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SELECTED ABSTRACTS FROM THE 2014 NZ SPORTS MEDICINE AND SCIENCE CONFERENCE, WELLINGTON, NEW ZEALAND
Subspecies Mamil: A Rare Evolutionary Development?

In 1569 Italian Doctor and Scholar Girolamo Mercuriale (1530-1600) published what is often described as the original Sports Medicine text book. While distant in time and language from modern sports medicine texts, Mercuriale was passionate about the use of exercise for promoting health and preventing illness and in that sense had similarities to 21st century sports medicine. Heally influenced by the Greek Philosopher/Doctor Aelius Galenus (Galenum of Pergamon AD 129 – 200), Mercuriale felt that the preventative health benefits of exercise espoused by Galenus had been lost over centuries, and took it upon himself to re-establish exercise as a tool for the physician.1

1) "on gymnastics practice or exercise...the art of gymnastics, extremely favoured among the ancients,...you will find that nothing more useful or beneficial to man has been transmitted, and only in a random and confused manner." (P21)

Mercuriale takes a very systematic approach to exercise, describing the use of exercise in ancient Greece, then carefully articulating the nature of various games and exercises before finally describing their medical benefits.1, 2 The renaissance period was a critical period in the development of the modern science of medicine, with the Galenus model clearly superseded by empirical approaches to medicine. However, in the 500 years since Mercuriale’s first put pen to paper, the challenges of utilising exercise for health benefit have persisted.3

In the late 19th century, intense competitive exercise was becoming so common place that concerns regarding the risks of strenuous exercise were being raised, with advocates of exercise for "health having to defend the benefits of intense exercise." By the turn of the 20th century, as well as large international competitive multi-sport events such as the Olympics having begun, numerous non-competitive "exercise for health" alternatives were being promoted globally. Authors and entrepreneurs such as Eugen Sandow (1868 – 1925) and Bernard Burnet (1868 – 1935) were actively promoting a healthy mind in a healthy body, through commercialised promotion of their own exercise for health strategies, books and magazines.4

Neither a successful mental nor a successful accumulation of wealth can be achieved without a good foundation of physical life....Neglect the body and the whole of life becomes a failure." (P126)5

Eugen Sandow (who ultimately became known as the “Father of Body Building”), is not normally recognised as a leading sports medical person but on perusal of his textbook “Life is Movement”, it is quickly apparent that he was perhaps ahead of his time in hiving off exercise as a tool for medicine. Sandow recognised a place for competitive games and sport, but also that they felt that they were not necessarily suitable for all and that it was more important to “lay down a physical foundation for life, and build up muscle and tissue and a healthy organism not for the mere performance of any particular game or athletic feat, but at the finest insulation policy in the world against physical deterioration and disease". (P 393)1

Indeed, while exercise was described as a "health accountant", a subsection in "Life is Movement" is titled "Exercise should be prescribed like medicine" (P 345) under which he recommends that “Every student should be taught the prescription of...balanced physical movement".7 Seventy years on, it was New Zealanders who were among the first to legitimise exercise prescription for health, with the development of initiatives such as the “Green Prescription” (1998), designed to promote exercise and health in NZ. Over the last 15 years the rest of the world has tried to catch up, with initiatives such as ACSM’s “Exercise is Medicine”, and numerous conferences dedicated to this area.6

New Zealand’s easy access to the outdoors and widespread sporting facilities gives us a huge advantage over many countries. Why then, do our statistics make such depressing reading? According to the NZ Health Survey (2012/13) 31% of adults and 11-24 year olds in New Zealand are obese. Up to 60% of Pacific Island adults in NZ may be obese, with diabetes prevalence at 13% in the same group. This equates to 1.2 million obese individuals in our five county: 15% of adults continue to smoke despite many smoking bans and risk groups, while 15% of adults drink alcohol “hazardously”. In addition, 15% of the population suffers from some form of arthritis (including osteoarthritis) and 17% suffer from chronic pain.6

It has been well established that “The Green Prescription” can have a positive impact on activity levels, nutritional intake, mental well-being and may influence other participants showing positive health changes.8 However, despite the best intentions, it appears that in 2013/14 Group, Vice-Chair of the FANA Sports Medicine and Rehabilitation initiative, to currently sit with the Ministry of Health) over the last 16 years, the Green Prescription and its offspring “Active Families” (targeting children with a BMI over 25) remains an avenue for promoting exercise and health in NZ. Over the last 15 years the rest of the world has tried to catch up, with initiatives such as ACSM’s “Exercise is Medicine”, and numerous conferences dedicated to this area.6

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The latest incarnation of a booming active families final survey report 2014.

In Issue 41(1), the editorial described the outcomes of the SMNZ conference to see the results of this unscientific assessment of the predictive merits of genetic testing of athletes, the following table illustrates the (very generalised) outcomes of the genetic testing that was performed. To summarise, the results illustrated without exception that our punter, our trier, our wannabe, our weekend warrior, our dreamer of sporting glory, was found to have the preferred genetic profile when compared with a double Olympic Gold Medallist.

This of course, "proves" nothing (there are some obvious weaknesses in this study design!), but should encourage us to carefully consider the merits and risks of spending $300 on a genetic test for performance prediction.

That an individual's genetic makeup is important to sporting success is undeniable, and yet reducing predictions for genetic performance alone remains an inappropriate oversimplification. Furthermore, genetic testing is a serious business, and should not be taken lightly. In other fields of medicine, when undergoing genetic evaluations (such as for conditions like Huntington's Disease), a formal psychological evaluation and support structure is required to be in place, thus prior to any testing taking place. Direct to the consumer marketing of genetic tests, does not provide such support.

The unexpected and unintended consequence of this outcome is that our "punter" has been cast as an "underachiever", not living up to his genetic "potential". The unintended implication is that this is undermining the lack of psychological, physical or mental development to application of his "natural" talent. Our punters long held mantra in the face of his repeatedly "average" athletic performances was that "the mind is willing but the body is weak," which is no longer applicable given his new found understanding of his "genetic potential" (assuming he was to believe the genetic results of course). What impact this cognitive dissonance may have on his long term athletic performance (and engagement in sport) remains to be seen.

The scientific basis for the genetic profiling of potential or current athletes to predict future capability, injury profile or preferred event, typically remains limited to how quality association studies, with limited or no predictive ability. The marketing of these genetic tests direct to the consumer, without any direct medical or counselling involvement challenges many of the standards of good practice, and has an appearance of 21st century snake oil.

**ADDITION**

The Man Who Knew Too Much

In Issue 41(1), the editorial described a superlative evaluation of the merits of genetic profiling for predicting future performance in athletes. For those of you who may not have made the SMNZ conference to see the results of this unscientific assessment of the predictive merits of genetic testing of athletes, the following table illustrates the (very generalised) outcomes of the genetic testing that was performed. To summarise, the results illustrated without exception that our punter, our trier, our wannabe, our weekend warrior, our dreamer of sporting glory, was found to have the preferred genetic profile when compared with a double Olympic Gold Medallist.

**POWER**

In 2015 New Zealand will be co-hosting the Cricket World Cup, and many SMNZ members will be involved. The World Cup will be a great opportunity for us to illustrate both what a great sporting country NZ is, and the quality of our sports medicine services. In recognition of this event, the British Journal of Sports Medicine, Sport Health, the Journal of Science and Medicine in Sport and the NZJSM have been collaborating to publish Cricket specific issues, which will appear over the next few months. Reflecting this collaboration, we include two interesting case reports related to cricket players in this issue, and I would like to thank John Orchard for his support in raising the profile of Sports Medicine in Cricket in this way.

I ultimately look forward to a great event and a successful NZ cricket team. Good Luck all!
This summary covers the British Journal of Sports Medicine issues from July to December 2014 inclusive.

**JULY**

The July issue was concerned with monitoring of physical activity. In the opening editorial, Weiler and colleagues asked the question: ‘Is the lack of physical activity strategy for children’s health better for children?’ This summarised the current data indicating that today’s school children are much less active than their forebears. They report on limited funding that has been pledged by the UK government to improve the provision of physical education for primary school children, and comment that the investment seems pitiful in comparison to the overall education budget. They call on current and future governments to create a comprehensive national policy for child centred physical education.

Later in the same issue is an excellent review article on exercise training in children with asthma. Wasonooji and colleagues from the University of Maastricht summarised 29 studies and concluded that training had positive effects on several cardio- respiratory fitness parameters. They noted, however, that the effects of training on asthma control, airway inflammation and bronchial hyper-responsiveness were barely studied. They conclude that an effective training programme for children with asthma consists of at least two 60-minute training sessions per week, with training intensity individualised, and the programme should be continued for at least three months.

Excessive time sitting has been shown to be detrimental related to several health outcomes. Samantha Stephenson and colleagues from the University of Queensland instituted a pilot study in a single workplace with 21 intervention participants. The authors noted that to date there has been no RCT incorporating a lot of the elements noted in the Danish intervention study. The authors noted that to date there has been no RCT comparing different surgical approaches to treat this condition, and arguments for both open and laparoscopic surgery were advanced. This article provides an excellent overview of the state of play in the UK, at least with regard to groin pain in athletes.

Low carbohydrate diets are much in the news. An article entitled ‘Low carbohydrate diets for athletes: what evidence’ by Tim Noakes and colleagues advances arguments in favour of a low carbohydrate diet. They point out that athletes adapted to a low carbohydrate diet live and train with chronically low blood insulin concentration.
and have instantaneous access to fat reserves at all times. By contrast, they provide teams and coaches with appropriate professional backup.

In the later August issue there was an evidence-based overview of the effectiveness of physiotherapy interventions and manual therapy to treat subacromial impingement. The authors reviewed ten RCTs and two reviews and concluded that, in the medium term, exercise therapy gave the best results compared to placebo or controls. For other interventions, e.g. hyperthermia or ultrasound, conflicting, limited or no evidence was found.

Anterior dislocation of the shoulder is both common and serious. Recent advances in imaging and shoulder surgery have shown the potential dangers of traditional reduction methods such as Kocher’s and the Hippocratic methods. These authors recommend the Stimson technique, i.e. placing the patient prone with the injured arm hanging off the edge of the bed and applying 5kg of traction to the patient’s wrist. Other traction techniques including the scapular manipulation technique and Milch’s technique have proven to be easy, safe and effective in reducing the shoulder and are recommended by these authors. The article includes excellent illustrations describing the various methods. They conclude that trainers should learn these better and safer relocation methods based on the current evidence that is available.

What are the legal responsibilities of doctors when making participation decisions in athletes with cardiac disorders? Pauwels-Goldkoop comments that the screening physician has a legal responsibility to consider consensus recommendations in sports cardiology, to avoid wrongly grounding an athlete and prevent misinterpretation of test results. Likewise, the athlete can ask for a second opinion and further medical advice to help in decision making when a cardiovascular anomaly is identified. In addition, sports governing bodies have a legal responsibility to provide teams and coaches with appropriate professional backup.

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The August issue was published in association with the British Cardiovascular Society and covered aspects of sports cardiology. It included a state of the art review on the incidence of sudden cardiac death in athletes. Rates of sudden cardiac deaths varied from 1:917,000 to 3:300. Central to this were subgroups, particularly African-American athletes and basketball players, appear to be at higher risk of sudden cardiac death. Also in the same issue was an article by our own Dan Exeter and colleagues reporting higher risk of sudden cardiac death in the intervention group, who had a lower incidence of ankle sprains compared to the control group. They found that during the one-year follow-up, 20% of participants reported a recurrent ankle sprain. However, there was marked variation between the groups, with 15% recurrence in the brace group, 27% recurrence in the training group and 19% recurrence in the combination group. Based on this data, bracing is the most effective intervention and the authors recommend ongoing use of braces during sports for 12 months, rather than bracing being restricted to the acute phase.

Minimallist footwear has grabbed the attention of runners in recent years. Jack Taunton and colleagues examined the injury risk and pain perception in runners using this footwear. They found that the runners in neutral shoes reported the fewest injuries and those in partial minimalist shoes were the worst. Runners in full minimalist shoes (Vibram 5-finger Bikila) reported greater shin and calf pain. They comment that clinicians should use caution when prescribing the use of minimalistic running shoes. From my clinical experience and the biological plausibility argument, it would appear that those athletes with significant biomechanical abnormalities are the ones who should particularly avoid minimalist shoes if they wish to run long distances in a pain free manner with minimal risk of injury.

SEPTEMBER

The September issue reported on research carried out in the four IOC centres of excellence that were identified in 2009:

- The Australian centre in Ballarat studied sports injury surveillance, coding and classification systems; prospective monitoring of sports injury incidents and injury causation; and also implementation research within community sport.
- The Canadian centre in Calgary studied concussion and injury in youth ice hockey; and injury prevention to prevent osteoarthritis.
- The South African centre in Cape Town studied the burden of injury and illness in specific populations of athletes; protection of the health of the athlete participating in mass community-based endurance sports events; plus development and implementation of a comprehensive lifestyle intervention programme for patients with lifestyle related chronic diseases.
- The Oslo Sports Trauma Research Centre in Norway examined the burden of injury and other health issues in specific athlete populations and is applying video analysis methods with novel model-based imaging matching technology to a range of sports, including handball, football, alpine skiing and snowboarding.

All of the centres have provided research opportunities for trainers under the guidance of world leading experts.

Of potentially most interest to New Zealanders was the study by Schwellnus and colleagues on the 2012 Super Rugby competition. They found more than 50% of players sustained a time loss injury during the four month season. 42% of injuries were severe enough for the players to miss a week or more of competition. These data are higher than the reported incidence in club rugby and serve to emphasise the high level nature of the Super Rugby competition.

The second issue in September looked at muscle injuries. Our own Bruce Hamilton wrote an editorial with the intriguing title ’Medical management of hamstring muscle injury: strained evidence for platelet rich plasma’ Platelet rich plasma has been vigorously advocated in the lay press and via testimonials from selected elite athletes. However, the paper by Reurink and colleagues published in the New England Journal of Medicine earlier in 2014, which was a double-blind randomised controlled trial, found no benefit from use of PRP compared with a placebo injection of saline. This challenges the proponents of PRP to substantiate their opinion with equally high quality trials. Later in the same issue there was an excellent editorial by Nicola Maffulli that had previously been published in the BMJ. He comments that, despite the findings of well conducted studies, that autologous blood products probably do not work, it seems likely that they will continue to be widely used.

Predicting return to play after hamstring injuries is not easily done. Moen and colleagues studied 28 clinical and MRI parameters in 282 clinical and MRI positive hamstring injuries undergoing a standardised rehabilitation programme. The clinical parameters that were most useful were self-predicted time to return to play by the athlete, and a deficit in passive straight leg raise on the injured side versus the normal side. MRI parameters in Grade 1 and 2 hamstring injuries were not predictive.

John Orchard, well-known to New Zealanders, commented on the role for MRI in hamstring strains. He proposed that in professional athletes, having MRI information in addition to clinical information might improve clinical decision making. Certainly in the Australian professional sporting environment MRI scans are ordered routinely in those athletes with hamstring injury. By contrast, in recreational athletes there are not the same pressures on return to play. Orchard also comments on the ‘risk appetite’ of the player and coach; certainly player confidence is an issue that has been under emphasised to date.

OCTOBER

The October issue was sponsored by the Swedish Society of Exercise and Sports Medicine. An editorial by Mats Borjesson and Jon Karlsson examined the ethical dilemma faced by the team physician and commented that these are often overlooked in sports medicine education. In New Zealand, our own Lynley Anderson has published extensively in the field and New Zealand clinicians arguably have a heightened awareness of these issues following her work.

Later in the same issue, Dominic Malcolm and colleagues examined practical responses to confidentiality dilemmas in elite sports medicine. They commented that clinicians use a range of interpersonal strategies to manage the challenges with regard to patient confidentiality; as far as practicable, the athlete should be encouraged to be upfront with their condition with the coach. Over the years I have taken to including the athlete in the circulation list for their clinical letter. They can then share this information with whomever they wish.

