amputee cyclists and the effect of prosthetic foot stiffness. 2007. Retrieved from http://www.smartech.gatech.edu.

2 Lecrivain G, Payton C, Slaouti A, Kennedy I. Effect of body roll amplitude and arm rotation speed on propulsion of arm amputee swimmers. *J Biomech* 2010; **19**;43(6):1111-7

3 Tovin B, Prevention and Treatment of Swimmer's Shoulder. *N Am J Sports Phys Ther.* 2006; **1**(4):166–175.

GINNY RUTLEDGE, TONY PAGE, JUDITH MAY, JAKE PEARSON, DUNCAN REID, CHRIS MILNE, SHARON KEARNEY, SARAH BEABLE

NZ Reflections on the IOC World Conference on Prevention of Injury and Illness in Sport

Monaco 10-12 April 2014

Introduction

The IOC World Conference on Prevention of Injury and Illness in Sport occurs every three years, and brings together world leaders in the fields of Sports Medicine and Physiotherapy to discuss the health and well-being of athletes. Over the past 10 years or so, it has proven itself to be one of the most popular Sports Medicine conferences, and this year was no exception, with many thousand attendees from all around the world. The range of presentation topics was immense and the most challenging aspect of the programme was figuring out where to be at different times.

Pleasingly, NZ had a strong representation at the conference, and the following is a summary of personal highlights from some of those who attended. We would recommend the IOC World Conference as a conference to put in your diary for 2017.

PREVENTING INJURIES IN WORLD CUP ALPINE SKIING: RESEARCH AND IMPLEMENTATION HAND IN HAND

Ginny Rutledge

HPSNZ Lead Physiotherapist Snow Sport

Alpine Ski Racing and the more recent Olympic Sports of Free Ski and Snowboard are high risk sports if performed at the Elite (World Cup) Level. There are concerns with regard to the incidence and severity of injuries occurring at the elite level across all three Sports as evident at the Sochi Winter Olympics in February 2014.

Of these three disciplines Free Ski presents with the greatest risk of severe injury (>28 days off snow) followed by Snowboard and then Alpine Skiing. (Florences et al, Scand J Sci Sports: 2014)

The governing body FIS (Federation of Ski) and the Oslo Sports Trauma Research Group have been collecting data from 2006-2014 across the 5 months of the northern hemisphere world cup season in Alpine Ski.

The injury surveillance strategies include interviews and questionnaires to coaches and athletes during and post season, but also included video of injuries in an effort to gain insight into mechanisms and causes of injuries.

Four perceived key injury risk factors were identified in order of perceived ranking of risk, which were presented on behalf by Jorg Sporri, University of Salzburg , Austria)

- System-Ski/Plate /binding boot
- Changing snow conditions
- Speed and course setting aspects
- Speed in general.

Alpine Ski racing has four disciplines Downhill and Super G (Speed Disciplines) and Giant Slalom and slalom (Technical Discipline) The Speed Disciplines present with highest rates of injury whereby Speed and jumps are identified as the risk factors.

Injuries most commonly occur to the knee, head, shoulder and lower back. FIS Injury Surveillance (ISS) reports one injury for every three skiers per season with 30 percent of these being severe. (>28 days off snow)) 60 per cent of these injuries occur in World Cup competition.

The knee is the most commonly injured, with the ACL accounting for the majority of the severe injuries. Interestingly there is no gender difference between males and females, but males present with a higher overall risk of injury.

Knee ACL mechanisms that have been captured on Video have been recreated via Model based imaging (MBI) by Tron Krosshaug of Norway to clearly demonstrate injury mechanism.

The most common (50%) of the ACL injures are classified as" slip catch" whereby the skier loses pressure on the outside ski with the inside edge catching and the ski sliding away. This creates internal tibial rotation and a valgus moment with resultant injury to the ACL.[1] Two other ACL injury mechanisms include the "landing back weighted "and the "Dynamic snowplough". Video footage of these were presented by Tone Bere. of theNorway Olso Sports Trauma Group.

Due to the ski /Plate boot /binding issue as a risk factor an effort to reduce the aggressiveness of the Giant Slalom Ski and avoid the Slip catch mechanism. A prototype evaluation project was carried out in Austria by the Salzburg Group with three key aims

- Reducing the aggressiveness of the in ski –snow interaction (more skidding less carving)
- Reducing the mechanical load-(turning forces)
- Reducing the turning energy (turn speed)

While at the same time trying not to detract from the ski ability and attractiveness of the sport

At the beginning of the 2012/3 season the GS Ski was singled out by FIS and the specifications changed requiring the ski to be longer and thinner, with a ski radius change to 35m. This essentially returned the Ski to "old school" long and straight taking skiing back to the 80s. This created considerable disgruntlement amongst the

racing community and challenges for the Ski Companies. Changes were also made to GS course set specifications with the distance between the gates shortened and the courses set to require more technical skiing.

With the complex jigsaw puzzle in mind including the snow conditions, course setting, equipment and the athlete FIS has set up a FIS risk management program. Pernilla Wiberg (Swedon), herself one of the more famous World Cup Alpine Skiers presented on behalf of this group. Safety elements such as making slalom gates thinner, looking at slope preparation, Helmet componentry, teeth and back protection and continuing to work on protective knee bracing are part of their on -going projects.

To date modifications to the GS Ski has not influenced the rate of ACL ruptures in GS Skiing in World Cup. However, there does appear to be a slight decrease in overall rate of injuries in recent seasons. (Oslo Group, Bere et al)

ANTERIOR CRUCIATE LIGAMENT (ACL) INJURY

Ginny Rutledge

HPSNZ Lead Physiotherapist Snow Sport

We were spoilt to have the World Leaders in ACL Injury prevention presenting in Monaco. Day one of the conference started with Symposium - 'The role of human movement patterns in predicting ACL injuries'. Amongst the lectures Lindsay Di Steano (USA)presented the results of the large prospective cohort study "The Jump ACL" carried out on 5000 military academy personnel looking at biomechanical risk factors. The cohort was followed up over 4 years for incidental ACL ruptures. Their biomechanical and neuromuscular risk factors were presented noting that the greatest predictor of an ACL injury was a previous ACL injury. An interview with Karim Kahn discussing this recent study can be listened too on BJSM podcast free of charge.

Gerthe Myklebust and Tim Hewitt co-presented workshops:" Techniques for preventing ACL injuries". Gerthe is well known for her international contribution to successful ACL Injury prevention programs in handball and soccer with >50% injury reduction. Some of her key messages for implementation of successful prevention programmes include athlete compliance, coach acceptance,changing coach culture, and multivariate approaches including education and media. Successful programmes should include technique correction- for example cutting technique with low knee abduction angles and toe landings, Strength (core and hamstring focus), plyometrics, as well as dynamic balance. The Norwegian prevention website can be found on:

http://www.klokavskade.no/no/Skadefri/

Tim Hewitt presented Sport research statistics showing that 67 % of athletes do not return to sport within a year, and approximately 1/4 will re tear with a high percentage being a tear of the contralateral knee.

