NZSOPA BULLETIN

NEW ZEALAND SPORTS AND ORTHOPAEDIC PHYSIOTHERAPY ASSOCIATION

December 2010

Welcome to the final edition of the NZSOPA Bulletin for 2010.

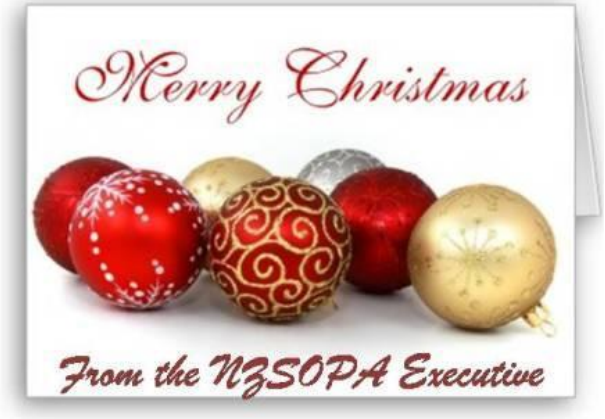
This Bulletin represents the end of an era. As you will see from the AGM minutes, from the 1st January 2011 NZSOPA will become "Sports Physiotherapy New Zealand". This will bring us into line with other international sports physiotherapy special interest groups, and was by far the most popular name in the membership survey conducted prior to the AGM. Members can be assured this will not mean removing "orthopaedics" as a content area for this group, and as you will see in this edition of the NZSOPA Bulletin the "Special Projects Group" have performed a series of reviews of physiotherapy-related osteoarthritis research reviews.

This year has been another busy year for the NZSOPA Executive. Our inaugural Sports Physiotherapy Symposium was held in Tauranga in March 2010. This was well attended and feedback was very positive. Planning for the next Symposium for March 2012 has already begun and we will advise the dates when keynote speakers are confirmed. We also ran a membership survey to which we had an excellent response rate (thanks to the iPod prize offer!) and we have implemented many suggestions as we continue to improve value for the membership dollar.

We are fortunate to have had ongoing support from our long-standing sponsors Asics and Formthotics. The Asics Education Fund has supported two applications this year, and a report from Kirsty Walker (one of the recipients) is included in this Bulletin in which she discusses the courses she attended in Sydney on biomechanics and rehabilitation of cycling and running athletes. Both the website and the Bulletin have undergone improvements and work continues on these to improve the content and 'look'. Thanks to the editorial assistants (David Rice and Nicola Thompson) and to the NZSOPA "Special Projects Group" who have contributed a significant amount of the content to recent NZSOPA Bulletins.

Some of our members have been affected by the Christchurch earthquake and the West Coast mining tragedy, and our thoughts are with you and your families over this Christmas season. Finally, we would like to wish all members and their families a very Merry Christmas, a Happy New Year and we will be back with a new look in 2011 as

"Sports Physiotherapy New Zealand".



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NZSOPA to become "Sports Physiotherapy New Zealand"

At the 2010 AGM, held on 20th November at the Duxton Hotel in Wellington, the motions to change the name of the group to "**Sports Physiotherapy New Zealand**", and to adopt the updated constitution were passed. Reasons for raising the issue of a name change included aligning with the World Confederation of Physical Therapy (WCPT) sub-specialty in sports physiotherapy, and the new constitution will fulfill our obligations as an incorporated society.

This name change will not result in any change to the strategic direction of the group and we will continue to cover the spectrum of sports and orthopaedic related issues across all age groups and levels and types of recreational and sporting participation.

Minutes of the NZSOPA AGM 2010

The NZSOPA AGM for 2010 was held at the Duxton Hotel, Wellington on 20th November 2010. A copy of the minutes of the meeting is available on our website www.nzsopa.org.nz/reports.html.

NZSOPA Symposium 2012—"Prevention, Practice and Performance"

On Sunday 21st November the NZSOPA Executive held a meeting to discuss a range of issues including planning for the 2012 Symposium "Prevention, Practice and Performance". The exact dates are yet to be confirmed but it is anticipated it will be held again in Tauranga in March 2012. We will let you know the date once we have confirmed keynote speakers for the symposium.