Concussion has been much in the news recently. Later in the same issue is an article by Nordstrom and colleagues studying 46 elite male football teams in 10 European countries over 10 seasons. Over that time it was found that concussion increased the...
risk of subsequent injury by about 50%. The authors suggest that a more in-depth medical evaluation is necessary after a concussion, to focus on assessment of neurological and cognitive deficits. They advocate comparing pre season and post concussion tests of cognitive function to help in determining readiness to return to play and subsequent injury risk. This would be standard practice in the professional sporting environment in this country but variably applied at the community sport level.

Can a specific exercise strategy reduce the need for patients with subacromial impingement to proceed to surgery? Certainly this has been the case, with Holmgren and colleagues from Linkoping University looked at 102 patients with six months or more of subacromial impingement. The patients were randomised to a specific exercise strategy targeting the rotator cuff and scapular stabilisers, or to a control group exercise for 12 weeks. Only 20% of the specific exercise group subsequently required surgery versus 63% of the control group one. Would hope that in this country, patients with subacromial impingement were being treated with the specific exercise strategy outlined above.

The second October issue was headed ‘Food for Thought’ and examined the complex and controversial interactions between diet and exercise. Of those 71 reported knee injuries, and the athletes with knee injuries increased their BMI percentile by up to five units more than someone of the same age without an injury. Clearly a worrying statistic.

What about weight training? Schantz and colleagues examined 56 overweight and obese males from 13 to 17 years of age. They were randomly allocated to an intervention group put onto a six month resistance training programme, and a control group who did not undertake the programme. After six months the intervention group was stronger, which is no surprise. There was no statistical difference in body composition outcomes, but the weight training group had improvement in their self worth. From Norway, Moholdt and colleagues reported on current physical activity guidelines and commented that these were insufficient to mitigate long term weight gain. They conclude that the amount of physical activity required to prevent long term weight gain is greater than the guideline amount for health benefits.

Low back pain is incredibly common and we need red flags to screen for malignancy and fracture. Downie and colleagues from Australia and the Netherlands included 14 studies evaluating 53 red flags and concluded that older age, prolonged corticosteroid use, severe trauma and the presence of a contusion or abrasion increased the likelihood of spinal fracture. Not surprisingly, a history of malignancy increased the likelihood of spinal malignancy. No other reliable predictors of spinal malignancy were found, but it would seem sensible to not ignore significant weight loss in the preceding year.

The November issue could well be called the rowing issue, as it concentrated on issues relevant to that sport. There was an analysis of the role of the FISA Medical Commission, which overviews medical aspects of rowing. FISA, along with UCL, has been active in promulgating a no-needle policy. FISA has also been proactive in instituting a requirement for athletes competing in World Championships at the U23 level to have a cardiac questionnaire administered and a resting ECG recorded. This requirement is about to be extended to competitors in the Open Age World Championships.

The December issue included several articles on muscle injuries including deep posterior compartment syndrome. Winkles and colleagues carried out a systematic review of surgery for deep posterior compartment syndrome of the leg. They found seven studies all with Level 3 evidence reporting on a total of 131 patients that met their inclusion criteria. However, only four of these studies strictly adhered to predefined internationally recognised criteria and cut-off levels for intracompartmental pressure varies widely among the seven studies. Surgical procedures ranged from a superficial crural fasciotomy to multiple fasciotomies of various deep posterior compartments. Not surprisingly success rates were not high, ranging from 30% to 65%.

In the accompanying editorial, Mark Hutchinson comments that release of at least 80% of the entire fascia is required in instituting a requirement for athletes with posterior compartment syndrome which require their own specific reconstruction. In their group of 164 rowers, who were scheduled to compete internationally. She commented that the rows were often selected a relatively short time before they were due to depart overseas, and this caused logistical problems in trying to arrange flow on investigations, e.g. echocardiography, where these may be required.
Laura Langman first came into the Silver Ferns over ten years ago as an 18 year old. Since then she has played over 100 consecutive games in the ANZ championships and 100 consecutive games for the Silver Ferns. This obviously marks her as a great player and one that has managed to avoid injury and we thought it a great opportunity to hear from a player's perspective what kept her on the court. Thanks to Sharon Kearney for setting the interview up and to Laura for taking the time to answer a few questions. When talking to Laura it quickly became apparent that there was a little luck involved (she’s had a couple of well-timed injuries!), but there are far more significant reasons for her achieving a double hundred not out–just luck!

**What is your experience of player and coach attitude toward injury in netball?**

Laura discussed how every coach gets frustrated by injuries as it affects the team-line up and often ultimately the result. In some team environments it has been very clear who makes the call regarding an injured player and others not and she has seen players play injured. Laura’s preference was for a team environment where it was clear the physiotherapist made the call on injury as this removed the ones from the player and also avoided issues as well senior players might put pressure on a player to play without understanding the full nature of the injury. She emphasised this often required a strong physiotherapist to stand up to senior players and sometimes a coach, noting that if the season was on the line and you only had one player who can play in a position then the physiotherapist can come under significant pressure. Laura recalled occasions when a coach had overridden a physiotherapist’s decision but then regretted it as it had negatively impacted on the player’s performance and the team’s performance.

**When did you specialise in netball?**

Laura recalled that when she was growing up specialisation in netball wasn’t really an option as there was “no such thing as the under 8s”. The first representative team she made was the under 15’s and even then they only had one tournament so there was plenty of time for her to engage in other sports such as volleyball, cross country and horse riding. Netball didn’t really become serious until her last two years at secondary school and more so when she made the New Zealand secondary schools team. She also mentioned that growing up on a dairy farm exposed her to natural weight training with feeding out, carrying milk buckets and challenging herself to climb-ins in the cow shed. Looking back she may have had a better conditioning background than she realised – she made specific note that she certainly didn’t have an iPad!

**What do you think you have done that has helped keep you on the court?**

Laura highlighted how she was influenced at an early age by a coach who “taught the living daylight out of her” but was very focused on good landing technique and a physiotherapist who was pedantic with regard to muscle balance screening – it was obvious she had huge respect for both individuals. She also realised early (in secondary school) that it took a long time to recover from injuries (eg, calf problems) and that prevention was thus crucial given that she hated sitting on the bench and was always keen to be available to play. She made the point that if the physiotherapist mentioned she had a deficiency she hated it and was always asking “show me what I need to do to get better” and for example during one off-season “smeared her calves” until they were up to speed. She also never wanted to look like “RoboCop” on court – held together by tape!

As well as believing the advent of physiotherapy muscle screening had assisted in preventing injuries, she spoke about taking up Pilates around 5 years ago (once a week). She believed this had improved her ability in the gym and improved her movement control – rather than just going for quantity in the gym she became more focused on quality. She also highlighted the introduction of Matt Kritz (Strength and Conditioning Coach) to the Ferns strength and conditioning programme and believed the increase in volume in his programme compared to previous programmes had the team better prepared to cope with the increased physical demands of an increasingly physical game.  

**You obviously value the input of the physiotherapist and the conditioner?**

Laura admitted to being a bit of a weirdo and loving fitness testing (she loved getting a few numbers in front of her – eg, power profiles) – at one stage a power imbalance was picked up (left worse than right) so Laura took that on board to the point where her left side was better than her right. She loved gathering information on her weaknesses/imbalance and was clearly highly motivated by this to improve.

She took on the message from strength and conditioning that she needed to be as strong as she was big to handle how she motivated to be the most she can. She mentioned how not all players were motivated by fitness tests in the same way and some needed to suffer a substantial injury before they sat up and took notice. Interestingly when doing the fitness testing Laura emphasised that she was only ever interested in beating her own previous best and had no interest in the outcomes of other players – internal motivation to the fore. Her summary “when taking the court I want to know that my conditioning/strength muscles are the right they can be so I know I have that behind me so I can just focus on playing”.

**What injuries have you had and how did you cope?**

Laura has had a few ankles sprains - all caused by contact with other players. The only other injury she’s had was a stress fracture of the foot and she acknowledged she wasn’t the best “patient” – she initially wanted to try and play through the stress fracture (taping up her foot). She recognised this could be viewed negatively but also suggested this was a positive when she saw it in young players as it indicated high motivation to be on the court. Laura saw a fine line between playing through an injury or pulling out too early – in her opinion netball has players doing both and it’s very player dependent and team environment dependent. The ANZ championship is often a one shot opportunity for many players and fear of losing an opportunity or conversely under performing on court is a huge influence. Although she hasn’t had any knee issues she noted her paranoia at the prospect of a knee injury was a motivating factor to do the injury prevention work. She had clearly spent hours doing preventive landing programmes, massive amounts of single leg drills in the gym as well as neuromuscular training programmes.  

**What advice would you give to younger players to reduce their risk of injury?**

Laura emphasised the onus was on the players to turn up in shape to be able to handle the demands of the game. It was fairly obvious that she has a great work ethic and would clearly buy into the old adage of you get out of it what you put in. She speaks at clinics with young players for Netball NZ and clearly knows how to instruct good landing technique. She also invites younger U23 players to train with her at the gym so they have an idea of what is required – “two laps around the field is not conditioning!”. Laura also mentioned that some young girls were still concerned by the myth that if you lifted weights you were going to get massive and that put them off – she was keen to educate younger players that this wasn’t the case.

**Do you think players need access to academies and the like?**

Laura mentioned that on the whole she wondered if the Australian players were fitter, stronger and faster with what she viewed as greater access to academy structures and possibly sports science. However she freely admitted that she came from a “hick town” and had still managed to succeed. She did comment that a possible downside of a high performance environment is players thinking they will have more done for them and in the process they end up doing less themselves.

**Resilience is not due to luck. Laura has worked incredibly hard for many years to be the resilient athlete she is. I am sure coming from a rural background is a piece of the resilience model. As she said she was developing strength and condition in a farm setting forming a young age. The timing of her very few injuries have been somewhat lucky. Yes she was not the “best patient” when she had a stress fracture in her foot but that was only because she wanted to be on the court. An athlete of Laura’s capability and passion will question and challenge injury management plans – we are acutely aware of this and so we have the best medical team at our finger tips to ensure we are making very sound evidence based decisions and those decisions always involve the athlete. We managed to talk Laura round to a sound resolution re her foot and hence she did not miss a game. “The great thing about athletes like Laura is they keep you on your toes. They are always raising the bar and pushing the envelope and you have to be doing the same thing in your own profession (whether it be Strength and Conditioning, Physiotherapy or Coaching) to keep up with them but also ensure you are one step ahead”
John Herbert Heslop
1925 - 2014

The death of John Heslop, earlier this year, signalled the departure of another highly respected “statesman” who left an indelible mark on the development of sports medicine in New Zealand.

John Heslop, a General Surgeon, Dunedin born and bred, was passionate about three things. There was the Otago Medical School, his cherished alma mater, then there was cricket where he had gained provincial level status as a player and national level recognition for leadership and finally there was his culinary interest, best exemplified by membership of the “Dunedin Trip and Onions Club”. But it was through his unbridled love of cricket that John Heslop most publicly espoused the link between clinical medicine and sport, long before the advent of sports medicine as a specialty.

John Heslop’s academic credentials at Otago as an Associate Professor in the Department of Surgery, his prolific list of publications and his tireless work for the Royal Australasian College of Surgeons are well documented and these were recognised through a number of prestigious professional awards. Generations of undergraduate students and advanced surgical trainees benefitted from his wit, wisdom and unique teaching style. Student attendance at Mr Heslop’s general surgical outpatient clinic was a never-to-be-forgotten experience, peppered with countless fascinating anecdotes, stamping him as a remarkable teacher and empathetic doctor.

However what is less well known to many in the sports medicine fraternity is the leadership John Heslop provided as an outstanding sports administrator and a mentor to many accomplished sportspeople. From the New Zealand Cricket Board of Control to Presidency of New Zealand Cricket and as a highly successful Manager of two New Zealand touring teams to England (1975) and the West Indies (1985) John Heslop left his mark on cricket at every level.

It was no coincidence therefore that in 1963 at the foundation meeting of the New Zealand Federation of Sports Medicine, that John Heslop had willingly joined the late Dr Norrie Jefferson in setting the future for our organisation. At that meeting in February 1963 John Heslop articulated his strong beliefs that doctors in sports medicine needed to understand and apply fundamental clinical skills that were to become the forerunner of modern sports medicine practice. He was instrumental in helping to advise the future development of Sports Medicine New Zealand serving for many years on our Executive and becoming a Foundation Fellow and Life Member in 1995. In the same year John Heslop was recognised in the Queen’s Honours, receiving the award of CBE (Commander of the British Empire) for his services to medicine, sport and the community.

His legacy to sport and medicine in New Zealand was truly remarkable and as a student, friend and colleague I am humbled in providing such a brief snapshot of an inspirational mentor.

David Gerrard
Professor, Dunedin School of Medicine
University of Otago

Jock Anderson

Sydney’s preeminent musculoskeletal radiologist Jock Anderson died in May of this year. We were all very saddened to hear of his demise.

He was a great friend of ACSP and also of Sports Medicine New Zealand, and gave freely of his time to speak at our meetings. We all learned so much from him – mostly about radiology but also quite a bit about life in general. His quiet, understated style meant that he got his message across in a gentle but effective manner.

Outside of his involvement with the College, Jock was a hugely respected radiologist who bridged the gap between radiology and clinicians with consummate ease. He understood the mechanism of the injury as a critical factor in diagnosis as he had been a good athlete in his youth.

He was responsible for setting up the imaging services for the Sydney Olympic Games and went about this with his usual skill and enthusiasm. His diplomacy was key to getting an onsite MRI machine at the Sydney Games, the first time this service had been offered within an Olympic village. Not surprisingly, plenty of athletes (and also officials) were able to make use of this superb service. Jock was able to generate a fair amount of data which formed the basis for some useful publications in subsequent years. His skill in setting up the service in Sydney led to his recruitment as a consultant for imaging services at later multi-sports events. As a Kiwi, I was always struck by Jock’s appreciation of our country. He had a bunch of fishing mates who used to fish with him and he would stay in the huts by the braided rivers of South Canterbury. With his Rodd and Gunn attire and gentle laconic style, I imagine this was his spiritual home.

His real home was in East Crescent Street on Sydney’s North Shore and enjoyed a magnificent view overlooking Sydney Harbour and the Opera House. Jock was generous in granting many of us Kiwis temporary residency and we greatly enjoyed his hospitality on many occasions. One such memorable event was just prior to the 1999 IOC Conference in Sydney; when we went round to his place to witness the Wallabies versus Springboks match at the 1999 World Cup. The hospitality and atmosphere was superb, and it helped that there was an entertaining game of rugby to watch as well.

Jock was a real renaissance man and had interests that spread far beyond medicine including vintage boats, old military memorabilia and the like. Such people enhance our profession well beyond their numbers.

Farewell, my friend, and rest in peace knowing that you have contributed hugely to sports medicine in this part of the world and well beyond.

Chris Milne
Sports Physician, Hamilton, New Zealand
Return to play after soft tissue injury: The role of nutrition in rehabilitation

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Abstract

Injury can place a significant burden on an athlete, its timing can be cruel and jeopardise success. The inter-disciplinary rehabilitation process is crucial at the elite level, providing athletes with appropriate care and strategies that promote an optimal return to competition. The purpose of this review was to investigate the role of nutritional support during rehabilitation from soft tissue injury. Immobilisation following an injury places affected muscle groups at risk of atrophy due to anaboloc resistance, where muscle protein synthesis is reduced via the absence of muscular stimuli. Maintaining optimal host nutrition is critical during rehabilitation from soft tissue injury. Furthermore, amino acid supplementation has been shown to alleviate muscle atrophy during significant periods of immobilisation. However, in the absence of resistance exercise, diet alone cannot attenuate the decline in strength observed during immobilisation. Wound healing and tissue regeneration is a vital component of rehabilitation, tendon tissue is responsive to exercise in a similar manner to that of myobibular and sarcaplasmic fractions within the muscle. Recent evidence suggests a leucine-rich protein supplement can augment the hypertrophic response of tendon to resistance exercise. There is a theoretical rationale for the supplementation of creatine and protein during rehabilitation although HMB and LCn−3PUFAs supplementation requires further investigation. Dietary strategies that attenuate muscle atrophy, promote tissue healing, and maximise the response to exercise are a vital component of the rehabilitation process.