An interesting workshop was run by Markus Weldon (Sweden). He introduced their soccer specific programme that is being implemented successfully nationwide in Sweden. This is a 15 min warm up program with compliance and player attendance as key messages. This app can be downloaded free on smartphone. Search: Knakontroll. It is worth viewing as it includes video clips of the exercises and progressions delivered.

http://www.altaif.se/altaif-fotboll-f02/nyheter/444671/app-knakontroll

The final day symposiums included "Screening for ACL injury using the drop jump task." Presenters debated the Drop Jump test as a screening tool. Tim Hewitt told us that knee valgus and abduction angles (>8 degrees) are a valid predictor of ACL injury in the female athlete. Darin Padua presenting for the "Jump ACL" Cohort stated that they found no support for knee kinematics (valgus collapse or reduced knee flexion) as a predictor of ACL injury using the drop Jump test. However they did find that hip adduction at initial ground contact was a risk factor (Pelvic drop /Hip Shift)

The risk factors are multivariate including family history (4x risk if a parent has prior ACL), joint geometry and laxity, general ligament laxity, BMI, female sex and neuromuscular. The reasons why male and females rupture may be different…

These later presentations highlight that screening is difficult if we want to predict who will get injured. However we know what the risk factors are, and we should focus on these to improve prevention strategies and prevention should be for everyone.

HAMSTRING INJURIES

Tony Page

All Blacks Sports Physician

Carl Askling presented his paper 'Acute hamstring injuries in Swedish elite sprinters and jumpers: a prospective randomised controlled clinical trial comparing two rehabilitation protocols' (4)

A more rapid return to sprinting activity in elite athletes was demonstrated when following a lengthening type rehabilitation protocol when compared to a contracting type standard hamstring rehabilitation protocol.

Hamstring injury is a common injury in sprinters and jumpers, with a known high re-injury rate. This study follows similar methodology to a study done in football players in Sweden.

The commonest clinical "sprinting type" hamstring injury occurs when a fatigued athlete sprinting at high speed acutely grasps the proximal outer hamstring and is unable to continue exercising. The biceps femoris long head is usually injured, and less commonly the proximal semi-tendinosis may also be involved. The second, less common hamstring strain injury is the "stretching type", when an acute "pop" is felt, usually with assisted stretching , often during warm up. This stretch type injury is more severe and usually involves a proximal tear of the semi-membranosis tendon.

It is proposed that neuromuscular inhibition of voluntary hamstring contraction occurs after injury particularly at longer muscle tendon lengths. Therefore a rehabilitation protocols involving exercises performed in a lengthened position was developed, and this was compared to a standard rehabilitation protocol.

A general rehabilitation programme was performed in both groups three times a week, consisting of stationary cycling, fast foot stepping in place, 40 m short stride jogging and forward- backward 10m accelerations, all performed pain free. Athletes then progressed to high speed running drills three times a week, consisting of 6 x 20 m, 4 x 40 m and 2 x 60 m sprints.

The L(lengthening)protocol intervention consisted of 3 exercises, performed pain free from day 5;

1 "Extender"(active knee extension, lying supine)
2 "Diver"(stand on injured leg, palms together, perform a forward reach, flexing through ipsi-lateral hip, push hips backwards, slight knee flexion)
3 "Glider"(weight on injured heel, grasp handrail ipsi-lateral side, slide uninjured leg (in a sock) backwards, causing flexion in ipsi-lateral hip, pull back to upright starting position using arms)

The control group did hurdler position contract relax(PNF type) exercise, upright cable pendulum exercises and hamstring bridges.

Before return to play the Askling "H" test was performed.

This is an un-validated test, but consists of a set of 3 single leg straight leg hip flexion movements performed at high speed while lying supine. The test is positive if apprehension is experienced and RTP is then delayed.

RTP was 49 days in the L protocol and 86 days in the C protocol.

TRENDS IN ATHLETIC FOOTWEAR OVER 30 YEARS: BENNO NIGG, KEYNOTE ADDRESS

Tony Page

All Blacks Sports Physician

Prof Nigg detailed a career in research with multiple publications concerning athletic foot wear and injuries.

Despite in house scientific input and much marketing from shoe companies to the contrary, the rate of injury in runners has not reduced over 30 years. He discussed the failure of shoe prescription on the basis of gait assessment, arch height and foot characteristic to reduce injury rates. In a literature review which he presented, there was a paucity of evidence for shoe features or prescribed orthotics having any effect on reducing injury rates.

The "Runners World Annual Shoe Survey" ranking shoes from 1 star to 5 stars on the basis of features determined by editorial staff has driven trends in athletic foot wear design, that have not been evidence based. The development of elevated heels, anti-pronation features and differing midsole designs in the last 30 years occurred in a non- scientific manner. Often patented shoe design features were discontinued once the patent period expired, suggesting a precedence of marketing over science.

He cited recent prospective research showing that the provision of soft insoles, chosen by patients (soldiers) on comfort alone, reduced subsequent injury rates. In addition, injury rates appear lowest when athletes are allowed to choose shoes on comfort criteria alone.

He therefore described the concept of the shoe acting as a sensory filter, or comfort filter, rather than a biomechanical device.

Overall, the impression gained was that shoe design needs to be simplified and focus on comfort alone, unless evidence shows that additional features actually reduce injury rates.

IOC CONSENSUS STATEMENT "BEYOND THE TRIAD- RED-S" AND FEMALE ATHLETE TRIAD COALITION STATEMENT ON TREATMENT AND RETURN TO PLAY.

Judith May

Medical Director Triathlon NZ

In early 2014 two different groups developed updated guidelines for the Female Athlete Triad. The "2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad": was developed by an international consortium of researchers in association with the American College of Sports Medicine. This was soon followed by the "IOC consensus statement: beyond the Female Athlete Triad-Relative Energy Deficiency in Sport (RED-S) which was developed by an expert working group. Both statements have been published in the British Journal of Sports Medicine (2,3).

Both groups presented their guidelines which highlighted some differences of opinions. Margo Mountjoy represented the IOC consensus group and introduced the new concept of Relative Energy Deficiency in Sport (RED-S). The authors feel this terminology should replace the female athlete triad, as it allows for the inclusion of males who are not immune to low energy availability (EA) and its consequences. They also feel it reflects that many other physiological and psychological processes are affected by low energy availability, not just menstrual function and bone health. They also introduced a traffic light system for risk assessment in return to sport.