The Executive also discussed a range of other issues including:

- Results of the 2010 NZSOPA membership survey—where we can improve
- Educational courses to be run in 2011 and in the future
- Update on the proposed Sports Physiotherapy Australia Level I and Level II courses to be run in NZ
- IFSP sports physiotherapy specialisation process
- Possible election of President (Dr Tony Schneiders) to the IFSP Executive—implications and benefits to NZSOPA
- Physiotherapy NZ rebranding and implications for NZSOPA branding
- NZSOPA and ASICS Education Fund—reporting requirements
- Establishing working relationships with physiotherapists working with NZ's sporting teams and athletes

Thanks to Physiotherapy NZ for the use of their offices for our meeting.

New Executive Member—Dr Gisela Sole

At the 2010 AGM, Dr Gisela Sole (University of Otago) was voted onto the Executive to assist the current Executive members to serve the growing number of members (now 642). Gisela was chairperson of the Western Cape Sports Interest Group in South Africa during the 1990's during which time she developed and ran continuing education Sports Physiotherapy courses, and she was an Executive committee member of the Western Cape branch of the South African Sports Medicine Association.

Gisela has extensive clinical experience in musculoskeletal and sports physiotherapy, having lectured at the University of Cape Town for 8 years during which time she helped develop a Masters Degree programme in Sports Physiotherapy. Since arriving in NZ in 2001, Gisela has been on the NZ College of Physiotherapy Academic Board for 6 years, and was awarded a Fellowship in Sports Physiotherapy by the NZ College of Physiotherapy in 2010. Gisela is currently a Senior Lecturer and Associate Dean of undergraduate studies at the University of Otago.

We are fortunate to have someone of Gisela's calibre willing to contribute to the running of NZSOPA. We would like to welcome Gisela on board and we look forward to working with her.

The management of hamstring injury: Issues in diagnosis

Wayne Hoskins, Henry Pollard, *Manual Therapy* 10(2005) 96-107

Edited by Nicola Thompson

Abstract

Hamstring injuries are the most prevalent muscle injury in sports involving rapid acceleration and maximum speed running. Injury typically occurs in an acute manner through an eccentric mechanism at the terminal stages of the swing phase of gait. Biceps femoris is most commonly injured. Re-injury rates are high and management is a challenge given the complex multi-factorial aetiology. The high rates of hamstring injury and re-injury may result from a lack of high-quality research into the aetiological factors underlying injury. Re-injury may also result from inaccuracy in diagnosis that results from the potential multi-factorial causes of these conditions. Inaccuracy in diagnosis could lead to multiple potential diagnoses that may result in the implementation of variable management protocols. Whilst potentially useful, such variability may also lead to the implementation of sub-optimal management strategies. Previous hamstring injury is the most recognized risk factor for injury, which indicates that future research should be directed at preventative measures. Much anecdotal and indirect evidence exists to suggest that several non-local factors contribute to injury, which may be addressed through the application of manual therapy. However, this connection has been neglected in previous research and literature. This paper will explore and speculate on this potential connection and offer some new contributive factors for hamstring injury management.

Hamstring injuries have been found to be the most common injury in athletics and many field sports (Bennell and Crossley, 1996; Woods et al., 2004; Orchard and Seward, 2002; Neumann et al., 1998; Watson, 1996). Approximately 6 players in each squad will injure a hamstring every season in professional soccer (Woods et al., 2004) and Australian Rules football (Orchard and Seward, 2003). In relation to severity, injury will cause a player to miss approximately 3 weeks of play (Orchard and Seward, 2003; Woods et al., 2004). Given the high incidence of hamstring injuries, diagnosis and identification of underlying risk factors is paramount when treating and managing these injuries.

Anatomy

The hamstring muscle group comprises semitendinous and semimembranous medially and biceps femoris, short and long heads, laterally. The tendon of long head of biceps femoris is continous with the sacrotuberous ligament at the ischial tuberosity, which then passes across the sacrum and attaches to the thoracolumbar fascia (TLF) (Vleeming et al., 1995) The TLF, in turn functionally connects the hamstrings to the lumbar-pelvic spine, upper torso, shoulder and skull through attachments to lumbar vertebrae, latissimus dorsi, transverses abdominus, internal oblique, rhomboids, splenius capitus and cervicus tendons (Vleeming et al., 1995; Barker et al., 2004; Van Wingerden et al., 2004). Therefore it is recommended that the biomechanics of the lumbar spine and pelvis be assessed when evaluating hamstring pain. Distally biceps femoris attachment to the lateral side of the fibula: therefore it has been suggested that the superior tib-fib joint be assessed in hamstring injuries (Woods et al., 2004). Biceps femoris has strong fascial connections to peroneus longus at the fibula, linking it to the action of the foot and ankle (Weinert et al., 1973).