Keywords: immobilisation, muscle protein synthesis, muscle atrophy, rehabilitation

Protein Supplementation during Immobilisation

Nutritional interventions to counteract such atrophy and impairments in muscle function during the immobilisation period would be advantageous for the rehabilitating athlete. Paddon-Jones et al 2005 supplemented healthy males with 15g of essential amino acids (EAA) + 30g of carbohydrate three times daily between meals during 28 days of bed rest. This was compared to a control group who consumed isocaloric meals, minus the supplement. No weight loss was observed in the supplemented group while a significant weight loss occurred in the control group. Similar observations were reported in lean leg mass where -0.4 ± 0.1 kg loss was in the control group while the supplement group remained stable throughout the bed rest period. Although the experiment group consumed more calories in the form of protein and carbohydrate, the authors concluded that although they had further altered the muscle protein response and reduced losses in lean mass. By contrast, a similar study, involving 60 days of bed rest in healthy women, Trappe et al 2007 observed that supplementation with 5g of branched chain amino acids across each meal, comprising of a total protein intake of 1.6g/kg could not avoid significant reductions in quadriiceps muscle volume and calf volume. However, a group consuming a lower daily protein intake (1.0g/kg) minus the BCAA supplement but also exercised 3 x week maintained thigh and calf volume.13 14 15 Hence, a group consuming a lower daily protein intake (1.0g/kg) minus the BCAA supplement but also exercised 3 x week maintained thigh and calf volume. Furthermore, it is important that reasonable expectations are placed around body composition via the multiple –discipliary team to avoid athletes feeling the need to supplement.28

Protein supplementation during immobilisation has recently been studied in rodents.26 27 28 The authors concluded that the safety profile of HMB as a muscle-sparing qualities. HMB has shown that protein breakdown (MPB) may be a factor in the early periods of immobilisation (within 10 days).29 30 31 However, it is generally accepted that the primary reason for atrophy observed during immobilisation is due to a reduction in the rate of muscle protein synthesis (MPS) rather than an increase in MPB.32Phillips et al 2009 have termed this impaired muscle protein response as “anabolic resistance”.33 This was clearly demonstrated by Glover et al 2008 when they subjected healthy men and women to 14 days of unilateral knee immobilisation. A 27% reduction in post-absorptive MPS was observed through immobilisation when amino acids were infused at a high (26mg/kg-h)- and low (43mg/kg-h) doses. The non-immobilised limb displayed a greater MPS response by +681±7% and +541±2% respectively compared to the immobilised limb. It is of note that in both studies nutrition alone was unable to offset strength loss during immobilisation, highlighting the need for an exercise stimulus.34 Fortunately, complete immobilisation of 30 or 60 days is unlikely to take place in the majority of soft tissue injuries observed in sport that do not require major surgery. Nevertheless the impairments observed highlighted the need to ensure dietary strategies are utilised to minimise lean muscle mass loss during early stages of immobilisation. Dietary education should be an important element of the early stages of soft tissue injury management.

Maintaining Energy Balance during Immobilisation

If an athlete is immobilised or has substantially reduced energy expenditure it may not be surprising that they deliberately reduce their energy intake in the hope of avoiding gains in body fat. However, a negative energy balance is known to be catastrophic and if a negative energy balance was to occur this may further intensify the anabolic resistance during immobilisation. In healthy, young men and women a 500kcal decrease in total energy intake (1.5g/kg protein intake) for 10 days decreased muscle protein synthesis by 19%.35 This highlights the importance of dietary counselling and nutritional planning in the immediate post injury period to ensure an athlete remains in adequate energy balance. Furthermore, it is important that reasonable expectations are placed around body composition via the multiple –discipliary team to avoid athletes feeling the need to supplement.28

Nutritional Supplements of Potential Benefit during Immobilisation

Long-chain n−3 polyunsaturated fatty acids (LCn−3PUFAs) are essential nutrients which have received much attention for their proposed health benefits including their potential role in promoting protein synthesis.36 Smith et al 2011 observed a greater anabolic response (PSR & mTOR/p70S6K signalling) to insulin and amino acid infusion after 8 weeks of a high dose LCn−3PUFA supplementation (4g of Lovenza®/day) in healthy untrained adults.37 While these results are promising in their potential to counteract the anabolic resistance observed during immobilisation it is important to note that subjects were infused with a less than optimal dose of amino acids. It remains to be seen if protein synthesis rates would be elevated above those observed with an optimal dosing strategy.38 LCn−3PUFA supplementation during immobilisation has recently been studied in rodents.39 Here the authors demonstrated a slight but significant alleviation of loss in soleus mass when rodents’ hind limbs were immobilised for 14 days while fed a high dose LCn−3PUFAs diet. Conversely in a study out of the same laboratory rodents supplemented with a high LCn−3PUFAs diet displayed an inhibited muscle response during the early stage of soleus muscle recovery after disuse atrophy.40 After 10 days of immobilisation, the activation of Akt, mTOR signalling and P70S6K synthesis was suppressed during the subsequent 13 days of mobilisation. With these contrasting findings, the limitations in comparison of animal models to humans and the potential negative effects that LCn−3PUFAs supplementation may have on wound healing strength, more research is required on LCn−3PUFA supplementation.41 42

β-hydroxy-β-methylbutyrate (HMB) is a metabolite of the amino acid leucine and has received attention for its potential muscle sparing qualities. HMB has shown to attenuate muscle wasting in disease states such as cancer and AIDS.43 44 To date its effect on lean muscle mass in healthy and trained individuals remains inconclusive.45 In a meta-analysis by Rowlands and Thompson 2009 on the effects of HMB supplementation in trained and untrained athletes, they concluded the effects of changes in fat and fat free mass were trivial and inconsequential regardless of training experience.46 Wilkinson et al 2013 recently compared the acute effects of consumption of Leucine (Leu) and HMB in young men.47 When 3.4g of HMB was consumed compared to 3.4g Leu, MPS was stimulated +70% (HMB) versus 110% (Leu). HMB consumption also attenuated MPB by 57%. With recent evidence that MPB may be a factor in early onset muscle atrophy caused via immobilisation, HMB supplementation may have a potential benefit in the early stages of immobilisation.48 Molteno et al 2013 concluded that the safety profile of HMB as...
have focused on the provision of substrates and have supported a beneficial effect of glutamine. Although glutamine has abundant roles in wound healing and nutrition has long been recognised, questions whether particular amino acids may enhance collagen synthesis. The majority of studies have focused on the provision of substrates based on collagen's molecular structure of Glutamine, Proline and Hydroxyproline. Although Glutamine has abundant roles in cells involved with wound healing, research has not supported a beneficial effect of supplemental glutamine on wound healing or collagen synthesis. The amino acid Arginine (ARG) has received the most attention in recent decades regarding wound healing. Several mechanisms are proposed as to why arginine may be effective in promoting wound healing. ARG is both a substrate for protein synthesis and in the post-absorptive state, where the rates for collagen synthesis is much lower. However they demonstrated muscle collagen and tendon turnover was unresponsive to feeding at rest (20g essential amino acids) and a solution containing 15% protein, 64% carbohydrate, 21% fat respectively. This was in contrast muscle myofibrillar protein which showed a significant increase in the synthetic response to the nutrient provision of 20g of essential amino acids. Miller et al 2005 compared muscle protein synthesis to that of patellar tendon collagen synthesis after a repeated one hour, one leg kicking exercise in healthy young men. They showed that tendon is highly responsive to exercise, showing a 17 fold increase in protein synthesis 6 and 24 hours post exercise. In addition, MPS in myofibrillar and sarcoplasmic fractions increased 2 fold by 6 hours and peaked at 24 hours. The authors concluded there may be a common mechanical or humoral pathway for a muscle and tendon anabolic response, most probably the MAP kinase and or mTOR pathways. Recently Farup et al 2015 illustrated patellar tendon hypertrophy in response to exercise and nutritional supplementation. Twenty-two healthy, young and active men were assessed for the effect of a 12 week resistance training programme combined with either a high-locine whey protein hydrolysate (WHD) (19.9g) and carbohydrate (19.9g) supplement or an iso-energetic carbohydrate placebo (PLA). Both the quadriceps muscle and the patellar tendon cross sectional area (CSA) were assessed, using magnetic imaging (MRI). Quadriceps CSA significantly increased (in both WHD and PLA 3±0.8%). A significantly greater increase was observed in WHD compared to PLA. Proximal patellar tendon CSA increased significantly for WHD (14.9±3.1%) but not for PLA (0.8±2%) with a significantly greater increase in WHD compared to PLA. Similar observations have been reported by Holm et al 2005 where subjects consuming a 10g protein supplement of milk powder displayed greater CSA in the quadriceps when undergoing 12 weeks of a rehabilitation program from an anterior cruciate ligament injury. Recently Barbosa et al 2012 demonstrated in a rodent model that a leucine-rich diet stimulates collagen synthesis in tendons, particularly when in combination with physical exercise. These observations demonstrate a key role for protein supplementation in rehabilitation from soft tissue injury. It again emphasises the need to have a well-planned dietary strategy in order to optimise responses from rehabilitation exercise. Athletes should therefore treat the rehabilitation phase as they would when looking to maintain optimal lean muscle mass during regular training by consuming quality protein sources distributed regularly throughout the day and within close proximity post exercise. Confounding results have been seen in other studies. For example, Tyler et al 2004 observed no effect of creatine supplementation (20g/day) to 5g daily on body weight, body composition or strength in the first 12 weeks following ACL reconstruction. Roy et al 2005 observed similar findings 30 days after knee replacement surgery in elderly patients who were supplemented with creatine (10g/d x 36d pre-surgery to 5g/d x 36d post- surgery). Both studies concluded that the exercise stimulus during the rehabilitation was insufficient to facilitate the presumed hypertrophic effects of creatine supplementation. Of note, in all three studies when providing supplementation had no effect in minimising muscle atrophy during immobilisation or in the absence of a sufficient exercise stimulus. Only in young men with seven days of arm immobilisation has creatine supplementation (20g/day) been shown to maintain lean muscle mass and strength. And with its short and long term safety in use, creatine monohydrate supplementation may help promote gains in lean muscle mass during rehabilitation. However, its use in reducing muscle atrophy during immobilisation requires further investigation. Long-chain n-3 Polyunsaturated Fatty Acids (LCn−3PUFAs) Reduction in pain levels has been observed in recreational athletes with chronic tendon disorders when supplemented with high dose LCn−3PUFAs and an anti-oxidant complex. In one of the only investigations regarding LCn−3PUFAs during rehabilitation, subjects consumed the supplement for 32 days whilst undertaking ultrasound therapy (LCn−3PUFA supplement: 2.49g/d eicosapentaenoic acid (EPA), 1.89g/d docosahexaenoic acid (DHA), 3.38g/d of gamma-linolenic acid (GLA)). After 32 days a mean reduction in pain score of 99% was observed in the supplemented compared to 31% in the placebo group. The authors’ reasoned that LCn−3PUFA supplementation had the potential to dampen inflammation and pain without inhibiting the healing process, as seen with traditional Non-Steroild Anti Inflammatory Drugs (NSAIDs). Caution is needed in interpreting these results to the elite athlete due to the small number of recreational based subjects (31), a lack of dietary control, activity levels and the limited effectiveness of questionnaires to rate pain scales without functional tests. Currently no studies have repeated these observations but despite this LCn−3PUFA supplementation has been proposed to be used without restriction as part of a “polypill” approach in athletes with tendinopathy. Summary Literature pertaining to nutritional interventions for the promotion of rehabilitation following injury in its infancy. Nevertheless, there are several important aspects for athletes and practitioners to consider during rehabilitation from soft tissue injury. Adequate nutrition and the avoidance of nutritional deficiencies is critical in this period. An appropriate protein intake, spread evenly across the day will promote the maintenance of lean mass, while optimising protein synthesis throughout the day. Although an athlete’s energy expenditure may be restricted during this period, consideration of the energy demands of optimal healing warrants careful nutritional planning. In most cases this will vary across the different stages of rehabilitation and require detailed guidance by a nutrition professional. The addition of micro-nutrient and anti-oxidant supplementation is not recommended when an optimal diet is consumed. The supplementation of creatine monohydrate maybe warranted during rehabilitation but use of HMB and LCn−3PUFAs requires dietary intervention and counselling should take place as soon as possible after injury to ensure appropriate dietary strategies are promptly instigated to avoid muscle loss and to promote optimal healing. An adequate energy intake is critical for the maintenance of lean muscle mass during immobilisation and rehabilitation, and to promote the healing of soft tissue. A diet promoting an appropriate intake of micronutrients to ensure the avoidance of deficiency deficiencies will promote optimal healing; micronutrient supplementation is not warranted in situations where a balanced diet can be achieved. A sufficient protein intake is recommended, with high quality protein sources containing 20-25g protein spread across the day (5-6 times) to aid the maintenance of lean muscle mass. The inclusion of a rapidly digested and leucine rich protein source such as whey milk protein immediately after exercise may promote a greater anabolic response in exercise recovery. Excessive protein intakes (>2.0g/kg/d) are not required for further maintenance of lean muscle mass. Dietary interventions that compromise energy and nutrient intake, or promote rapid weight loss during rehabilitation should be avoided. Realistic expectations should be established with regard to body composition. Regular contact with a nutrition professional will ensure the dietary strategy is aligned with the overall rehabilitation goals. The nutrition professional should be part of the interdisciplinary rehabilitation team, to facilitate optimal healing maintenance of lean muscle mass and body composition during rehabilitation. The supplementation of creatine monohydrate during rehabilitation may promote hypertrophy and improved strength, however currently its effectiveness during initial immobilisation to preserve lean muscle is not supported. HMB supplementation during initial immobilisation exhibits potential due to its role in decreasing muscle protein breakdown. Omega 3 fatty acid supplementation has also shown to potentially dampen pain during rehabilitation from chronic tendon disorders. Both supplements warrant further investigation before their inclusion during rehabilitation can be warranted.

Table 1: Nutritional recommendations during rehabilitation from soft tissue injury

- Dietary intervention and counselling should take place as soon as possible after injury to ensure appropriate dietary strategies are promptly instigated to avoid muscle loss and to promote optimal healing.
- An adequate energy intake is critical for the maintenance of lean muscle mass during immobilisation and rehabilitation, and to promote the healing of soft tissue.
- A diet promoting an appropriate intake of micronutrients to ensure the avoidance of deficiency deficiencies will promote optimal healing; micronutrient supplementation is not warranted in situations where a balanced diet can be achieved.
- A sufficient protein intake is recommended, with high quality protein sources containing 20-25g protein spread across the day (5-6 times) to aid the maintenance of lean muscle mass.
- The inclusion of a rapidly digested and leucine rich protein source such as whey protein intake immediately after exercise may promote a greater anabolic response in exercise recovery.
- Excessive protein intakes (>2.0g/kg/d) are not required for further maintenance of lean muscle mass.
- Dietary interventions that compromise energy and nutrient intake, or promote rapid weight loss during rehabilitation should be avoided. Realistic expectations should be established with regard to body composition.
- Regular contact with a nutrition professional will ensure the dietary strategy is aligned with the overall rehabilitation goals.
- The nutrition professional should be part of the interdisciplinary rehabilitation team, to facilitate optimal healing maintenance of lean muscle mass and body composition during rehabilitation.
- The supplementation of creatine monohydrate during rehabilitation may promote hypertrophy and improved strength, however currently its effectiveness during initial immobilisation to preserve lean muscle is not supported.
- HMB supplementation during initial immobilisation exhibits potential due to its role in decreasing muscle protein breakdown. Omega 3 fatty acid supplementation has also shown to potentially dampen pain during rehabilitation from chronic tendon disorders. Both supplements warrant further investigation before their inclusion during rehabilitation can be warranted.
at a time when athletes may become despondent due to the necessarily slow rehabilitation process, dietary experimentation or lack of dietary adherence, that compromises total energy intake, protein intake or micronutrient supply may be detrimental to optimal rehabilitation and the expedient return to play. It is recommended that during this rehabilitation period athletes work closely with a nutrition professional and their inter-disciplinary team, to ensure appropriate nutrition strategies are implemented.