Mary Jane De Souza then presented the Female Athlete Triad Coalition statement. She debated that the traditional concept of the triad should remain as the consequences for females are more dire, and that low EA has a clear causal relationship with bone health and menstrual dysfunction. They also introduced a tool for risk stratification and return to play decision making. This involves a worksheet that assigns a point value for various risk factors for the triad such as low EA, low BMI, delayed menarche, oligomenorrhoea/amenorrhoea, low bone mineral density and past history of stress fracture. The points are then totalled to determine if the athlete is low, moderate or high risk. After considering various sport risk and decision modifiers e.g external pressures, competitive level and timing in season, a clearance or return to play status can be determined.

Certainly both groups have introduced new concepts and useful tools in determining the risk to the athlete. It will be interesting to see what evolves in the future, and which terminology and risk stratification tools become adopted in the literature and clinical practice.

PATELLAR TENDINOPATHY

Jake Pearson

Medical Director Paralympics NZ

Patellar tendinopathy was covered at the both the Injury and Illness Prevention Conference and the Advanced Team's Physician's Course, with a dedicated session during the latter. The potential mechanisms of the development of patellar tendinopathy, specifically reasons for the failed healing response to repetitive microtrauma were reviewed by Michael Kjaer. Despite plenty of ongoing research on this, debate continues regarding the specific mechanisms. Front-running contenders include the potential role of compression, stress-shielding, a peripheral neuronal phenotype, or other metabolic or immunological factors. Karim Khan reminded us of the critical role that tension plays in maintaining tendon structure, and suggested that while 'there is robust evidence for the efficacy of mechanotherapy' (i.e. good support for an exercise therapy approach) it remains unclear if there is any real difference between eccentric and concentric loading, or whether the reaction is rather instead simply related to the overall load imposed.

In terms of further adjuvant treatments, a few of the options were discussed:

1. One speaker presented a reasonably well conducted RCT demonstrating the efficacy of peri-tendinous high volume injection of corticosteroid (relatively low dose) + sterile saline (30ml total) with the proposal that breaking the peri-tendinous adhesions is beneficial.
2. Shock-wave therapy seems effective when there is a significant calcific component to the tendinopathy
3. PRP injections compared to 'flipping a coin' but a reasonable consideration if >6 months of rehabilitation-resistant symptoms
4. The only clearly effective pharmacological treatment is IGF-1 and/or growth hormone..!
5. An arthroscopic surgical technique, curiously working outside the tendon, debriding the neovessels and portion of Hoffa's fat pad immediately adherent to the deep part of the proximal patellar tendon, with results comparable to the open technique.

CURRENT CONCEPTS IN INJURY PREVENTION FOR YOUNG ATHLETES: DO WE HAVE SOLUTIONS

Duncan Reid

HPSNZ Physiotherapy Lead National Training Centre

Presenters : John Di Fiori (USA),Margo Mountjoy (Canada) Neeru Jayanthi (USA). Greg Myer (USA), Thomas Best (USA), Kevin Guskiewicz (USA)

Key messages:

Margo Mountjoy: Prevention of abuse and harassment in youth sport. A silent injury

Abuse and harassment are as common in sport as in the community and have similar issues around the abuse of power. Young males and females are equally vulnerable. Often starts with befriending than special rewards and time alone with athlete. Athletes are often embarrassed and withdraw, so may feign injury as they do not want to go to training. So as a sports medicine provider if you can't relate the intensity of the injury to the symptoms you may need to be suspicious. If there is evidence that abuse has taken place it should be reported to the relevant authority, either police or social services. It is not appropriate to let the sport or medical team deal with this. The main thing is to support the athlete.

John Di Fiori: Physeal Stress in young athletes

Physeal stress injuries are well documented in young athletes and are mainly due to two risk factors, training duration and intensity, and rapid growth phases. Most physeal injuries are over-use not acute trauma. Prevention requires monitoring of training volumes and care through growth phase in 10 -14 year age range. Children should not play through pain. Parents need to be cautioned about children being involved in more than one sport in a season and that is OK to miss trainings for other important life events.

Early specialisation is also associated with increased injury risk and therefore variety of sporting activities in injury preventative. Children should have 1-2 days of rest per week, and we should all watch for signs of burnout and loss of interest. Time away from sport is important.

Greg Myer: Adolescent ACL knee injury

This is a multifactorial issue. Intrinsic risk factors include puberty, alterations in anatomy, hormonal changes, general ligament laxity and knee hyperextension, and increased BMI. External risk factors are a lack of trunk and hip control, reduced hamstring and quads strength increased dynamic activities and the amount of knee load. Adolescent males and female have similar characteristic pre puberty but after puberty males have greater strength and reduced knee valgus moments whereas females lose strength and have increased knee valgus moments with jump landing. Neuromuscular and proprioceptive training programmes can alter these variables but there is still some controversy. Risk factors can be identified but those actually going forward to have an ACL rupture is not so predictable. ACL injury rates in young females increases by 1.3% per year. 30% will have another ACL tear within one year of the first tear. The long term consequence is OA of the knee joint.

HEAT PROBLEMS SYMPOSIUM

Dr Chris Milne

Medical Director Rowing NZ

A symposium on heat problems was held late on the first day of the conference. The initial presentation by Martin Schwellnus provided a state of the art update on our present knowledge. Following on from that, Roald Bahr provided new guidelines to manage heat stress in elite sports. These had been drawn up after experience in high level volleyball competitions in various venues throughout the world. I believe rugby could usefully look at this work, as I vividly remember a Super Rugby match in Durban in March of 2002 where players were losing up to 6kg during the course of a match. In my view, beyond a certain temperature, 4x 20 minute quarters would be more appropriate

than 2x 40 minute halves.

The third presentation by Cristiano Eirale of Qatar described the challenges of playing football in a hot country, particularly in the context of the World Cup being awarded to Qatar in 2022. Their response has been to build high-tech stadia which can provide an indoor temperature of <30ºC, and hopefully closer to 25ºC, when the outside temperature is approaching 50ºC. This will be a major challenge but they certainly have the resources to do it.

The next presentation by Ron Maughan from the UK outlined the role of athletes in prevention of heat illness on the day of competition. Recommendations include:

1 Starting the day euhydrated
2 Drink according to thirst prior and during the competition
3 Staying out of the sun where possible
4 Pre-cooling has a role in certain events
5 After the event, providing adequate fluid and electrolyte replacement to restore body levels to normal

Late in the seminar, Julien Periard of Qatar outlined research identifying athletes predisposed to exertional heat illness based on the heat shock response.

Overall, I would rate this seminar as average to good. I have attended many such seminars over the years and was able to graft on a little additional knowledge from this one. However, for somebody new to the field, it provided an excellent overview of the issues and challenges.

RUGBY SEVENS SEMINAR

Dr Chris Milne

Medical Director Rowing NZ

The final day saw a presentation on the Rugby Sevens World Series and, in particular, the impact of injury and illness prevention programmes to minimise the adverse events of intercontinental travel. This was chaired by Martin Raftery from Australia, who is the ex Wallabies doctor and works for the IRB in Dublin.

Simon Kemp is currently Head of Sports Medicine for the English Rugby Football Union and started his sports medicine career with Ruth Highet in Wellington. He freely acknowledges that his grounding in New Zealand started him on the road to his current elevated position. He gave an excellent overview of the contrast between Sevens and 15-man rugby.

In essence, Sevens is played at a higher pace with less time for stoppages. Consequently, the athletes are better aerobically conditioned, as exemplified by the programme Gordon Tietjens has put in place for our New Zealand squad over the year. Anthropometrically and physiologically the Sevens forwards look most like loose forwards from the 15s game, and people will recall that Liam Messam and other All Black loose forwards have indeed played Sevens at international level. By contrast, the backs look more like outside backs in 15s, and many of our most exciting attacking talents have been unleashed in the 15-man game after first being exposed by Tietjens talent spotting in Sevens.

Martin Schwellnus then gave an excellent overview of the impact of travel on injury in Super Rugby and also Sevens rugby. He conducted a detailed study of all Super Rugby teams in 2013 and teams averaged 1.67 time loss injuries per game. Of greater relevance is the injured player proportion, which is very high. In any one season 55% of players can expect to be injured, i.e. it is the norm to have an injury during a Super Rugby season. Of these injured players, about half had more than one injury. There was no significant injury difference in home versus away games but illness was more common in away games, particularly upper respiratory tract illness.

His presentation was accompanied by one from Ross Tucker, also from South Africa, on strategies to maximise recovery to reduce the impact of international travel and repeated same day competitions. He explained that rugby players who travel have two primary issues: The first is jetlag and the second is sleep deprivation. However, there is a big variation between individuals, the so-called night owl versus the early morning lark type is said to be genetically determined. However, consistent studies have found that eastbound travel is more detrimental than westbound due to the shortening of the days, and any New Zealand team travelling back to play a home game after competing in South Africa can attest to this observation.

The seminar was rounded out by Phillippe Decq, a French neurosurgeon, who ascribes specific concussion issues relevant to Sevens players. These include multiple games per day, the impact of international travel and the pairing of back to back tournaments a week after one another.

Overall, I found this to be an excellent seminar. Rugby is a sport that, until a decade or so ago, had minimal published literature and we are grateful to New Zealand colleagues such as Steve Targett, Ra Durie, David Chalmers and Ken Quarrie for initiating this research.

ACHILLES TENDON INJURIES

Sharon Kearney

HPSNZ Lead Physiotherapist

Key Points

- There are few studies into biomechanical risk factors (RF).
- There are only 2 prospective studies done.[5,6]
- Retrospective studies highlight the possibilities of these risk factors.
  - Altered EMG pattern between soleus and gastrocnemius result in less shock absorption in calf and other muscles such as rectus femoris and gluteus medius pre and post heel strike so intra-tendinous loads may be altered.[7,8,9]
  - Smaller knee ROM in injured runners result in less shock absorption in quadriceps muscle, and therefore higher tendon loads. [7]
- Systemic Risk factors
- Increased adiposity associated with tendinopathy (not likely to be case in HP athletes).[10,11,12,13]
- Estrogen seems to be a protective factor, as post-menopausal women have an

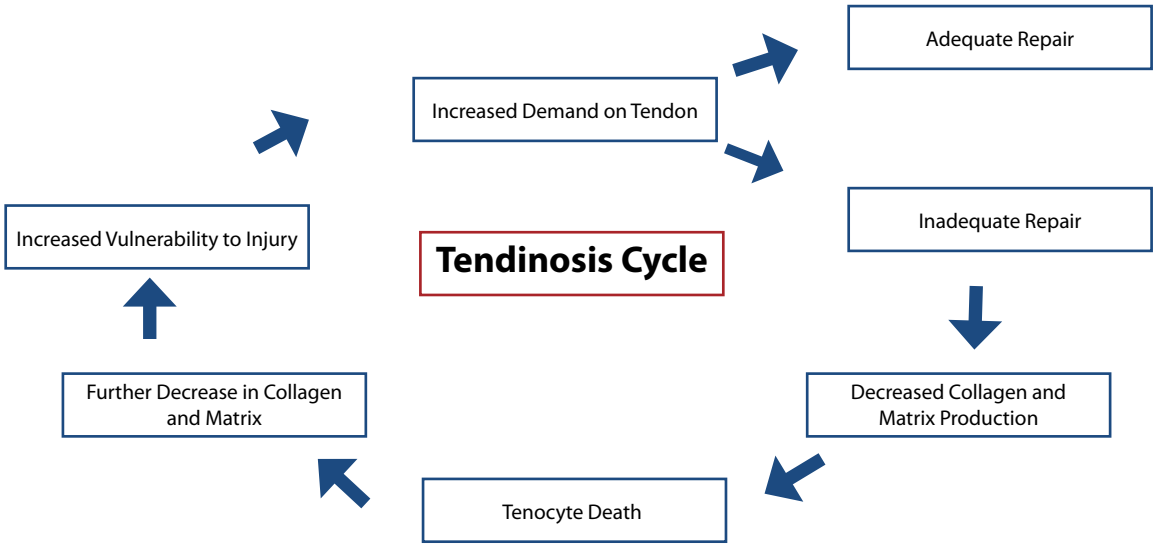

Figure 1: Proposed Cycle of Tendinosis

increased risk of achilles tendinopathy.

- Hypertension seems to be a risk factor due to blood flow, which may compromise normal metabolism and reparative maintenance of tendons.[14]

Blood Flow (Alex Clarke)

- A dense net of small arteries enters the Achilles tendonin its lower 20cm and seems to provide ample blood supply.[15,16]
- Blood flow is increased by localised exercise in healthy and tendinopathy.
- Baseline blood flow increased in symptomatic tendinopathy or following acute injury.
- Blood flow is dynamically regulated – therefore increased blood flow or power Doppler should not be referred to as neovascularisation. Neovascularisation can only be confirmed histologically.
- Power and colour Doppler have limited sensitivity but are useful in case management. The majority but not all Achilles tendon patients demonstrate increased Doppler effect. Power Doppler(PD) is more sensitive but tends to be used less.
- Presence of PD signal had the greatest positive prediction of development of Achilles tendinopathy.
- There is no relation between blood flow and prognosis or recurrence.
- Summary
  - Achilles tendon has substantial blood supply.
  - Blood flow is dynamically regulated
  - Presence of Doppler effect could be used as one indicator of increased risk of AT.
  - However in symptomatic patients Doppler is not a recommended sole diagnostic criteria or indicator of prognosis/treatment outcome.