**References**

Juvenile Osteochondritis Dissecans of the femoral trochlea in a cricket fast bowler

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Keywords: Osteochondritis Dissecans, Injury, Cricket

INTRODUCTION

The term Juvenile Osteochondritis Dissecans (JOCD) refers to the separation of a fragment of articular cartilage and subchondral bone from the joint articular surface in a skeletally immature child. JOCD has been reported most commonly in children who are athletes and more commonly in boys. In fact, the maximum reported incidence is between the ages of 10-20 years. More than 70% of JOCD lesions are found in the posteroslateral aspect of the medial femoral condyle, with inferior central lateral condylar lesions accounting for only 20% of cases and femoral trochlear lesions, less than 1%. Even though Athletes in 1912 was the first to report osteochondritis dissecans of the femur trochlea, a review of literature reveals only a few reported JOCD cases involving the femoral trochlea. We report a rare case of JOCD involving the femoral trochlea in a skeletally immature fast bowler and its management.

CASE REPORT

A young 16 year old fast bowler presented with complaints of pain in his left knee for three months. There was no history of any direct trauma, the pain would occur on deep knee bending and squatting, and significantly interfered with his bowling run-up and play.

On examination, the patient was moderately built, muscular and tall. Knee examination showed normal patellar tracking and Q-angle. The patellar grind test was negative in full extension. M.R.I. of the knee revealed an oval area of altered signal intensity suggestive of OCD involving the articular cartilage and subchondral bone of the anterior surface of the lateral femoral condyle in the trochlear groove (Figure 1). The M.R.I. lesion was classified as Anderson's stage IIIB (Table 1).

The bowler was taken up for arthroscopy of his left knee. Intraoperatively an area of cartilage softening was identified in the trochlear groove, with no separation of the osteochondral fragment. This finding correlated with Chen's stage A of arthroscopic staging (Table 2). As the lesion was stable with intact overlying cartilage, it was not drilled. A comprehensive rehabilitation protocol was initiated. It involved passive patellar mobilisation exercises with retinacular stretching, knee range of motion and quadriceps muscle strengthening exercises. Open kinetic chain exercises were initially allowed as knee extension from 90 – 45 degrees of flexion. Closed kinetic chain exercises were performed from 0 – 30 degrees after the first 3 weeks and then gradually increased to 60 degrees flexion. The player was prohibited from squatting for 2 months. Once he regained full painless range of motion with no muscle wasting, the player gradually resumed cricket over the next 4 months, and after 6 months of continuing aggressive rehabilitation he had resumed fast bowling.

DISCUSSION

Munro was the first to describe the disease that we now know as "osteocondritis dissecans", but it was in 1905 that Konig gave this condition its name believing that inflammation was a causative factor. Barré et al further defined possible etiologies of JOCD formation through an aberrant Q-angle. The patellar grind test was negative in full extension. M.R.I. of the knee revealed an oval area of altered signal intensity suggestive of OCD involving the articular cartilage and subchondral bone of the anterior surface of the lateral femoral condyle in the trochlear groove (Figure 1). The M.R.I. lesion was classified as Anderson's stage IIIB (Table 1).

The results of nonoperative treatment for JOCD are successful in properly selected children with stable lesions. There have been reported a 1-year healing rate of 81% in skeletally immature children by simply having them abstain from sporting activity. Skeletally mature patients as well as those approaching skeletal maturity need to be treated more aggressively. Conservative management can however still be attempted with stable lesions keeping in mind that healing may take >4 months and a fibrous union develops, the fragment may displace at a later date. The JOCD lesions in this case were Anderson stage IIB (according to MRI) and Chen stage I (according to arthroscopy). This young bowler had a good functional outcome with conservative management and appropriate physiotherapy.

REFERENCES


Table 1: MRI staging of osteochondritis dissecans (Anderson et al)¹

<table>
<thead>
<tr>
<th>Stage</th>
<th>Evaluation</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIA</td>
<td>Stable</td>
<td>Subchondral bone flattening in the epiphysial plate before growth plate closure</td>
</tr>
<tr>
<td>IIB</td>
<td>Unstable</td>
<td>Incomplete separation of the osteochondral fragment</td>
</tr>
<tr>
<td>IIB</td>
<td>Unstable</td>
<td>Fluid around an undetached, undisplaced osteochondral fragment</td>
</tr>
<tr>
<td>IV</td>
<td>Terminal</td>
<td>Complete separation of the osteochondral fragment, loose bodies</td>
</tr>
</tbody>
</table>

Table 2: Arthroscopic staging of osteochondritis dissecans (Cheng et al)²

<table>
<thead>
<tr>
<th>Grade</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Articular cartilage is intact and smooth but may be soft or ballotable</td>
</tr>
<tr>
<td>B</td>
<td>Articular cartilage has a rough surface</td>
</tr>
<tr>
<td>C</td>
<td>Articular cartilage has fibrillations or fissures</td>
</tr>
<tr>
<td>D</td>
<td>Articular cartilage with a flap or eroded bone</td>
</tr>
<tr>
<td>E</td>
<td>Loos, undisplaced osteochondral fragment</td>
</tr>
<tr>
<td>F</td>
<td>Displaced osteochondral fragment</td>
</tr>
</tbody>
</table>

Figure 1: Showing Osteochondritis Dissecans of the trocheal notch of the femur
Post-traumatic AV malformation within the quadriceps muscle: An unusual cricket injury

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INTRODUCTION

Hemangio mas and vascular malformations are benign lesions of blood vessels. Mulliken and Glowacki in 1982, divided vascular anomalies into hemangiomas (which are neoplastic lesion with endothelial hyperplasia) and vascular malformations (which are congenital lesions with normal endothelial turnover).1 Extra-crani al arteriovenous malformations (AVMs) are far less common than intra-crani al AVMs.4 AVMs frequently involve the skin, subcutaneous tissue and sometimes the musculoskeletal system. AVMs are high-flow lesions providing a direct connection between an artery and a vein.4 Congenital AVMs are usually latent during infancy and childhood but may enter an active expanding phase in adolescence.4 These lesions often occur on the extremities or trunk where they may present as an enlarging soft tissue mass in the subcutaneous tissue, or may be located below the deep fascia and involve the musculoskeletal system. Intramuscular AVMs have been reported in the pyriformis muscle, flexor digitorum superficialis and in the temporal and lingual musculature.7,8,9,10,11 Sports related lesions of this kind are rare, and do not come to mind, leading to diagnostic confusion and management delays. Only one previous case has been reported in the muscle of a football player,12 and that too after repeated interventions, but with no swelling or pain at the surgical area.

CASE REPORT

A 20 year male cricketer presented with severe localised pain 2 inches proximal to the proximal patellar pole. Examination revealed a mobile, tender, firm nodule; MRI showed a cyst at the lateral aspect of the quadriceps tendon, which was evaluated arthroscopically and then excised by an incision centered over a marking needle. Histopathology showed large dilated venous channels with interspersed arterial channels and some thrombosis, leading to a diagnosis of an intramuscular AVM. Symptoms resolved completely after excision, with the player going back to the same level of competitive cricket.

REFERENCES


FIGURES

Figure 1: MRI showing loculated contained cyst-like lesion proximal to patella at musculo-tendinous junction of quadriceps tendon.

Figure 2: Intra-operative photos showing excision of lesion. Note the bluish-black discolouration of the lesion due to dilated venous channels.

DISCUSSION

AV malformations are infrequent, with a reported prevalence estimated to be around 1.3% of the general population. AVMs are abnormal communications between the arterial and venous system. They may be congenital or acquired. Acquired AVMs form secondary to trauma, surgery, or tumor. Most AVMs involve the head and neck, followed by the lower extremities and trunk.1 Post-traumatic AVMs develop most commonly after penetrating trauma. They have also been reported to occur after blunt trauma, but this is much less common and usually occurs in the setting of a fracture, compartment syndrome, or crush injury.11 An extensive literature review showed only one published report of this condition related to traumatic contact injury in sports.12 Although cricket is strictly a non-contact sport, injuries in the game can result in a number of ways. Cricketers can suffer from direct impact type injuries which include hits by the bat or ball while fielding and collisions with the structures around the field (eg, fence) or with other players.17 The only previous case of post-traumatic AVM in sports has been a professional American football player who received both corticosteroid and platelet-rich plasma (PRP) injections for a noncontact gastrocnemius...
injury. He subsequently developed an AVM requiring embolisation. To our knowledge, no case of post-traumatic AVM has been reported in a sports of any kind, let alone cricket.

The gold standard for diagnosis of an AVM is arteriography. Ultrasonography with Doppler helps identify the flow patterns through vessels and identify abnormalities indicative of an AVM. Magnetic Resonance Angiography can not only identify flow patterns but can also clearly define the extent and location of the pathology. In our case the diagnosis of AVM was missed on the initial MRI as it was a plain MRI without contrast, as we had not suspected this lesion. Histopathology subsequently confirmed the diagnosis after excision.

Treatment options for AVMs in the extremities include surgical ligation or excision, or endovascular embolisation. Endovascular techniques have the advantage of being well tolerated, can be performed under local anesthesia, can be done on an outpatient basis and avoid dissection through a traumatised zone of tissue. The choice for endovascular embolisation depends on the size of the AVM, its accessibility, and the rapidity of flow across the fistula. The method is safe and effective for vascular lesions of the extremities, but was not considered in our case, since the lesion was not suspected prior to excision, and the diagnosis was retrospective.

The possibility that the AVM was congenital in nature and the trauma merely drew attention to its presence cannot be ruled out, even though the player and his mother both insisted that the swelling was not present prior to trauma. Davidovic et al in their study on post-traumatic AVMs and pseudocavernous found that 17.6% of their patients had surgery for AVMs within 1 month of their injury. This would indicate that 1 month is a sufficient time to develop an AVM after trauma. In our case the patient presented 7 months after the injury. This strengthens the possibility of the AVM being post-traumatic in nature.

CONCLUSION

We present a rare manifestation of a contact injury to the muscle by a hard ball. AVM malformations in sports are rare, and have never been reported in cricket, a high index of suspicion should be kept in sportspersons who present with persistent pain and swelling in large muscles after contact injuries, and sometimes even plain MRIs are not diagnostic. Specialised tests would lead to the diagnosis earlier, and then minimise invasive treatment options become viable, especially for larger lesions. Surgical excision of a small lesion gives good results and allows full return to competitive sports.

REFERENCES


INVITED ARTICLE

Athletes with spinal cord injuries

Jake Pearson
Sports Physician
Wellington, New Zealand

This article is the third in the NZJSM series on athletes with disabilities, focusing on medical issues in athletes with spinal cord injuries.

True / False:

1 An athlete experiencing autonomic dysreflexia will typically be tachycardic.
2 There is minimal benefit in attempting heat acclimatisation for an athlete with a spinal cord injury.
3 A fibula fracture in a wheelchair athlete should unite in a similar timeframe to an able-bodied athlete.

The effects of a spinal cord injury (SCI) depend on the level and severity of the lesion. The most common site of SCI in athletes is the lower cervical spine, with resultant spastic paralysis of the lower limbs (usually requiring the use of a wheelchair), and partial paralysis of their upper limbs. The nerve roots corresponding to the level of the injury are typically only partially affected. The purpose of this article is not to review the neurology, which can be reviewed in textbooks, but rather cover the potential clinical implications including an increased risk of injury, autonomic dysreflexia, impaired thermoregulation, neurogenic bladder, osteoporosis, and peripheral nerve entrapments. Autonomic dysreflexia can potentially affect those with a spinal cord lesion at T6 or above, and the management of the major sympathetic outflow tract. A curious stimulus (eg, a blocked catheter) originating below the level of the SCI triggers an unregulated sympathetic response with a number of flow-on effects. The most concerning effect is severe hypertension, which can potentially be life threatening from an intra-cranial haemorrhage or cardiac arrhythmia. It is important to note that a high SCI athlete’s normal blood pressure may be low (eg, 90/60) and hence even a mildly elevated blood pressure may be relevant depending on the clinical circumstances. Symptoms may include headache, anxiety or simply the sense that ‘something is wrong’, or symptoms related to the reactive parasympathetic response above the level of the SCI such as nasal stuffiness, skin flushing, sweating, or chillies. For the patient, the same reason will typically be paradoxically headache. Management involves quickly identifying and addressing the precipitating cause, such as a blocked catheter and overdosed bladder, faecal impaction, a skin lesion or even an occult fracture. The patient should be placed as upright as possible and either oral nifedipine or a GTN spray can be given to temporarily reduce the blood pressure (a caution is that males with SCI may use medication for erectile dysfunction, in which case GTN is contraindicated). If things are not able to be quickly and adequately controlled, urgent transfer to more advanced medical facilities is appropriate. There are cases of athletes intentionally invoking this response immediately before competition to try to gain a physiological advantage (eg, a 10% improvement in a simulated 7.5 km wheelchair race), a technique known as ‘boosting’. As a result, pre-competition clinical and blood pressure checks are randomly performed, with repeat offenders subject to sanctions similar to those imposed for other doping violations.

A SCI athlete’s ability to control their body temperature is affected by their inability to vasodilate/constrict, sweat or shiver below the level of the spinal cord lesion, which is of more concern in high level and/or complete SCIs. Monitoring of athletes during training or competition is important, but with an increased level of suspicion, since the symptoms of heat illness in a SCI athlete may be non-specific. Extra attention should be directed towards preventative measures including maintaining hydration, wearing appropriate clothing, controlling the training environment, and applying external cooling before, during or after exertion as appropriate. Despite a SCI athlete’s more limited physiological adaptation response there is still significant value in implementing measures that improve heat tolerance in able-bodied athletes such as pre-acclimatisation and optimising fitness/conditioning. Most athletes with a SCI will have a degree of bladder dysfunction, with the attendant increased risk of urinary tract infection.
Symptoms may be atypical and non-specific, such as a general feeling of unease, and left untreated, can cause an individual to become rapidly unwell. Appropriate antibiotic treatment is thus critical, noting that bacteria in an otherwise well SCI athlete should not usually be treated with antibiotics. Thus the decision to treat or not often comes down to the gut feeling of the practitioner in close consultation with the athlete, and also possibly the proximity to competition. Reminding the athlete about the importance of adequate technique during catheterisation, may assist with prevention of infections.

One hundred percent of individuals with SCI have premature osteoporosis in the parietal extremities, and loss of total bone mineral content of 25-50% depending on the level and completeness of their spinal cord lesion. This effect appears related to paretic extremeties, and loss of total bone

The principles of prevention and treatment follow similar lines to those articulated for the stumps of lower limb deficiency covered in a previous article in this series. Finally, repetitive contact of the hands with wheelchair rims places the athlete at risk for median or ulnar nerve entrapments as well as other problems related to direct pressure on the upper limb. Padding of the wheelchair rims and/or gloves as well as wheelchair design, and good technique can reduce but not completely eliminate this risk. Specific musculoskeletal issues affecting the upper limbs, including shoulder and thoracic spine dysfunction, will be covered in the next article focusing on physiotherapy-specific issues.

For a comprehensive review, particularly of musculoskeletal injuries and autonomic dysreflexia, the interested reader is referred to a previous article in this journal. While slightly daunting at first, care of the athlete with SCI is helped greatly by an understanding of the physiological effects of spinal cord compromise, and the common medical issues that occur.

REFERENCES
**Sport Concussion in New Zealand National Guidelines**

This guideline document has been produced to inform National Sports Organisations (NSOs), and recreation, education and health sectors in their development of specific policy for concussion in sport. This guideline produced by ACC in consultation with a panel of medical, sport and research experts, is based on the 2012 Zurich consensus Statement[1] on Sport Concussion.