Eccentrics (Scott Reid)

- A gradual progression from eccentric-concentric to eccentric followed by faster loading may benefit patients who are unable to start with Alfredson due to pain and weakness.
- Too much or too less dorsiflexion is a possible risk factor for Achilles tendinopathy.
- A thinner tendon (in reaction to eccentrics) may be a prevention tool.
- When US is normal at the beginning of the season, eccentric training can prevent the tendon to become abnormal.
- When US is abnormal at the beginning of the season eccentric training can increase the injury risk.[17]
- Oscillations – pattern of loading and unloading with force fluctuations may provide an important stimulus for tendon re-modeling i.e. similar to bone re-modeling.
- Strength – load intensity rather than contraction type is stimulus.[18]
- Increase in strength = prevention tool?
- Progression in load – isometric. concentric eccentric plyometric.
- Slow speed may lesson risk of tendon injury.

Flexibility (Duncan Reid)

- Reduced ankle dorsiflexion is 2.5 x more likely to incur limb injury However too much range (DF >9deg) can increase risk.[6]
- There is no evidence pre exercise stretching reduced soft tissue or bone lower limb injury.
- Eccentrics exercises may actually be a stretching activity vs strengthening.

CARDIAC SYMPOSIUM:
IS IT REALLY POSSIBLE TO PREVENT SUDDEN CARDIAC DEATH IN SPORT?

Dr Sarah Beable

Bike NZ Medical Director

This was an extremely informative and highly relevant symposium regarding sudden cardiac death in the active population presented by an internationally recognised panel of Whyte, Chalabi, Wilson, Borjesson, Papadakis, Sharma and Drezner.

This two hour session involved an overview of sudden cardiac death in young athletes,

and current perspectives on screening athletes for conditions predisposing to sudden cardiac death. A challenge as a sports medicine practitioner is differentiating the 'athlete's heart' from pathology and this symposium was highly educational in different ECG interpretations in athletes, and also those of different ethnicities.

The importance of a thorough history asking about different cardiac symptomatology, family history, and a thorough cardiovascular examination and was reiterated. The common theme in all the informative presentations was that ECG (supported by a presentation on the Seattle criteria) is an essential screening and diagnostic tool to detect underlying cardiovascular conditions that may increase the risk for sudden cardiac death

A stand out lecture for me was from Jonathan Drezner from the USA on the use of AED in high schools, showing 71 % of sudden cardiac arrest patients who were defibrillated on site survived to hospital discharge. This is an important piece of research that confirms that AEDs are essential in many community areas, schools, and sporting arenas as possible.

PSYCHOLOGICAL ILLNESS IN RELATION TO INJURY IN ATHLETES

Dr Sarah Beable

I attended a two hour symposium lead by Johnson, Ivaarson and Tranaeus, well published researchers on this topic. Andreas Ivaarson et al based their research around a baseline stress injury model (Williams and Andersen 1998) that suggests the psychological state (life events, underlying anxiety, stress, depression, and daily hassles for example) increases the incidence of injury, and furthermore on injury recurrence. Urban Johnson presented recent research that the last 6 months of athlete life impacts on injury outcome; and those that experienced minimal daily uplifts and had more significant life events were more likely to get injured.

Ulrika Tranaeus from Sweden presented his research on a group of randomized control trials where they introduced psychology support in injured athletes compared with a cohort of injured athletes with no psychological support intervention and the supported group showed this reduced the rate of injury recurrence. Although very early days in terms of research, and seemingly limited to handball, football and floorball players, this an exciting, developing area for injury and illness prevention research.

References

1 Bere T, Florenes TW, Krosshaugh T et al. Events leading to ACL injury in World Cup Alpine Skiing: a systematic video analysis of 20 cases. *Br J Sports Med* 2011; **45** (16):1294-302

2 De Souza MJ, Nattiv A, Joy E et al. 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad. *Br J Sports Med* 2014; **48**:289

3 Mountjoy M, Sundgot-Borgen, Burke L et al. The IOC consensus statement: beyond the Female Athlete Triad-Relative Energy Deficiency in Sport (RED-S) *Br J Sports Med* 2014; **48**:491-497

4 Askling CM, Tengvan M, Tarassova O et al. Acute hamstring injuries in Swedish elite sprinters and jumpers: a prospective randomised controlled clinical trial comparing two rehabilitation protocols. *Br J Sports Med* 2014; **48**:532-539

5 Van Ginckel A, Thijs Y, Hesar NG et al. Intrinsic gait-related risk factors for Achilles tendinopathy in novice runners:a prospective study. *Gait Posture* 2009 Apr; **29**(3):387-91

6 Mahieu NN,Witvrouw E,Stevens V et al. Intrinsic risk factors for the development of Achilles tendon overuse injury:a prospective study. *Am J Sports Med* 2006 Feb; **34**(2):226-35

7 Azevedo CB, Lambert MI, Vaughan CL et al. Biomechanical variables associated with Achilles tendinopathy in runners. *Br J Sports Med* 2009 Apr; **43**(4):288-92

8 Wyndow N, Cowan SM, Wrigley TV et al. Neuromotor control of the lower limb in Achilles tendinopathy:implications for foot orthotic therapy. *Sports Med* 2010 Sep 1; **40**(9):715-27

9 Baur H, Muller S, Hirschmuller A et al. Comparison in lower leg neuromuscular activity between runners with unilateral mid portion Achilles tendinopathy and healthy individuals. *J Electromyogr Kinesiol* 2011 Jun; **21**(3):499-505

10 Gaida NE, Alfredson H, Kiss ZS et al. Asymptomatic Achilles tendon pathology is associated with a central fat distribution in men and a peripheral fat distribution in women: A cross sectional study of 298 individuals. *BMC Musculoskelet Disord* 2010 Mar 2; 11:41

11 Wendleboe AM, Hegmann KT, Gren LH et al. Associations between body mass index and surgery for rotator cuff tendinitis. *J Bone Joint Surg Am* 2004 Apr; **86**-A (4):743-7

12 Shiri R, Vikari-Juntra E, Varonen H et al. Prevalence and determinants of lateral and medial epicondylitis:a population study. *Am J Epidemiol* 2006 Dec 1; **164**(11);1065-74

13 Malliaras P, Cook JL, Kent PM. Antropmetric risk factors for patella tendon injury among volleyball players. *Br J Sports Med* 2007 Apr; **41**(4):259-63

14 Holmes GB, Lin J. Etiologic factors associated with symptomatic Achilles tendinopathy. *Foot and Ankle Int* 2006 Nov; **27**(11):952-9

15 Wolff KS, Wibner AG, Binder H e al. The avascular plane of the Achilles tendon: A quantitative anatomic and angiographic approach and a base for a possible new treatment option after rupture. *Eur J Radiol* 2012 Jun; **81**(6):1211-5

16 Theobold P, Benjamin M, Nokes L et al. Review of the vascularization of the human Achilles tendon. *Injury* 2005 Nov; **36**(11):1267-72

17. Fredberg U, Bolvig L, Andersen NT. Prophylactic training in asymptomatic soccer players with ultrasonographic abnormalities in Achilles and patellar tendons:the Danish Superleague Study. *Am J Sports Med* 2008 Mar; **36**(3):451-60

18 Malliaras P, Barton CJ, Reeves ND et al. Achilles and patellar tendinopathy loading programmes: a systematic review comparing clinical outcomes and identifying potential mechanism for effectiveness. *Sports Med* 2013 Apr; **43**(4):267-86

Health, Wellbeing and Success

Sochi 2014

Te Taumata o Angitu, or the 'pinnacle of success' was the name of the pounamu pendants prepared specifically for the Winter Olympic Games team by Ngai Tahu. It was a perfect symbol for us, incorporating who we were representing, who had supported us and the magnitude of the challenge ahead. The binding cord of these taonga was a symbol for the binding together the team, which ultimately proved to be both unified and successful.