These guidelines are intended to help provide advice via the NSOs and recreation, education and health sectors to help people (e.g. medical doctors, health providers, first aiders, coaches/trainers, players, parents, sports administrators, school teachers etc.) be able to understand:

1. Why there is a need for concussion guidelines.
2. What concussion is.
3. How to recognise the signs and symptoms of concussion.
4. What action to take when a concussion occurs, and how to get help.
5. Who can assess and diagnose concussion (only a medical doctor).
6. Why a management protocol for graduated return to school/work/sport is needed.
7. How NSO's can develop a concussion policy and implementation plan.

**Key Messages**

We need concussion guidelines because concussion can be a serious injury to the brain and it occurs frequently in New Zealand. Concussion is a mild traumatic brain injury (mTBI). Concussion is a brain injury defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic, and biomechanical injury constructs can be utilized in defining the nature of a concussive head injury.[1]

- Recognise and Remove. If concussion is suspected, remove from play/activity immediately and seek urgent assessment by a medical doctor.
- Concussions often occur without loss of consciousness (only 10-20% lose consciousness).
- Extra caution is required for child and adolescent athletes.
- It may take several hours (or even days) post injury for some or all of the symptoms of concussion to emerge.
- Non-medical personnel have an important role to play in recognising the signs and symptoms of concussion. Concussion can present in a similar manner to other catastrophic conditions with delayed onset of symptoms.
- A medical doctor must provide assessment and diagnosis of concussion because the diagnosis may be difficult and relies on clinical judgement.
- It is unanimously agreed that no return to sport/activity on the day of concussive injury should occur.[1]
- The effects of concussion can interfere with the athlete's ability to learn in the classroom or to function well at work. Return to school/ work may need to be graduated and demands altered to reflect level of function, guided by a medical practitioner experienced in this area. Return to school/work and social activities should be achieved before return to sport/activity.

**Why we need concussion guidelines**

Concussion is a serious injury and occurs frequently:

- Estimated 35,000 head injuries in New Zealand per year[2]
- 21% (7,350 injuries per year) of all head injuries in New Zealand are sustained through sport related activity.[3] ACC only receive claims for 6,250 of these sports related concussion injuries suggesting that 1,100 currently go untreated.
- 2009-2013 sports related concussion claims cost ACC $76 million.
- 46% (3,381 injuries per year) of sports head injuries are classified as ‘mild with a high risk of complications’. Injuries are most frequently sustained during rugby, cycling and equestrian activities.
- 11% of sports related concussion claimants had multiple concussions within a 2 year period (2009-2013).
- Evidence shows that with repeat concussion people may experience a decline in general health and quality of life up to 10 years following injury.[4]

**2. Definition of concussion**

Concussion is a mild traumatic brain injury (mTBI). Concussion is a brain injury defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical, pathologic, and biomechanical injury constructs can be utilized in defining the nature of a concussive head injury.

A laymen’s definition of concussion is:

Concussion is a brain injury that can occur in any sport, particularly where there is full body contact. Concussion is caused by the impact of force (a blow) to a part of the body not necessarily the head directly.[1]

**3. Signs and symptoms of concussion**

Concussion presents with a range of signs and/or symptoms that may or may not include loss of consciousness[1] It is important to remember that not every sign and symptom will be present every case and signs and symptoms may have delayed onset.

**Physical signs (you see)**

- Visible injury to face or head (especially in combination with any other signs)
- Seizure or convulsion
- Vomiting

**Clinical symptoms (they feel)**

- Generally feeling “not quite right”
- Fear
- Drowsiness/trouble sleeping
- More emotional
- Irritability
- Problems with memory
- Reduced ability to think/concentrate

**4. Action to take when a concussion occurs, and how to get help**

Use the Concussion Recognition Tool (CRT) (a printable PDF of the pocket CRT can be downloaded at: http://links.lww.com/JSM/A32).

Recognise and Remove

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**5. Concussion guidelines**

Concussion guidelines are intended to help provide advice via the NSOs and recreation, education and health sectors to help people (e.g. medical doctors, health providers, first aiders, coaches/trainers, players, parents, sports administrators, school teachers etc.) be able to understand:

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**Why we need concussion guidelines**

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- Evidence shows that with repeat concussion people may experience a decline in general health and quality of life up to 10 years following injury.[4]
• It is unanimously agreed that no return to sport/activity on the day of concussive injury should occur. [1]
• If a suspected concussion has occurred it is important to see a medical doctor for assessment immediately.
• Medical doctors are available at general practitioner practices, concussion clinics or hospital emergency departments.
• It is unanimously agreed that no return to sport/activity on the day of concussive injury should occur. [1]
• In cases of uncertainty always adopt a conservative approach – “if in doubt, sit them out”.

It is useful to have a list of local medical doctors, concussion clinics and emergency departments close to where the sport/activity is being played. A pre-activity checklist of the appropriate services could include:
• Local doctors or medical centre.
• Local hospital emergency department.
• Ambulance services (111).

To help an unconscious athlete:
• Apply first aid principles – DRABC (Danger, Response, Airway, Breathing, Circulation).
• It is extremely important to treat all unconscious athletes as though they have a neck injury.
• An unconscious athlete must ONLY be moved by a medical professional trained in spinal immobilisation techniques.
• Urgent hospital care is necessary if there is concern regarding the risk of structural head or neck injury – call 111.
• An athlete with any of the following should be referred to hospital URGENTLY:
  o Loss of consciousness or seizures.
  o Persistent confusion.
  o Deterioration after being injured – increased drowsiness, headache or vomiting.
  o Report of neck pain or spinal cord symptoms – numbness, tingling, muscle weakness.
• If at any time there is any doubt the athlete should be referred to hospital.

5 Assessment and diagnosis of concussion by medical doctors

Only a qualified medical doctor can assess and diagnose a concussion.

Anyone with a suspected head injury needs to see and be assessed by a medical doctor. This is essential to confirm the diagnosis of concussion and to assess the risk for more serious injury.

We endorse the Sport Concussion Assessment Tool version 3 (SCAT3) and the Child-SCAT3 as a validated means of assessing concussion by a medical doctor. A printable PDF of SCAT3 can be downloaded at: http://links.lww.com/JSM/A30. A printable PDF of Child-SCAT3 can be downloaded at: http://links.lww.com/JSM/A31.

We recommend you become familiar with symptoms evaluated in SCAT3.

The SCAT3 is NOT to be used for diagnosis of concussion alone. It provides a standardized assessment to aid diagnosis by a medical doctor.

NOTE: In some areas of the world, sports physiotherapists and other trained medical personnel can do the assessment (e.g., SCAT3), but only a doctor can diagnose concussion.

6 Concussion management and a graduated return to school/work/sport protocol

Initial concussion management involves physical and cognitive rest until the acute symptoms resolve and then a graded programme of exertion (physical and mental activity) prior to medical clearance and return to sport.

All athletes diagnosed with concussion must go through a graduated return to activity protocol led by a person trained in concussion management (e.g. coach, physical trainer, teacher, parent etc.). Athletes should have fully returned to school or work and social activities before returning to activity. Clearance by a medical doctor is required before return to sport/activity.

There is a lack of research to support the optimal period of time an athlete should be out of training and competition. Below is an example of a graduated return to sport protocol based on the best available evidence and expert experience.

<table>
<thead>
<tr>
<th>Return to activity stage</th>
<th>Functional exercise at each stage of rehabilitation</th>
<th>Objective of each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No activity</td>
<td>Avoid all physical and mental exertion including the use of technology (e.g. use of phones, computers, reading, watching TV).</td>
<td>Recovery.</td>
</tr>
<tr>
<td>Light aerobic exercise</td>
<td>Walking, swimming or stationary bike keep intensity of exercise very low/very easy. No resistance training.</td>
<td>Increase heart rate.</td>
</tr>
<tr>
<td>Sport specific exercise</td>
<td>Running drills. No head impact activities.</td>
<td>Add movement.</td>
</tr>
<tr>
<td>Non-contact training drills</td>
<td>Progression to more complex training drills e.g. passing, drills.</td>
<td>Exercise, co-ordination and cognitive load.</td>
</tr>
<tr>
<td>Full contact practice</td>
<td>Following clearance from medical doctor, participate in normal training activities.</td>
<td>Restore confidence and assess functional skills by coaching staff.</td>
</tr>
<tr>
<td>Return to play</td>
<td>Normal sport.</td>
<td>Full return to sport.</td>
</tr>
</tbody>
</table>

- It is unanimously agreed that no return to sport/activity on the day of concussive injury should occur. [1]
- Return to activity should be particularly cautious where children and adolescents are concerned.
- Each individual international sports federation may have specific rules which must be considered (e.g. International Rugby Board rules for New Zealand rugby).
- The safety of the athlete is the priority and must NOT be compromised.
- The decision regarding return to school/work and clearance to return to restricted activity should always be made by a medical doctor.
- The decision regarding the timing of return to sport/activity should always be made by a medical doctor.
- In some cases, symptoms may be prolonged or graded activity may not be tolerated. If recovery is prolonged, evaluation by a concussion specialist or clinic may be warranted to determine if there are other aspects of the concussion that could respond to rehabilitation.

In summary, the figure shows the roles and responsibilities for concussion management (i.e. stages of identification, assessment and diagnosis, rehabilitation and return to sport).
It is intended to formally review this document prior to February 2017.

References

Develop a policy and implementation plan

It is suggested that National Sport Organizations (NSOs) and other relevant organisations develop a concussion policy and educate their members/community in how to implement the guidelines specific to their sport. AGC has an expert panel available that can be consulted to review organisations/concussion policies, implementation plans and education material with the goal of ensuring a consistently high standard of care across New Zealand.

REPORT
Care of the adolescent athlete
#youtholympicsmedicalreport

Jake Pearson
Sports Physician, Wellington, New Zealand
Jess Meyer
Physiotherapist, Auckland, New Zealand
Brett Warman
Physiotherapist, Christchurch, New Zealand

In August 2014 the 2nd Youth Olympic Games were held in Nanjing, China. Nanjing is a city of merely 9 million or so people situated a 5 hour bus ride inland from Shanghai. The NZ team consisted of 51 athletes (14-18 year olds) and about 30 support staff. A range of sports were represented, including hockey and basketball teams (modified to 5- and 3-person teams respectively), swimming, wrestling, rowing, beach volleyball, golf, weightlifting, gymnastics, and a smattering of others. The Chinese built an amazing athlete's village and competition venues on a grand scale reminiscent of the Beijing Olympics in 2008. Our medical team consisted of one doctor and two physiotherapists. Pre-event medical information was collected via a questionnaire on the NZ Olympic Committee online platform. A mini-conference was held a few weeks before departure for the key support staff as well as most of the coaches. This was a fantastic way of all being on the same page when we met again at the airport at departure. At the village out of necessity our medical room was the common area in one of two bedroom apartments, with anything requiring privacy conducted in a makeshift consultation area in the larger of the two bedrooms, with a chaperone present as appropriate. The NZ team did not have any major medical issues or injuries during the Games. Common medical complaints included relatively low grade gastrointestinal symptoms, upper respiratory tract infections, insect bites and minor wounds. From an environmental perspective it was hot but not dramatically so, and the air quality seemed to cause issues for some of those with pre-existing asthma. Injuries were all relatively low grade. We thus had minimal requirement for the medical Polyclinik in the village, with a few precautionary x-rays and ultrasound, and one set of blood tests (where the value of persevering against bureaucracy was required to be demonstrated). Drug testing included blood as well as urine tests for most athletes. A strong emphasis was placed on the cultural and education programme rather than results, but of course all athletes are very competitive. In this sense the campaign was successful, with gold medals in equestrian and trapshooting, a silver medal in triathlon, and bronze medals in swimming (x2) and triathlon team event. We were fortunate to have a relatively mature and easygoing group of teenage athletes; however adolescent athletes can pose some unique challenges to a medical team on tour. Adolescents fall into an awkward, perhaps slightly soppy gap between the paediatric and adult populations. Most literature has focused on the special considerations of the incompletely developed musculoskeletal system, covering acute and overuse injuries to growth plates and specific areas such as the pars interarticularis. The more conservative management of concussion recognises the increased vulnerability of the developing brain. Medical conditions requiring particular consideration include asthma and certain infectious diseases not least of all the area of sexual health. Provision of optimal treatment to adolescent athletes however also requires an appreciation of specific psychosocial factors, and the rest of this article will briefly touch on some of these.

Taking time early on to develop a relationship with athletes will ultimately be worthwhile from a therapeutic perspective and as a bonus almost certainly also make the ongoing provision of treatment more enjoyable and satisfying. Parents (hopefully!) still play a very prominent role in a teenager's life - athletes are no exception - and healthcare providers need to bear this in mind when managing certain situations. The athlete's coach will often be a very strong influence or even something of a mentor, and when travelling may assume the primary caregiver role as well. Another strong source of influence is the athlete's peer group, something that may not always be prepared to share or in fact be completely aware of themselves!

For many young athletes it can be a new experience to have readily accessible medical support; many may have never before engaged with a health professional without a parent present, and hence may be lacking in health literacy. They will probably need education about the importance and benefits of early reporting of symptoms, and at times even reminders about supposedly commonly accepted hygiene practices! Being mindful that time management and general organisational skills are often still a work in progress may help in dealing with lateness or missed appointments, or their decision to stop by with a non-urgent issue at 10.30 pm at night. A balance between tolerance and attempting to educate on what will eventually be expected of them would seem a reasonable approach. Adolescents tend to be more self-conscious about their bodies and medical staff should be sensitive to this. The use of a chaperone is strongly encouraged in any situation that has the potential to be misinterpreted, and when gaining formal consent is required - remember that some are still legally minors. Being aware of potential social pressures and motivators that may influence their behaviour and decision-making with respect to injury or illness may help identify and address any barriers early on. Providing explicit reminders about the sanctity of medical confidentiality is recommended. Athletes have coping strategies for the stress associated with elite competition, but these strategies may not yet be fully developed. Possible maladaptive coping behaviours may involve alcohol or recreational drug use, or even manifest as disordered eating."
With the support of a Prime Ministers Scholarship, I was fortunate to be able to attend this conference in Qatar from 1-3rd November. The conference was rich in experts such as leading physiotherapists Tim Tyler and Christian Muschaweck, through to world renowned surgeons including professor Per Holmich and Ulrike Muschaweck.

Despite groin injuries having such a high prevalence in football, arguably the most popular worldwide sport, there remains a dramatic lack of consensus regarding its nomenclature, diagnostics and causes. Sports involving rapid changes of direction and/or kicking such as football, ice hockey and AFL all have a high incidence of groin injuries. The risk rate of a groin injury is 2.5 times greater in male athletes compared to female athletes and subsequently was observed in up to 65% of asymptomatic athletes. The HAGOS scale and perhaps also useful (based solely on clinical observation) was Askling’s adductor H test - which some presenters had found beneficial in assessing groin pain related return to play decisions. Discussion arose surrounding the presence or not of a fibro-cartilage plate anterior to the pubic symphysis. While many acknowledge the presence of this anatomical structure, its role in groin pain remains unclear. Some experts believed that this plate negated the attachment of adductor longus to the pubic symphysis, whereas others countered that it was the means by which it originated. The importance of bone marrow oedema also provoked discussion as while it was noted in many cases of groin pain, it was also observed in up to 65% of asymptomatic athletes. It was clear that further research (as always) is required. However, there are some exciting studies being performed in Qatar looking at objective testing of footballers and the relationship to the development of groin pain over consecutive seasons. The need for accurate diagnostics was reinforced, along with the need to standardise nomenclature to both facilitate consistent communication between professions internationally and to allow direct comparison between research projects.

I would like to acknowledge the support of the Prime Ministers Scholarship in attending this stimulating international conference.

REFERENCES

Jerry Morris

Jerry Morris, one of the fathers of exercise medicine, died in London in 2009 at the age of 99% (curiously very close to the batting average of the great Don Bradman). His study on the activity patterns and mortality of London bus drivers versus conductors produced the first real evidence that regular physical activity was an important protector against premature death. He was notoriously reluctant to travel by air, so I was first exposed to his teaching during lectures at the Diploma Course in Sports Medicine held at London Hospital Medical College in the mid 80s. By that stage he was officially ‘retired’ and in his mid 70s, but had the spring in his step of a much younger man. His ingenious study of London busman recruited drivers and bus conductors from the famous London double-decker buses in 1949. The study rolled on to 1953 and it became obvious that the drivers were suffering many more heart attacks and other cardiac events than the conductors. This was at a time when ‘stress’ was thought to be the genesis of many medical ailments (think peptic ulcer disease before H. pylori was discovered). It was hypothesised that the drivers were experiencing the effects of stress from driving in the busy London traffic - but ‘no’ said the redoubtable Dr Morris. He had asked the drivers and conductors their views on stress and it became obvious that the stress of navigating the streets for the drivers was far less than the stress for the conductors on getting money out of Londoners to pay for their bus fares. Subsequent commentators wondered if a degree of self-selection had occurred, as the height to weight ratio of the drivers was less than that for the conductors. This may well have been true. Drivers got to sit for 90% of their duties, whereas the conductors had to climb an average of 600 stairs per day. However, later studies of Londoners in other occupations showed that leisure time activity, e.g. mowing the lawn, gardening and walking the dog, was also protective against cardiac events. So the field of exercise medicine was born. Morris’ work was not happening in isolation. Over in the USA, Ralph Paffenbarger was studying the lifestyle and health events of longshoremen (waterside workers) in Los Angeles. He found similar results to Jerry Morris, i.e. that those in more active jobs had a lower risk of cardiac events; further proof of the hypothesis that exercise prevents against cardiac events. Then in 1999 I witnessed a meeting of these two great men, Morris and Paffenbarger. They were both invited speakers at the IOC Conference of Medicine and Science in Sport held at the Sydney Convention Centre. What made the biggest impression on me was seeing them at the Sydney Olympic Stadium on an organised tour. Morris, by then 89 years of age, and Paffenbarger were still active men. They each got into a crouch start position on the athletic track that was to witness so much drama the following year (think Cathy Freeman in the 400m and the legendary sprint between Haile Gebrselassie and Paul Tergat in the men’s 10,000m).

Later, others took up the challenge of applying the new knowledge to cardiac rehabilitation. Traditional teaching was that heart attack victims needed to rest up for six weeks following a cardiac event. However, based on Morris’ work, Professor Terry Kavanagh of the University of Toronto began offering exercise rehabilitation programmes to heart attack victims. They worked. In 1973, seven heart attack and cardiac bypass patients who had been rehabilitated by Dr Kavanagh’s team ran in the Boston Marathon. Their work did not go unnoticed in New Zealand. Morrie Rendall of the YMCA in Auckland got together with Colin Kay, a local business man, and with the advice of Auckland cardiologists including Trevor Agnew they started a cardiac rehabilitation programme in Auckland. It was taken up in other New Zealand centres, too. In Hamilton, where I have worked since graduation, Dr Denis Friedlander started a similar programme and was himself an active member of the Hamilton Marathon Clinic. New cardiac rehabilitation programmes are the norm and exercise is recognised as the most cost-effective method of reducing the burden of non-communicable diseases. And it all started with one man’s hunch about bus drivers and conductors.
T

The 2012 London Olympics saw worldwide coverage and spectator support for this rapidly growing area in sport by well-trained athletes, at the elite level, with various impairments. Many previous records were broken and today Paralympic athletes are well trained, managed and experienced in competition. There is growing interest in all areas of sports science and medicine to gain a competitive edge and to maximise the benefits of training and competition, with sports nutrition one of these key areas. There is a growing body of knowledge in this area which is being published in peer review journals.

Involvement in physical activity and sport is recognised for the many benefits for the person with impairments and undergoing rehabilitation (medical, psychological, social and physical improvements) from injury. Sports nutrition is changing and evolving constantly and adapting sports nutrition principles in some impairments (amputee, visually impaired) may require minimal change while for other disciplines with impairment additional issues including medical conditions or constraints provide more challenge and care, with a highly individual focus. Sports nutrition practices are no longer just an adjunct to rehabilitation following injury or therapy.

This 230 page referenced text pulls together the knowledge in this area which is being published in peer review journals.

In technology and practice. Table 12.2 on interpretation of skinfold and body mass results will assist many practitioners both able and impaired athletes. This text is a valuable resource for experienced sports nutrition practitioners and key reading for new practitioners in the area and anyone with a general interest in the application of sports nutrition to challenging and rewarding environments and athletes. It is inspiring to read and to know the immense advances in knowledge and also to appreciate the work still to be done. Application of the information in this text will aid sports nutrition practitioners to raise the level of care and impact on performance for Paralympic athletes.

The book covers include:

- Classification and body composition assessment
- Spinal cord injuries – including cooling strategies and hydration status
- Cerebral Palsy and Acquired brain injuries – physiology, terminology, energy expenditure and sweat rates
- Amputee – chronic medical conditions, injuries, body composition and nutrition priorities
- Spinal cord injury and eating disorders – various classification and practical aspects working with these athletes
- Intellectual Disability – Down syndrome, Autism and Phenylketonuria and challenges to the ability to eat, chew and swallow
- Medical Issues, Drug and Nutrient Interactions – medical concerns such as pressure ulcers, urology, Hygiene, nutritional deficiencies, use and impact of medications such as antibiotics, anticoagulants, herbal and NSAIDs (nonsteroidal anti-inflammatory drugs)

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THE DR MATT MARcHALLLEDcH HAMSTRING INJURIES: AN OVERVIEW OF A COMMON AND CHALLENGING PROBLEM

THomas Best
Professor of Family Medicine, Ohio State University College of Medicine Professor, Department of Biomedical Engineering

Hamstring injuries are frequently identified as a common soft tissue injury occurring in athletes who participate in sports involving rapid acceleration/deceleration and frequent stopping and starting as well as kicking. These injuries account for up to 20% of all sports injuries and the financial impact of these injuries has recently been estimated to be quite considerable. The frequency of injury, recurrent rate, and optimal treatment methods continue to challenge clinicians, athletes, and team personnel alike. The understanding of hamstring muscle strain-type injuries and potential associated costs has resulted in a substantial amount of research into the factors related to such injuries. Two recent systematic reviews were reported to collate the evidence for risk factors for hamstring injuries. Both reviews identified hamstring muscle weakness and thigh muscle imbalance, muscle flexibility, previous hamstring injury, other previous injury and age as potential risk factors, however, these reviews concluded that single variables were inconsistently identified as associated factors. During the recent decade, the approach of assessment and treatment of soft tissue injuries has changed as athletes targeted at developing strength at a younger age, moving toward the modifying the athlete. Balance within the motor system is derived from coordinated activity of synergist and antagonist muscles. According to this theory of view, change in muscle length and strength characteristics can lead to altered movement patterns, pain, and movement disorders. Increased or decreased muscle activity and delayed muscular activation can also change the normal movement pattern. Recently, several studies have suggested that the main focus of rehabilitation should be on modification of the altered movement pattern found in patients with hamstring strains. This approach covers several aspects of hamstring injuries. First, we will review what is known about risk factors for hamstring injuries. A review of recent studies examining hamstring kinematics during running will serve as a foundation for our current understanding of treatment aimed at the prevention of altered movement patterns. Findings from these studies will be put into the context both of return to sport as well as mitigating risk for recurrent injury. Secondly, basic science data aimed at understanding the role of inflammation in muscle injury and repair will be reviewed with an effort to provide clinicians with evidence to guide the use of medications such as non-steroidal as well as modalities such as massage to mitigate tissue injury and permit more rapid return to sport while reducing risk for subsequent injury. Finally, the use of ultrasound and its potential for management of hamstring injuries will be explored. Recent studies using ultrasound have found that presence of muscle structure following hamstring injury that will be used to potentially show the recurrence rate of hamstring injuries continues to be high despite our best efforts at implementing evidence-based rehabilitation programs.

HAMSING ANATOMY REVISED

Stephanie Woodley
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Hamstring strains represent one of the most common injuries in sport, particularly in disciplines that involve high-speed running, kicking and change of direction. Hamstring pathologies can involve a variety of structures within the muscle-tendon-bone complex. However, the proximal muscle-tendon unit is often implicated in acute strains, and the long head of biceps femoris is injured more frequently than its medial counterparts. Recent evidence suggests a relationship between the anatomy of acute strain and the type of activity being undertaken at the time of injury. For example, high-speed running injuries mainly result in damage to the long head of biceps femoris, typically involving the proximal musculotendinous junction. In contrast, stretching-type injuries are usually located more proximally, with the free tendon of semimembranosus being the most vulnerable.

An understanding of hamstring muscle architecture is a fundamental consideration in the diagnosis and management of hamstring injuries.

As expected, a number of studies have examined the morphology of the hamstring muscles; however, few have focused on proximal anatomy. The anatomy of the hamstrings (biceps femoris, semitendinosis and semimembranosus) is complex, and each muscle is unique in terms of its attachment sites, muscle and tendon architecture, and intrinsic and extrinsic factors. Recognition of the long proximal and distal tendons and elongated musculotendinous junctions is relevant to identifying the injury and determining site of injury. This talk will revisit hamstring anatomy with a focus on clinically relevant areas of interest.

References

THE MERITS OF BASICAL HISTORY TAKING, PHYSICAL EXAMINATION AND MRI ON RETURN TO PLAY

Hans Tol
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In the past the prognostication of acute hamstring injuries was mainly based on patient history (PH) and physical examinations (PE).

Nowadays, sports physicians are increasingly requested to perform magnetic resonance imaging (MRI) of acute hamstring muscle injuries and to provide a prognosis of the time needed to play (RTTP) on the basis of their findings. The value of these findings has never been systematically studied.

The aim of the study is to systematically review the literature on the prognostic value of PH, PE and MRI findings for time to RTP in acute hamstring muscle injuries. The databases of PubMed and SportDiscus were searched in July 2014. Prospective studies evaluating PH and PE as a prognostic tool for determining time to RTP in athletes with acute hamstring injuries were eligible for inclusion.

BOOK REVIEW

Sports Nutrition for Paralympic Athletes

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Broad E (Ed), 2014. Taylor & Francis Group, CRC Press £64

This 230 page referenced text pulls together the knowledge in this area which is being published in peer review journals. The book covers include:

- Classification and body composition assessment
- Spinal cord injuries – including cooling strategies and hydration status
- Cerebral Palsy and Acquired brain injuries – physiology, terminology, energy expenditure and sweat rates
- Amputee – chronic medical conditions, injuries, body composition and nutrition priorities
- Spinal cord injury and eating disorders – various classification and practical aspects working with these athletes
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- Medical Issues, Drug and Nutrient Interactions – medical concerns such as pressure ulcers, urology, Hygiene, nutritional deficiencies, use and impact of medications such as antibiotics, anticoagulants, herbal and NSAIDs (nonsteroidal anti-inflammatory drugs)

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NEW ZEALAND JOURNAL OF SPORTS MEDICINE - 73

NEW ZEALAND JOURNAL OF SPORTS MEDICINE
MECHANICS AND CONTROL IN PELVIC GIRDLE PAIN
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Background: Pelvic girdle mechanics and control is a rapidly evolving area of research. The pelvic girdle may be seen from a mechanical perspective as a three link closed kinematic chain which is attached superficially and inferiorty to the lumbar and hip joints thus compiling the lumbar pelvic complex. An intercostal pelvic-pelvic hip complex provides a two-way dynamic link for load transmission between the axial and the lower appendicular skeleton through the bones and joints of the pelvic girdle. Pelvic girdle pain is associated with pregnancy; trauma, arthritis and spino-dural pathologies. The joints of the pelvic girdle have been identified as the source of low back and buttck pain for approximately 15-30% of the population.3 Appropriate load transfer through the pelvic girdle is dependent upon active compression of the pelvic articulations through the muscles and fascia of the lumbo-pelvic region.2 Chronic pelvic girdle pain has been shown to alter motor strategy in delayed activation of key stabilizing muscles likely contributing to poor stabilisation of the pelvic girdle during functional load transfer leading to failure of the load transfer mechanism and reinstate pain cycles.1

Objectives: This paper will explore the hypothesis that loss of early local muscle activation leads to compensatory motor pattern in global muscles which overcompensate for poor stabilisation of the pelvic girdle. Such motor pattern changes cause excess stiffness of the lumbo-pelvic complex leading to reduced coordination variability Methods: A total of 120 participants took part in this project 80 healthy controls and 40 with low back or pelvic girdle pain (n = 20). Participants performed two functional load transfer tasks to an auditory signal (the modified Trendelenburg and the ASLR). EMG activity of the internal oblique/transverses abdominis, external obliques, rectus abdominis and gluteal muscles were recorded using an 8 channel telemetry system collecting at 1000Hz. Ten Vicon MX T20 cameras were used to collect the kinematics of the trunk, pelvis, and hip. Participants performed four functional load transfer tasks measured with a force platform collecting at 1000 Hz with an amplifier gain of 1000. From this data we examined the muscle onset timing and timing of muscle activation, as measured using 52 retroreflective markers at 100Hz. Ground contact forces and moments were measured as hip-sink and pelvis-spine coordinate positions and postural stability from centre of pressure data.

Findings: The pattern motors cause excessive stiffness of the lumbo-pelvic complex leading to reduced coordination variability. The pain group had significant delay in muscle onset delay, they displayed higher muscle activity at movement onset in the biceps femoris (p<0.05) as well as the external oblique (p<0.05). Furthermore, the pain group experienced asymetrical spatial range of motion with increased motion on the contralateral side (p<0.001), reduced flexion velocity on the symptomatic side (p<0.001), and lower hip-sine coordinate variability (p<0.001). Considerations of the strength and stability support for the ankle. The precise aetiology has yet to be elucidated during a series of studies to determine possible mechanisms. The results of these are expected to help determine future policy of foot wear in the army with a view to decrease lower limb and ankle injuries.

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The long-term consequences of rugby participation on the neck

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Introduction: The study of retired professional athletes offers a unique opportunity to evaluate the long-term impact of sport participation. Currently there has been no examination of the impact neck injuries sustained during collision sports have on players once they retire. The purpose of this study was to examine the long-term impact of neck injuries sustained during rugby has on the cervical spine and subsequent health impacts.

Methods: Members of the Players’ Associations in New Zealand, Australia, Ireland, Canada and England were surveyed using an online questionnaire. The survey included questions on: personal descriptors, playing history, all injuries sustained during their careers, current levels of all pain and stiffness, current physical activity levels and current neck pain (NP) and neck stiffness (NS). The survey was completed by 255 retired players; however, only those that retired in 1995 or later were included in the analysis (n=195). The response rate ranged from 10.8% – 43%. Results: The neck was the 4th most frequently injured body region with most neck injuries attributed to ‘playing games’ (n=64). For injuries that resulted in surgical interventions the neck ranked 9th in frequency. Overall, surveys respondents reported that they had sustained a neck injury during their careers. Examination of current symptoms of pain and stiffness revealed that the neck was the top ranked area of current pain, with the majority of respondents (80%) reporting neck pain during the last year. For stiffness the low back was the most frequently cited region of stiffness followed by the neck. Of the 174 that responded to the question on current symptoms of pain and stiffness, 19% (n=139) indicated that they were experiencing one or both of these symptoms. For those that were currently experiencing NP, 90.65% indicated that the pain was of an intermittent nature. Of those (88.8% n=124) related this NP to their sport or ‘NS for training or for playing rugby’. The most common response for the intensity and frequency of NP and NS/NS symptoms was ‘occasionally mild’ (33.6%) or ‘moderate to severe’ (27.4%). A more concerning factor was that 27.4% of respondents were continuously experiencing some form of NP and NS of varying severity. For the Neck Disability Index (NDI) scores, 27.4% of respondents did not differ significantly from backs in their total score (p=0.38). Examination of the total NDI scores revealed that 3.0% (n=5) reported severe disability related to their NP, 16.8% (n=28) moderate disability, 28.1% (n=47) mild disability, and 51.1% (n=86) reported no disability. When each of the components in the questionnaire were examined for the two positional groups, the highest level of disability was recorded for ‘pain intensity’ for the forwards and ‘recreational pursuits’ for the backs. Conclusion: These findings highlight the frequency of neck injuries and the potential for development of long-term NP and NS once players have retired. These findings provide sufficient evidence to indicate that neck injuries sustained during the careers of rugby players will have long-term consequences that for some may impact on their quality of life and, thus, warrant further investigation.