Despite being involved in the Winter Sport Programme since 2005, this was my first attendance at an Olympic Games. Having not qualified previously as a Doctor (2006, Torino), or as an athlete (2010, Vancouver), I was interested to see what I had been missing, as well as wanting to assist our athletes whom I know work so hard.

The apparent oxymoron of looking after the health of elite athletes is never more apparent than at the time of major competition, when the goals of the athlete and their physical wellbeing are sometimes at odds. Physical wellbeing of course does not equate to wellbeing per se, and denying opportunity can leave psychological and emotional scars that heal slower than physical trauma, thus the pinnacle of sport is in some ways the ultimate challenge for the Sports Physician. I often cite models of high performance sport to my sporting and non-sporting patients as a model of wellbeing. One of the things that high performance sports excels at in New Zealand is collaboration and creating an environment of motivated people to use their relative skill for a common objective, that objective being the ultimate performance of a group of individuals. In that setting, I equate wellbeing with performance, and that holistic method of support is a good one to achieve health or happiness or any other objective in wellbeing.

In these Games I enjoyed being part of a very cohesive and skilled team. Such is the varied nature of disciplines within our Winter Olympic programme, and so varied are the cultures of individual sport, it has almost come as a surprise to see just how well our group united.

The biggest medical challenges during the Games fell into two categories. The first was the environment of a Games run in a nation with different language and culture. One of the greatest impacts for me was the reporting and interpretation of medical imaging. We had a number of significant injuries to manage, and despite state of the art equipment and specialist medical services, there seemed frequently to be a risk of information being lost somewhere between process and communication. It was apparent that the level of radiology service that I am accustomed to in Christchurch is something to cherish.

It is hard to describe the extent to which our wider team were affected by these cultural differences, however the skills within our group and a "get things done" attitude was encapsulated by our Chef De Mission walking straight through an entourage of security personnel to grab President Putin by the hand and wish him greetings from New Zealand! It seemed at the time to be quite a plucky manoeuvre, and more so as security tensions rose.

The second difficulty was managing the triad of injury, psychology and performance within such extreme sports. Within the Winter Sports Programme we had been faced with a massive 18 months in regards to significant injury, including many fractures, ligament ruptures, spinal injuries and concussions, with a risk profile far exceeding any other sport that I have been involved in. These physical injuries, particularly in the setting of courses and events set up for spectator interest, challenged skills and courage to the extreme. However the athletes within the team excelled during these games. To my observation, every athlete was pushed to their absolute limit, either physically, emotionally or psychologically. They achieved 5 top-ten placings which was our most successful Winter Games, with the sole exception of Annelise Coberger's 1992 silver medal. It might be good fortune that kept us largely free from illness despite living in close quarters under stress throughout the Games. It might also be an example of a supportive community contributing to overall wellbeing. We suffered very little sickness in our group, and the management and healthcare teams were cohesive and productive throughout. It would thus be opportune to recognise our entire operations and support team who worked long hours throughout the games, some even staying on repeat the procedure for the paralympic team. My personal thanks go to them for their contribution to the athletes, the wider team, and indeed their expert help to me. Specifically I would like to recognise Chef De Mission, Peter Wardell, and his expert leadership of the team, and the physiotherapists whose specific expertise in management within the wintersport and Winter Olympic setting was invaluable. Thanks to Ginny Ruttledge, Sally Birchall and Sheryl Dickinson. Thanks are also due to the NZOC and HPSNZ for their ongoing support of our sporting pursuit of excellence.

My experience of the games was thus a very positive one, and perhaps best summarised by the metaphor of the greenstone pendants that the team received. By recognising our base of support, and challenging ourselves through a structured journey, we can achieve our pinnacle, te taumata o angitu.

A RANDOMISED CONTROLLED TRIAL LOOKING AT COMPRESSION SOCKS ON FUNCTIONAL RECOVERY FOLLOWING MARATHON RUNNING

S A Armstrong[1], E S Till[2], S Maloney[3], G Harris[4]

[1]Anglesea Sports Medicine Clinic, Hamilton
[2]Albury Emergency Department, Albury
[3]Physiotherapy Department, Monash University
[4]MP Sports Physicians, Mornington

Introduction: Compression socks have become a popular recovery aid for distance running athletes. Although some physiological markers have been shown to be influenced by wearing these garments, no evidence exists on functional recovery. This research aims to shed light onto whether the wearing of compression socks for 48 hours after marathon running can improve functional recovery as measured by a timed treadmill test to exhaustion 14 days following marathon running.

Purpose: To investigate if compression socks improve functional recovery after marathon running

Methods: Healthy male and female athletes (n=24, age = 41 ±7yrs) participating in the 2012 Melbourne or 2013 Canberra marathons were recruited and randomised into the compression stocking (C) or placebo (P) group. The compression socks used were medical grade below knee Jobst compression socks with a compressive value at the ankle of 30 – 40mmHg. A graded treadmill test to exhaustion was performed 2 weeks prior and 14 days following each marathon. Participants were monitored for rate of perceived exertion (RPE) via the Borg RPE scale. Heart rate was noted every 3 minutes during the treadmill. Time to exhaustion, average and maximum heart rates were recorded. Participants were asked to wear their socks for 48 hours immediately after completion of the marathon. The treadmill was repeated 14 days following the marathon. The change in treadmill times (seconds) was recorded for each participant.

Results: 7 C and 9 P participants completed the treadmill protocols; drop-out rates were similar between the groups. In C the average treadmill run to exhaustion time 14 days following the marathon was increased by 2.4%(59 ±152s) compared to their baseline treadmill. In the placebo group the average treadmill run to exhaustion time was decreased by 5.1% (-102s ±139s). The data was analysed using a two sample t-test and was found to be statistically significant ($P<0.05$).

Conclusion: The wearing of below knee compression socks with a compressive value of 30-40mmHg for 48 hours after marathon running has been shown to improve functional recovery as measured by a graduated treadmill test to exhaustion 2 weeks following the event. Consequently, medical grade compression socks can be considered a valid recovery aid.

A NARRATIVE REVIEW
MEDICAL INTERVENTIONS IN THE MANAGEMENT OF HAMSTRING MUSCLE INJURY

M Robinson[1] and B Hamilton[2]

[1]Unisports, Auckland, New Zealand
[2]High Performance Sport New Zealand, Auckland, New Zealand

Hamstring injuries remain a common problem in the sporting population. Physiotherapy-led rehabilitation remains the mainstay of treatment, and the physician's input is often minimal. Anecdotally, many different topical, oral and injectable therapies are used around the world in an effort to accelerate the healing of these injuries and to prevent their recurrence. There is an increasing arsenal of medical interventions available for the treatment of hamstring injury; however the majority of medical interventions lack a substantial evidence base, and continue to be used on a personal experiential level only. Traditionally, sports medicine literature has ignored many of the practices being performed by practitioners working with high level athletes. As a result, the medical management of the hamstring muscle injury has progressed little in the last 50 years. This article reviews the evidence available to support some of the most commonly-used medical therapies and the pathophysiological basis for their use. It also presents the evidence behind some of the more promising future treatments for muscle injury, including stem cell therapy, growth factor delivery and potential novel uses of current medication not traditionally used in the musculoskeletal setting, such as anti-fibrotic agents, which have a sound pathophysiological basis and in-vitro evidence. These offer some hope to enhancing our medical management of hamstring injuries, but their value will only be established with further clinical trials.

HYPOPITUITARISM SECONDARY TO TRAUMATIC BRAIN INJURY: A VALID CASE FOR TESTOSTERONE SUPPLEMENTATION?

David F Gerrard

OBE CNZM MB ChB FACSP FSMNZ
Professor of Sports Medicine, Dunedin School of Medicine, University of Otago

Introduction: An increasing body of literature (1,2,3,4,5,6) confirms the link between chronic traumatic brain injury and a condition now widely reported as post-traumatic hypopituitarism. This has been reported in athletes including soccer players(1), boxers(4) and rugby players who have sustained low-grade, repetitive, sub-concussive brain insults. Amongst the sequelae are increasing reports of low serum testosterone. These cases raise the question of Therapeutic Use Exemption (TUE) to permit testosterone supplementation.

Purpose: This paper addresses the rationale for approving supplemental testosterone in athletes, hypogonadal as the result of sub-concussive head injury.

Methods: A review of the recent literature linking documented episodes of recurrent traumatic brain injury to hypogonadal hypogonadism was undertaken and tested against the current International Standards for Therapeutic Use Exemption applied by the World Anti-Doping Agency (WADA).

Conclusions: The hypopituitarism described following repetitive sub-concussive head injury in athletes, appears to be reversible and thought to be consequent upon a number of possible mechanisms including compromised hypophyseal blood supply as the result of sudden shearing forces within the bony confines of the pituitary fossa. On the basis that this pituitary dysfunction appears transient, constituting a functional rather than organic cause for hypogonadal hypogonadism, it is argued that the existing WADA criteria are not met and that supplemental testosterone in these athletes is not justified.

References

1 Auer M, Stalla GK, Athanasoulia AP. Isolated gonadotropic deficiency after multiple concussions in a professional soccer player. *Dtsch Med Wochenschr.* (2013) **138**(16):831-3. doi: 10.1055/s-0033-1343099. Epub 2013 Apr 15.

2 Crooks CY, Zumsteg JM, Bell KR. Traumatic Brain Injury:Review of Practice Management & Recent Advances. *Phys Med Rehab Clin N Am* 18 (2007) 681–710

3 Dubourg J, Messerer M. Sports-related chronic repetitive head trauma as a cause of pituitary dysfunction. *Neurosurgical focus,* (2011) **31**(5): 131-144

4 Tanriverdi F, Unluhizarci K, Karaca Z, Casanueva FF, Kelestimur F. Hypopituitarism due to sports related head trauma and the effects of growth hormone replacement in retired amateur boxers.*Pituitary* (2010) **13**:111–114

5 Dusick JR, Wang C, Cohan P, Swerdloff R, Kelly DF. Pathophysiology of hypopituitarism in the setting of brain injury. *Pituitary* (2012) **15**:2–9

6 Zaben M, El Ghoul, Belli A. Post-traumatic head injury pituitary dysfunction. *Disability & Rehabilitation*. (2013); **35**(6): 522–525

RE-OPERATION RATES FOLLOWING BROSTROM REPAIR (DIRECT LATERAL ANKLE LIGAMENT RECONSTRUCTION)

E Hardy,[1] N Baraza,[2] M Pereira[2]

[1]Alexandra Hospital,, Redditch, United Kingdom,
[2]Alexandra Hospital,, Trauma & Orthopaedics, Redditch, United Kingdom

Introduction: Brostrom repair is used to restore function in unstable ankles post lateral ligament injury. Data on reoperation rates following this procedure is scarce and we conducted a study to assess this in patients with chronic ankle injuries undergoing Brostrom repair.

Purpose: Determine re-operation rates and stability of the ankle post Brostrom repair

Methods: The hospital's computerised archiving system was searched for Brostrom repairs done by a single surgeon over the past 6 years with a minimum follow up of 6 months.

Results: 20 eligible patients were studied. Mean age at operation was 30.3 months and mean time between injury and repair was 41 months. All patients had good stability post procedure. Three patients had repeat operations (15%), all for on-going pain: One had ankle arthrodesis and the other two underwent arthroscopy and scar exploration.

Conclusion: Brostrom repair is an operation that provides good stability. Re-operation is mainly due to pain. 85% of patients studied were able to return to normal function.

THE EFFICACY OF A NECK STRENGTH INTERVENTION IN PROFESSIONAL RUGBY UNION PLAYERS

D M Salmon[1], P Handcock[1], S J Sullivan[2], N J Rehrer[1]

[1]School of Physical Education, Sport and Exercise Science, University of Otago, Dunedin
[2]Centre for Health, Activity and Rehabilitation Research, University of Otago, Dunedin

Introduction: Neck strengthening has been recommended for preventing and reducing neck injury in collision sports, but there is limited research for this advice. Acute cervical spine trauma from rugby participation is well documented.(1-3) The observed cervical spine pathological changes in rugby players have led many to suggest that sufficient physical preparation of this musculature is necessary to reduce the risk of injury. (3-5)

Purpose: To evaluate the impact of a neck exercise program over a season in professional rugby union players using peak isometric force and self-reported neck pain (NP) and stiffness (NS).