Predictors of vitamin D status in New Zealand elite athletes

Nicolle M Walker, Katherine E Black, Jillian J Haszard, Diane F Baker, Thomas D Love, Bruce Hamilton

Background/Aims: Vitamin D deficiency is prevalent amongst athletes and can impact negatively upon their health and performance. Athletes’ knowledge and attitudes towards vitamin D have not previously been researched nor whether this correlates with 25(OH)D status. Sun safety messages often dominate over vitamin D education in New Zealand and the impact of this upon athletes’ sun behaviour and consequent vitamin D status is unknown. Despite high rates of deficiency in elite athletes, few studies have documented the prevalence of vitamin D supplement use in this population. This study aimed to investigate knowledge of and attitudes towards vitamin D and sun exposure, prevalence of vitamin D-containing supplement use, and predictors of vitamin D status in elite athletes.

Methods: 110 elite, outdoor-sport athletes completed a vitamin D and sun exposure questionnaire during summer months at three New Zealand training bases located at approximately 37° latitude. Summer and winter finger prick serum 25(OH)D samples were collected. Regression analyses determined predictors of vitamin D status from the questionnaire.

Results: Ninety-three percent of athletes had sufficient (≥32ng/mL) 25(OH)D in summer and 89% were sufficient in winter. Only one athlete was found to be deficient (<20ng/mL) in winter. Two-thirds of athletes were able to name the sun as a source of vitamin D, although there was no relationship between athletes’ overall vitamin D knowledge and the amount of sun exposure. 49% of athletes were concerned about the risk of skin cancer (33%) than their vitamin D status (53%), yet 12% reported intentionally spending time in the sun to improve their vitamin D. Those athletes most concerned about their 25(OH)D status tended to have better knowledge of vitamin D, however this did not impact upon 25(OH)D sufficiency. Vitamin D, calcium and cod liver oil supplements were taken by 6-7% of athletes, 28% used fish oils and 16% used other nutritional supplements. Those who used fish oils and those with higher skinfolds were less likely to have sufficient vitamin D status. There were no significant associations (p>0.05) between knowledge and attitudes towards vitamin D, and behaviours that might affect 25(OH)D, such as spending time in the sun to tan and dietary vitamin D intake. Concern for skin cancer with sun exposure was not associated with athletes’ 25(OH)D status.

Conclusion: One athlete was found to be deficient (<20ng/mL) in winter. Two-thirds of athletes were able to name the sun as a source of vitamin D, although there was no relationship between athletes’ overall vitamin D knowledge and the amount of sun exposure.

Physiotherapy keynote address

Erik Witvrouw
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Before we can start a well-structured rehab programme it is important to have a good understanding of the function of the hamstrings, the anatomy and the injury mechanism. It has been mainly functioning in a lengthened position at high speeds in an eccentric way during the events when injuries most commonly happen (sprinting). This consequence of this is that we need to mimic this as much as possible during the treatment. Almost all of the hamstring injuries are located at the muscle tendon junction (MTJ) while the greatest stretch is placed in that area. It has been shown that the amount of elasticity is decreased near the MTJ in patients with previous hamstring injuries. Therefore, one of the aims of a physiotherapy approach should be to restore the normal elasticity of this area of injury. Research has shown that a dynamic stretching programme or possibly an eccentric training programme is able to influence this elasticity. So, an important amount of time during the rehab programme should be focused on this aim.

Therefore, a hamstring injury is happening while the muscle is at its most lengthened position, but this doesn’t mean it is happening while the muscle is overstretched. Research shows that a muscle injury happens when the (external) force on the muscle is higher than the amount of energy that can be absorbed by the muscle. In other words, the amount of energy that can be absorbed by the muscle is very important and is determined by the eccentric muscle force. Consequently, increasing the eccentric force seems to be an important goal in rehab, especially since it has been shown that this is significantly decreased after injury. However the reason for this decreased eccentric muscle strength can differ from patient to patient and needs to be investigated before this can be solved. A proper assessment should be able to identify the cause of this muscle weakness.

The hallmark of a decreased muscle strength is a decrease in quantitative muscle output, a qualitative decreased muscle output, a decreased intramuscular coordination, or a decreased intermuscular coordination.

Based upon an assessment of these different factors, a tailor made treatment plan can be designed with emphasis on strengthening the hamstrings muscles by training the intra-or intermuscular coordination, or a decreased intermuscular coordination. Therefore, a tailor made treatment plan can be designed with emphasis on strengthening the intramuscular coordination, or a decreased intermuscular coordination.

Efficacy of Preventive Neuromuscular Training on Anterior Cruciate Ligament Injury rates in Female Athletes: A Systematic Review

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Despite numerous prevention programmes, the hamstring is still the most frequently reported muscle injury in sports. It has been estimated that in a professional football squad of 25 players, five of them will sustain a hamstring injury with an average time to return to play of approximately 4 weeks. One of the aims of preventive measures is to reduce the risk of hamstring muscle injury. To establish the risk of hamstring injury, it could be that the real cause of the injury is situated in another hamstring muscle, and maybe the injured muscle is only the victim, but not the cause? The patient’s history, the eccentric strength of the involved muscle, the injury mechanism, and the local tissues might all contribute to the cause of a hamstring injury. It is interesting to see what other factors play a role of approximately 4 weeks.

1. Several prospective studies have employed what is commonly described in the literature as ‘preventative neuromuscular training’, which include one or more elements of: movement training, strength training, plyometrics, stretching, balance and/or proprioceptive training. A subgroup of
studies employed a ‘neuromuscular warm-up’ (NM warm-up) where the neuromuscular training intervention replaced the traditional sport warm-up. The objective of this research was to perform a critical systematic review of studies that investigated the effect of neuromuscular training interventions aimed at preventing ACL injuries in female athletes. The purpose was to evaluate the quality of the evidence and then to draw conclusions, based on the strength of the evidence, as to the prevention of sports injuries.

Methods: A search to identify relevant research articles was undertaken in a number of electronic databases. Studies were included if they were: 1) prospective controlled trials; 2) a neuromuscular intervention was conducted; 3) female athletes were participants; and 4) the number of ACL injuries were recorded. Two reviewers independently extracted relevant data, including ACL injury incidence and the methodological quality of each included study using the modified Downs and Black checklist. Quality Index scores were calculated to categorise methodological score. Overall levels of evidence were then synthesised.

Results: Thirteen studies were identified that met the inclusion criteria and exclusion criteria. The mean modified Downs and Black score of all reviewed studies was 18.5/28 (range 13 to 26). The mean modified Downs and Black score for studies that employed an NM warm-up was 23.4/28. Quality Index score calculation showed those four studies had strong methodological quality; eight had moderate methodological quality; and one had limited methodological quality. Across all studies, control group athletes sustained 170 ACL injuries, as compared to 83 ACL injuries that occurred in athletes who participated in a neuromuscular training intervention. For control group athletes, mean injury incidence was 0.15 (range 0.03 to 0.24) ACL injuries per 1000 sporting hours. For intervention group athletes, mean injury incidence was 0.08 (range 0.00 to 0.14) ACL injuries per 1000 sporting hours. This indicates that, as compared to females who participated in a neuromuscular training intervention, control group athletes were almost twice as likely to sustain an ACL injury and almost three times as likely to sustain a non-contact ACL injury.

Conclusions: Differences observed by sport studied, intervention type, participant characteristics and study design characteristics. Studies that employed an NM warm-up were of higher methodological quality and were relatively more effective than other types of intervention. Overall, there is a ‘moderate’ level of evidence for the efficaciousness of neuromuscular interventions in preventing ACL injuries in female athletes.


Adrenal insufficiency in female athletes: the place of dehydroepiandrosterone (DHEA) supplementation

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Introduction: The relatively recent upsurge in DHEA supplementation to treat androgen deficiency in athletes raises issues of clinical utility as well as compliance with the International Standard for Therapeutic Use Exemption in sport.

Purpose: This paper will discuss mechanisms of primary and secondary adrenal insufficiency and highlight current literature relating to DHEA supplementation. It will raise the obligations of an attending physician to ensure that the diagnosis, particularly in an elite female athlete is clearly established. The discussion will highlight the potential in female athletes for performance enhancement linked to DHEA as an androgenic precursor.

Methods: A review of literature relating to DHEA supplementation in females with documented adrenal insufficiency was undertaken.

Discussion: In partial or secondary adrenal failure, DHEA secretion and blood concentrations may be reduced or not abolished. However, reductions in serum DHEA(S) are often difficult to interpret given that prolonged eugluocorticoid treatment will suppress DHEA secretion and blood DHEA(S) concentrations. This is a common scenario in sport where the use of glucocorticoids is frequently employed to manage musculoskeletal trauma and even topical glucocorticoids may be absorbed sufficiently to suppresses serum DHEA(S). Clinical studies confirm that DHEA administration to women, increases blood testosterone1 but not in reflecting, a major increase (20-50 fold) endogenous blood testosterone concentration between sexes. Therefore in the context of anti-doping, DHEA administration is of primary concern in women athletes where the potential for overcompensation clearly exists.1,4

Conclusions: The role of DHEA replacement for women with primary or secondary adrenal failure remains controversial and is not well understood. A comprehensive understanding of adrenal sufficiency, together with current evidence supports the view that DHEA supplementation in athletes with documented adrenal insufficiency will result in testosterone concentrations that are significantly higher in women athletes than in men, which may be of potential concern. Thus, while DHEA supplementation may be beneficial in the treatment of adrenal insufficiency, its use in women athletes is not well understood and may result in adverse and potentially harmful outcomes.

Injury incidence rates (IRs) per 1000 match-hours exposure were calculated using standard methods. Injury sub-groups were compared by calculating rate ratios (RR) of two IRs and ninety-five percent confidence intervals (95% CI). Poisson mixed-effect generalised linear models were fitted to the matched case-control data to determine the relationship between IRs and baseline variables (potential risk factors) using the statistical software R version 3.2.0.

Results: The total number of 1259 players incurred during a combined period of 2465 match-hours of exposure. The overall IR was 5.23 (4.7-6.2/1000) match-hours exposure. Moderate-severe injuries (>1 day time loss from play) comprised 36% of all injuries. Tackling was the most frequent mechanism of injury, the head/neck was involved for 33% of injuries. The most frequent body region of injury and sprawl/injury cases were the most frequent injury type with IRs 17.8 (13.0-24.0), 9.3 (5.9-14.0) and 10.0 (6.0-17.0) respectively. Participants characteristics as measured at baseline were: age 24.9±4.9 years, playing experience 11.1±5.7 years, SF-36v2 physical component score 51.9±7.6, SF-36v2 mental component score 52.5±8.1 and BMI 27.6±5.3. Logistic modelling found older age (RR: 1.04 [1.01-1.07], p=0.001), fewer years of rugby participation (RR: 0.91 [0.85-0.97], p=0.005), lower BMI (RR: 0.96 [0.94-0.98], P=0.001) and lower SF-36v2 physical component summary score (RR: 0.98 [0.97-0.99], P=0.003) was associated with higher IR in amateur RU. Whereas player position i.e. backs versus forwards (RR: 0.66 [0.22-1.94], p=0.443) and SF-36v2 mental component summary score (RR: 0.99 [0.87-1.01], p=0.071) were not associated with injury.

Conclusions: This is the first study that has included a validated health outcome measure to predict in-season injury in RU. The modifiable health risk factors associated with injury were low physical health (as measured by SF-35v2) and lower BMI. Our findings draw attention to physical conditioning and functional training as modifiable aspects of health which can potentially be targeted through the development of preventative strategies.

The TEMPORAL EFFECT OF PRIOR MATCH ACUTE TRAINING LOAD ON IN SEASON INJURY RISK IN RUGBY UNION

Stephen Kara

Objective: Research in collision-sport supports worthy training-related load as an independent risk factor for injury. We analysed injury risk based on acute training load prior and cumulative training load and injury-related load.

Methods: Effects of cumulative team match and training load on count and total duration of training- and match-related injuries in an observational study of Rugby players over from 3- to 4-week delays. The study seasons were estimated via a application of over-damped Poisson regression. The cumulative team load was an exponentially weighted moving average, allowing for gradual decay of the effect of each match and training load over time. The cumulative team load was decayed over 0.4 to 1.0 days to establish the period during which prior cumulative load had most effect on injury risk.

Results: Cumulative team load with a 10-day averaging period had the greatest effects on measures of injury. Following periods of typically very high to typically low cumulative team load, a reduction in number of training-related injuries and match-related injuries by a factor of 0.49 (99% confidence limits 0.2 - 0.7, possibly large) and in total duration by a factor of 0.3 (0.1 - 0.5, likely large) was seen, whilst match-related injury contact incidence increased by 0.3 (0.1 - 0.6, likely large). All individually related injuries increased with higher acute team training load by a factor of 2.9 (2.0-4.4, most likely very large).

Conclusions: Training load supports the protective effects of higher cumulative team training load on training-related injury risk over a 10-day prior period, whilst adding evidence of increased risk with higher acute team load.

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The concept of epigenetics refers to gene expression states that are established in the absence of a change in the DNA sequence itself. This helps to understand how our environment in a broad sense, including exercise, nutrition, toxins and even behaviour, contribute to the regulation of gene expression and to our resulting health phenotype. Variation in health is determined by our inherited non- genetic factors, the modifiable environmental and lifestyle factors. Exercise induced increased gene expression in those genes involved in oxidative phosphorylation, metabolic activity in adipose tissue, and inflammatory pathways illustrate some of the potential mechanisms by which the benefits of exercise are conveyed. It is not known yet how long these changes last but epigenetic analysis provides further evidence emphasising the importance of exercise to achieve and maintain health and also possibly rethinking our attitude to exercise recommendations. The impact of physical activity on our health through epigenetic control mechanisms will be discussed.

OUTLIER DETECTION AND RELIABILITY OF HEART RATE MEASUREMENTS IN INDOOR BIKE-RUNNING PARTICIPANTS
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Background: While recommendations exist regarding the appropriate usage, filtering and analysis of heart rate variability (HRV) data, there are no recommendations regarding the selection of appropriate data segments or outlier detection. Aim: To determine whether subjectively selected (‘most stable’), predefined (‘last 5 minutes’), or ‘controlled breathing’ 5-minute data segments produce the highest HRV reliability in a sedentary population.

Method: Eight male (aged 53.6 ± 3.4 M: 26.4 ± 4.4; on medication: n=6) and 11 female (aged 55.5 ± 6.7 M: 26.8 ± 5.6; on medication: n=6; mean ± standard deviation) attended 2 measurements 1 - 2 weeks apart. Supine resting HRV (Polar RS800CX) was assessed during spontaneous breathing (10 minutes) and controlled breathing (6 minutes). Visual inspection, the Median Absolute Deviation, and 2X Standard Deviation were considered for outlier detection.

Results: The ‘last 5 minutes’ demonstrated the best relative reliability in heart rate (HR: 0.82 (0.58 – 0.92 intraclass correlation coefficient and 95% confidence limits)), root mean square successive difference (MSSD: 0.82 (0.56 – 0.93)), high frequency (HF: 0.76 (0.43 – 0.91)) and low frequency (LF: 0.42 (0.01 – 0.75)). Of note, standard deviations of HRV between (p < 0.05) and global NIIN intervals (SDNN: 0.57 (0.31 – 0.82)) was most reliably relative in the ‘most stable’ segment. The controlled breathing and ‘most stable’ data segments produced best absolute reliability for HR (5.6% (3.8 – 7.5%) coefficient of variation (95% Confidence Limits)) and LF (56.0% (37.8 – 109.3%)); and SDNN (28.4% (20.4 – 46.3%)) and HF (61% (41.7 – 111.1%)) respectively. The ‘last 5 minutes’ produced the best absolute reliability for MSSD (44.2% (17.5 – 40.2%).