Methods: Isometric neck strength was measured pre- and post-season for extension, flexion, left (LtFlx) and right lateral flexion (RtFlx). Testing was conducted in a unique simulated tackle stance where participants performed 1 maximal voluntary contraction (MVC) for each direction. One team was given the supervised neck exercise intervention (IG, n=28) while the other was a control group (CON, n=15). The neck exercise intervention included exercises for strength and endurance, muscle coordination, and impulse loading. Current, average and worst NP and NS values over the past 3 wk were recorded using a visual analog scale.

Results: Comparison of the peak force values for the two groups revealed a significant main effect for time x group ($F(1,41)=15.61$, $p< 0.00$), indicating that for all directions the IG improved from 31.41 to 32.53kg while the CON decreased from 33.11 to 26.64kg. Similar results were isolated for the main effect for direction x group ($F(3,123)=3.07$, $p=0.04$) and time x direction x group ($F(3,123)=4.17$, $p=0.01$). Ext revealed a decrease for both groups over the season ($F(1, 41)=11.64$, $p<0.00$), with no differences between the IG and CON. There was no change in time for both Flx and RtFlx ($F(1, 41)=0.55$, $p=0.46$ and $F(1, 41)=2.47$, $p=0.12$). When the groups were examined over time there was difference in the neck strength response between the two for Flx and RtFlx ($F(1, 41)=13.03$, $p<0.00$ and $F(1, 41)=11.06$, $p<0.00$), with the IG improving pre- to post-season while the CON decreased. LtFlx revealed a significant main effect for time and time

x group (F(1, 41)=10.33, p<0.00 and F(1, 41)=25.79, p<0.00). When neck pain scores between the two groups were examined pre- and post-season no differences were isolated for current or average neck pain; however, the CON did undergo a significant increase in worst neck pain, t(14)= -2.18, p=0.04, while the intervention group's scores remained unchanged.

Conclusion: Neck specific exercises implemented over a rugby season preserved neck extensor peak force and improved peak force for flexion, LtFlx, and RtFlx. The intervention decreased both the worst NP and average NS scores. As NP is one of the most frequently cited symptoms of minor neck injuries, reductions in symptom severity through a neck specific intervention could translate into a reduced number or less severe minor neck injuries.

References

1 Fuller CW, Brooks JH, Kemp SP. Spinal injuries in professional rugby union: A prospective cohort study. *Clin J Sport Med*. 2007; **17**(1):10-6.

2 Lark SD, McCarthy PW. Cervical range of motion and proprioception in rugby players versus non-rugby players. *J Sports Sci*. 2007; **25**(8):887-94.

3 Peek K, Gatherer D. The rehabilitation of a professional rugby union player following a C7/T1 posterior microdiscectomy. *Phys Ther Sport*. 2005; **6**(4):195-200.

4 Pinsault N, Anxionnaz M, Vuillerme N. Cervical joint position sense in rugby players versus non-rugby players. *Phys Ther Sport*. 2010; **11**(2):66-70.

5 Sinibaldi KS, Smith DR. Prevention of spinal injuries in rugby. *Strength Cond J*. 2007; **29**(4):18-24.

MULTI-DISCIPLINARY PERSPECTIVES ON THE USE OF LOWER-EXTREMITY INJURY ASSESSMENTS FOR A RUGBY PLAYER'S RETURN-TO-PLAY

S R Brown[1], M Brughelli[1], P A Hume[1], D King[1], N Gill[2], H Craighead[3], S Kara[4]

[1]Rugby Codes Research Group, Sports Performance Research In New Zealand (SPRINZ) at AUT Millennium Institute, Auckland University of Technology, Auckland, NZ;

[2]New Zealand Rugby Union; [3]New Zealand Warriors Rugby League; [4]Auckland Blues Rugby Union

Introduction: Intra and inter-limb imbalances can affect injury risk and athletic performance in rugby1. Dynamometry and force plate instrumented treadmills are two methods for assessing an athlete's return-to-play status2. Interpretation of these data by health practitioners is important to the health and longevity of the athlete.

Purpose: To provide multi-disciplinary perspectives on how biomechanical assessments of a rugby player's symmetry in lower-extremity strength pre and post-rehabilitation is useful as a determinate of the players' return-to-play status.

Methods: A professional male rugby league player (28 y, 178 cm, 98 kg) was tested pre and 10-weeks post-rehabilitation of a patellar tendon rupture. Isokinetic concentric knee and hip extensor and flexor strength on each leg at 60°·s-1 was completed using a Humac Norm dynamometer and standard protocols1. Bilateral sprint kinetics for five maximal effort sprints was completed on a Woodway self-motorised instrumented treadmill. Peak torque, angle of peak torque, peak horizontal force and peak vertical force were compared pre and post-rehabilitation against normative data from 14 un-injured rugby league players of the same position and similar characteristics.

Results: Pre to post testing: peak torque increased in the injured leg during knee extension (47%), knee flexion (47%) and hip extension (49%); peak torque leg asymmetry decreased 22%; angle of peak torque increased in the injured leg during hip extension (27%) and hip flexion (67%) reducing asymmetries by 50%; sprinting horizontal force increased (injured: 50%, non-injured: 19%); sprinting vertical force decreased (injured: 3%, non-injured: 5%); horizontal and vertical peak force leg asymmetries decreased 18% and 13% respectively. The return-to-play decision made by the player's supporting health team and coaching staff was based primarily on the sizable asymmetry decreases and return to normative ranges for knee and hip strength measures.

Practical implications based on multi-disciplinary perspectives: Sports injury and performance biomechanist Patria Hume: "To enable return to sport at the elite level, baseline values are needed to determine return-to-play levels, as well as quality normative databases for athlete types". Sports medic Doug King: "I use baseline values a lot and judge players' return-to-sport activities based around these values. I perform regular baseline assessments to ensure players can equal or better these values throughout the season". Strength and conditioning coach Nic Gill: "The use of objective data to assess the quality of rehabilitation and to track progress back to 'normal function' is valuable for all rugby code athletes". Sports team physiotherapist Hamish Craighead: "Concise programs that provide targeted exercises give medical, training staff and the athlete the opportunity to approach their rehabilitation with confidence". Sports team doctor Stephen Kara: "Reliable, valid and sensitive assessments ensure we have minimised the risk of recurrence prior to returning the athlete to play".

Conclusions: Lower-extremity assessments are useful for an athlete's career and a team's investment. It is recommended that coaching staff support athletic baseline and post-injury assessments for improved performance and to enable quality information on which to base return-to-play decisions.

References

1 Brown SR, Griffiths PC, Cronin JB & Brughelli M. Lower-extremity isokinetic strength profiling in professional rugby league and rugby union. *Int J Sports Physiol Perform* 2013; [In press].

2 Mendiguchia J & Brughelli M. A return-to-sport algorithm for acute hamstring injuries. *Phys Ther Sport* 2011; **12**, 2-14.