The role of apparent aversive environmental constraints affecting the development of skills of Brazilian football players
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To date, studies in the field of motor learning have been limited in scope to investigating only physical and even aversive socio-cultural learning environment constraints affect skill development.1 However, considering that expertise in sports emerges from the complex interaction of multiple constraints, socio-cultural factors have to be further explored in a contextualised manner so that knowledge in the field of motor learning can be furthered. Alluding to the notion of Contextualised Skill Acquisition Research that advocates for not only physical but also socio-cultural environmental constraints play an important role in the development of elite athletes, 1 we investigated the role of a relatively novel range of variables to guide our study. Autism spectrum disorders are a group of neurodevelopmental disorders that range from the mild to the severe. As such, participants were selected based on the following criteria: (i) being a football player; (ii) being of Brazilian origin; (iii) having a chronological age of at least 18 years; and (iv) not exhibiting any kind of physical or intellectual limitation that would prevent their full participation in the study. The protocol was reviewed and approved by the University’s Ethics Committee. The study was carried out over a period of 1 year and consisted of three sessions, each lasting for 1 hour. Each session was preceded by a 10-minute warm-up, followed by 40 minutes of specific technical and tactical practice, and concluded with a 10-minute cool-down. The sessions were conducted in a semi-structured manner, with the coach providing specific instructions and feedback to the players. Data were collected using a combination of standardized tests and self-report measures. Results: The study findings will be discussed, focusing on the role of socio-cultural constraints in skill acquisition. The study will also be used to draw conclusions about the potential implications of the findings for football training and performance.
The relationship between the specialized judo fitness test and aerobic fitness in Saudi Judo athletes

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Conflicting evidence exists regarding the influence of the aerobic fitness variables on the judo-related performance. 1–4 Therefore, the aim of this study was to assess the relationship between the Special Judo Fitness Test and aerobic fitness in Saudi Judo athletes. 14 Judo athletes (mean ± SD, age, 17 ± 4 years, body mass, 66.7 ± 21 kg, height, 160 ± 13 cm) performed the Special Judo Fitness Test and a maximal multistage 20 min shuttle run test to estimate the aerobic fitness of the sample. The mean (SD) of the index of the Special Judo Fitness Test and VO2max were 16.2 ± 1.6 and 42.5 ± 8.5 (ml/kg/min), respectively. The index of the Special Judo Fitness Test was in inverse direct relationship with VO2max (r = -.62, p < .05). It is concluded that the aerobic fitness is associated to the judo-related performance.

References


THE EFFECT OF ALTITUDE ON ELITE TRACK-AND-FIELD ATHLETES’ PERFORMANCE

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The International Association of Athletics Federations (IAAF) considers marks at altitudes above 1000 m as acceptable for record consideration but are distinguished by having an ‘A’ listed adjacent to the performance. The current altitude ceiling of 1000 m in the Special Judo Fitness Test may lead to the same distinction. We hypothesise that specific clinical tests, which combine pain and sensory tests, can provide a useful tool to identify active inflammation at the sacroiliac joints. The current absence of such a tool means the Special Judo Fitness Test may not be suitable to assess judo-related performance.

References


SLUMPED VERSUS NON SLUMPED ATHLETES: PSYCHOPHYSIOLOGICAL DIFFERENCES
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This investigation sought to compare brain activity of slumped and non-slumped athletes to determine psychophysiological characteristics or phenomenon of a slump using a Stroop task. Sport Adaptation of the Malachup Burnout Inventory (SAMBI) was administered to 460 Korean high school student athletes. Among them, twenty six participants with the highest (slumped) group and lowest (non-slumped) group on SAMBI participated in this experiment. Electroencephalographic data were recorded from frontal (Fp1, Fp2, F3, F4, F7, F8), central (Cz, C3, C4), parietal (Pz, P3, P4) and occipital (O1, O2) brain regions using the 10-20 electrode placement system. A computerized version of the Stroop Color Word Test was used. Analysis was carried out for group (2) x task (3) using a 2-way ANOVA. Dependent variables were theta, alpha, beta, and gamma power. Burn out data revealed that slumped athletes had significantly high level of burnout scores than those of non slumped athletes. Non-slumped athletes exhibited higher accuracy than slumped athletes on the Stroop task. The results of this study indicated that slumped athletes are more under burnout state than non slumped athletes. The findings of this study showed lower magnitude of theta, alpha, beta, and gamma power in the frontal area in slumped athletes as compared to non-slumped athletes. This psychophysiological assessment offers the possibility to timely identify a state slump in an athlete presentation.

Keywords: Slumped athletes, psychophysiological differences, brain, electroencephalograph

RELIABILITY OF ANTICIPATORY POSTURAL ADJUSTMENT PARAMETERS IN PREGNANT WOMEN AND CONTROLS
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Currently, it is unknown whether pregnant women present different anticipatory postural adjustment (APA) behaviour compared with matched controls. Examples of APA temporal parameters such as the initiation of the weight shift (T0), initiation of leg movement and muscle onset (T1) and muscle onset can be identified by a variety of techniques. Automated methods usually detect APA temporal parameters as a change in the signal magnitude in relation to the baseline. Visual inspection identification relies on the tester's subjective ability to identify changes in the signal. While the automated method has the advantage of being faster than the visual inspection identification, it can be unreliable in situations where the signal-to-noise baseline ratio is high. Visual inspection is more time consuming technique, but it allows the identification of APA temporal parameters under noisy baseline conditions. The reliability of visual inspection of the transversus and gastrocnemius muscles onset has been shown high in previous studies.3 4 However, no previous studies looked at the reliability of other lower limb muscles.

Aim: To assess the inter-session, intra- and inter-tester reliability of APA parameters identification combining the automated and visual techniques.

Methods: Forty pregnant women and 30 controls were asked to perform a single leg stance in a self-selected speed. This was performed five times under four conditions: right and left leg lifting (with eyes open or closed). Superficial EMG of four bilateral muscles (external oblique, multifidus, rectus femoris and biceps femoris) was recorded during the leg stances. The EMG signals were bandpass filtered (16 to 500Hz) and amplified with an overall gain of 1000. A force plate was used to assess centre of pressure (CoP). For the intra-session reliability study, a total of 880 trials for pregnant women and 680 trials for matched controls were used. For inter-tester reliability, two researchers assessed 168 trials and for the intra-tester reliability, one researcher assessed the 168 trials in two different days, one week apart. All the APA parameters were initially automatically identified and then visually examined. If the automated method did not select the right time the tester manually corrected the value. Time T0 was determined when the CoP value raised 2 SD above or below the baseline; time T1 was identified when the CoP magnitude again reached the equivalent value to T0; finally, time of muscle onset was identified when the EMG value exceeded 2 SD above baseline for 50ms. Intra-class correlation coefficient (ICC) was used to determine the intra-session reliability, between two independent testers and within same tester.

Results: Intra-session reliability ICC results showed moderate to high reliability for both groups. The lowest ICC value was found for RF muscle, in the control group (ICC = 0.63, 95% C.I. 0.33 to 0.81) and the highest ICC value was found in the RF muscle in the pregnant women group (ICC = 0.89, 95% CI 0.82 to 0.94). Inter-tester and intra-tester reliability results showed excellent agreement between testers and within tester with ICC ranging from 0.98 to 1 and 0.92 to 1 respectively.

Conclusion: A combination of computer-based and visual APA parameters identification showed reliable estimations of T0, T1 and muscle onset.

References

RELIABILITY OF OSCILLOMETRIC CENTRAL HEMODYNAMIC RESPONSES TO AN ORTHOSTATIC CHALLENGE
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Background: Limited studies have used pulse wave analysis (PWA) to assess the reliability of central hemodynamic responses to an orthostatic challenge, reporting intra-class coefficient (ICC) values of 0.74 and 0.70 for central systolic blood pressure (cSBP) and augmentation (AIx), respectively. These previous studies have conducted PWA using radial artery tonometry; this technique may be impractical for use in the clinical setting or for epidemiological studies. Recent, oscillometric PWA devices have emerged, presenting user-friendly, operator independent and practical alternatives to tonometry.

Objective: The purpose of the current study was to determine whether an oscillometric PWA device can be used to reliably assess cSBP and AIx responses to an orthostatic challenge (modified tilt-table).

Methods: Twenty healthy adults (50% female, 26 ± 5y, 24.7 ± 2.2 kg/m2) were recruited. Participants were tested on 3 different days between 7 am and 10 am in the fasted state, separated by a maximum of 7 days. Following a 10-minute supine rest period, baseline PWA assessments were collected. The participant was then passively and rapidly (≤ 1 sec) tilted to a 60-degree upright position using a modified tilt-table for 5 minutes. During the tilt period, PWA assessments were collected at 2- and 5-minutes. Following the tilt, the participant was returned to a supine position for a 5-minute recovery period with further assessments at 2 and 5-minutes. Central hemodynamic variables were assessed on the left arm using an oscillometric PWA device (AiCort Medical SphygmoCor XCEL, Sydney, Australia). The AiCort was normalised to a heart rate of 75 bpm (AiCort75).

Results: Repeated measures ANOVA indicated a significant main effect of TILT on cSBP (P < 0.001, ηp² = 0.71) and AIx@75 (P = 0.001, ηp² = 0.67), increasing cSBP by 2.3 (95% CI 2.4, 0.16) mmHg and decreasing AIx@75 by 2.6 (95% CI 0.6, 5.2)%, respectively. The ICC criterion of 95% was exceeded for AIx@75 (ICC = 0.90 – 0.87) and AIx@75 (ICC = 0.90 – 0.88) across baseline, tilt and recovery conditions.

Conclusion: Oscillometric PWA device can be used to reliably assess cSBP and AIx responses to an orthostatic challenge.
Background: The criterion intra-class correlation coefficient (ICC) of 0.75 was exceeded when measured to the anterior aorta (0.95), posterior aorta (0.93) and vertebral body (0.95). The reliability coefficient expressed relative to the mean (RC) was slightly lower (better for vertebral body (0.98) and anterior aorta (1.26%)) and posterior aorta (12.2%). For PFT measurements, the mean thickness was comparable for sagittal (1.7 cm) and transverse (1.7 cm) planes. Similarly, ICC values were comparable for sagittal (0.98) and transverse (0.98) measurements, as were RCs (0.76% and 0.69%). Conclusion: IAAT assessments are marginally more reliably measured when measured to the vertebral body, and PFT assessments are equally reliable for both measurements planes. However, it is easier to ensure appropriate probe placement with sagittal PFT measurements. Further research is warranted to determine whether US central adiposity assessments are equally reliable for normal- and overweight populations.

RELIABILITY OF CENTRAL ADIPOSY MEASUREMENTS USING B-MODE ULTRASOUND

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Background: Central adiposity poses a higher risk for developing metabolic syndrome, cardiovascular disease, diabetes and cancer (1). Ultrasound is relatively inexpensive, safe, acceptable to patients, and can be portable, making this apparatus suitable for wide-spread adoption among research academics and healthcare professionals.

Objective: To systematically compare the reliability of various B-mode ultrasound measurements of central adiposity.

Methods: A total of 16 healthy adults (10 males; mean ± SD age 26.4±6.9 years) participated in two tests separated by 7-10 days. B-mode ultrasound measurements of IAT and PFT were undertaken after searching the online database EBSCO Host. The reliability of the measurements was assessed using the Bland-Altman analysis and the intraclass correlation coefficient (ICC).

Results: For all parameters, except LF/HF, there was excellent agreement between the devices (ICC above 0.95), with SDNN and HF approaching significance. For the telemetric device, the ICC values were slightly lower (better for vertebral body (0.98) and anterior aorta (1.26%)) and posterior aorta (12.2%). For PFT measurements, the mean thickness was comparable for sagittal (1.7 cm) and transverse (1.7 cm) planes. Similarly, ICC values were comparable for sagittal (0.98) and transverse (0.98) measurements, as were RCs (0.76% and 0.69%). Conclusion: IAAT assessments are marginally more reliably measured when measured to the vertebral body, and PFT assessments are equally reliable for both measurements planes. However, it is easier to ensure appropriate probe placement with sagittal PFT measurements. Further research is warranted to determine whether US central adiposity assessments are equally reliable for normal- and overweight populations.

COPIING STRATEGIES AMONGST NEW ZEALAND RUGBY PLAYERS DURING THEIR CROSS-CULTURAL TRANSITION TO JAPAN

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As a result of globalisation, the number of international athletes who compete outside their home country has dramatically increased over the past few decades. For example, in 2010 there were 323 New Zealand rugby players playing their trade overseas, including 72 players based in Japan. Research evidence has demonstrated that people who have moved or travelled to a new, and perhaps more cross-cultural, environment can experience a range of challenges which can negatively impact their psychological well-being, such as decreased psychological well-being (eg, Yeh, Arora, Inose, Okubo, & Greene, 2003). However, previous sport psychology literature has not examined how international athletes cope with stressors associated with their cross-cultural transition. Utilising Berry’s (1992, 1997) acculturation framework, the purpose of this qualitative study was to identify the coping strategies utilised by New Zealand rugby players in Japan. Professional elite rugby players (n=10) currently living and competing in Japan participated in one-on-one, in-depth interviews, which were subsequently transcribed and content analysed. The results revealed four major themes of coping strategies, including (i) social support, (ii) strategies to overcome language/cultural barriers (iii) emotion-focused coping, and (iv) problem-focused coping. The findings indicated that these 10 rugby players used numerous coping strategies in response to stressors they encountered during their cross-cultural transition. In particular, social support appeared to play a significant role in facilitating positive adaptation. Practical recommendations will be outlined for players, coaches, and support staff regarding specific stress management and social support strategies to expedite a player’s positive adaptation.
RELIABILITY OF OSCILLOMETRIC CENTRAL BLOOD PRESSURE AND ARTERIAL WAVE REFLECTION READINGS: EFFECTS OF POSTURE AND THE FASTED STATE


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Background: Pulse wave analysis (PWA) has emerged as a non-invasive, valid and reliable technique to investigate central hemodynamic properties, including central systolic blood pressures (cSBP) and systemic arterial wave reflection (augmentation index, AIx). Recently, oscillometric devices have entered the market, presenting a user-friendly and a practical option for use in the clinical setting. Prior to clinical adoption, it is imperative to ascertain measurement precision and ecological validity. Two real-world scenarios that may impact measurement precision within clinical practice include posture and the fasted state.

Purpose: To examine whether i) posture and ii) the fasted state affect the between-day reliability of oscillometric cSBP and AIx recordings.

Methods: Twenty healthy adults (50% female, 28±5 y) were recruited. Participants were tested on 6 different mornings between the hours of 7am and 10am: 3 days in the fasted state and 3 days in the non-fasted state. On each occasion the participant was tested in the supine and seated position. A maximum of 14 days separated all measures. Central hemodynamic variables were assessed on the left arm using an oscillometric device. The AIx was normalised to a heart rate of 75 bpm (AIx@75). The effects of POSTURE and FASTED state were assessed using repeated measures ANOVA. Reproducibility of parameters was assessed using intra-class correlation coefficient (ICC) and the reproducibility coefficient (RC).

Results: No interaction effect was found for any central hemodynamic variable. For cSBP, there was no main effect for FASTED but there was a large effect for POSTURE (η²p = 0.40), with cSBP increasing by 3.5 (CI: 1.4, 5.5) mmHg. For the AIx@75 there was no main effect for POSTURE but there was a large main effect for FASTED (η²p = 0.22), with AIx@75 decreasing by an absolute 3.0 (CI: -0.4, 6.4) %. The criterion ICC value of 0.75 was exceeded for both cSBP (ICC = 0.89) and AIx@75 (ICC = 0.79) for the supine-fasted condition, indicating excellent between-day reliability. For cSBP the RC was lowest (best) under the supine-fasted condition and greatest (worst) for the seated-non-fasted condition. For AIx@75 the RC values tended to be slightly higher (worse) for the seated compared to supine position.

Conclusion: Findings from this study suggest that oscillometric PWA can be used to reliably assess central hemodynamic variables in health young adults under standardised conditions.

References