Expansions of semitendinous extend to the knee joint capsule, functionally linking it to the popliteus muscle and knee joint (Bejui et al., 1984; Beltran et al., 2003). The hamstring group is also linked to the knee through the hamstring-anterior cruciate ligament arc, through which proprioceptive feedback from ACL mechanoreceptors and afferent input from skin and muscles are thought to play an important role in hamstring activation during gait (Tsuda et al., 2001). Previous history of knee injury has been shown to be a significant risk factor for hamstring injury (Verrall et al., 2001). Given the functional anatomy of the hamstrings, the full kinetic and kinematic chain should be assessed with any hamstring injury.

Diagnosis, prognosis and severity

Clinical diagnosis is derived from mechanism of injury, location of pain on palpation, and loss of function through range of motion and muscle testing (Kujala et al., 1997). Magnetic resonance imaging (MRI) is the most sensitive imaging technique, providing information on the extent of injury and expected prognosis (Speer et al., 1993). However it is usually performed only on elite athletes, when there is no obvious mechanism of injury or no response to treatment (Brandser et al., 1995). Plain X-Ray can be used to screen for acute avulsion of the ischial tuberosity, particularly in young athletes (Brandser et al., 1995). Severity of injury can be described by three grades, rating injury disability and expected rehabilitation timeframe (Garrett et al., 1984).

Location of Injury

The classical hamstring strain occurs proximal to the distal muscular-tendon junction where force is concentrated (Kirkendall and Garrett, 2002; Slavotinek et al., 2002). The location of the

injury has implications for recovery time injuries to the tendon and musculo-tendon junction will have an increased recovery period compared to those to the muscle belly due to the limited blood supply (Garrett et al., 1984). Biceps femoris is the most commonly injured of the hamstring muscle group (Garrett, 1996; De Smet and Best, 2000; Slavotinek et al., 2002; Koulouris and Connell, 2003; Woods et al., 2004). Suggested causative factors for the higher rate of biceps femoris injuries include myo-fascial attachments, greater respective muscle tendon length during sprint (Thelen et al., 2005) and dual innervation by common peroneal and tibial divisions of the sciatic nerve (Burkett, 1970).

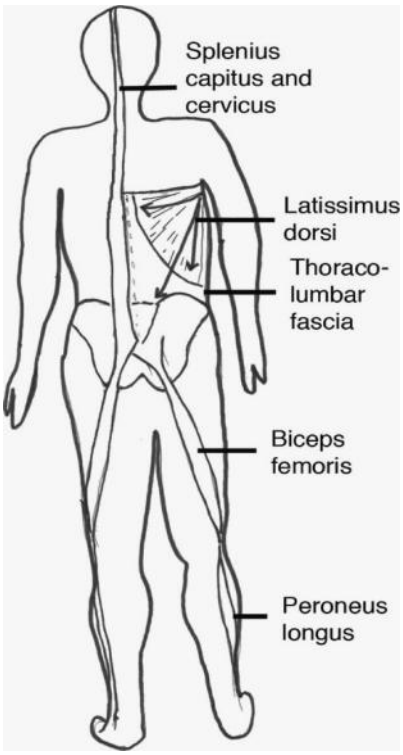

Figure 1. The fascial connections between biceps femoris and splenius capitus and cervicus proximally and peroneus longus distally.

Aetiology of injury

Hamstring injuries classically occur when accelerating or running at maximum speed (Sherry and Best 2004; Woods et al., 2004) in an acute mechanism. Injuries range from delayed onset muscle soreness (DOMS) and partial strain to complete muscle rupture (Kujala et al., 1997). The hamstrings have a relatively high proportion of fast twitch type II muscle fibres capable of producing large forces but are relatively quick to fatigue (Noonan and Garrett, 1999). Muscle injury has been shown to predominantly affect these type II fibres after intensive eccentric activity such as sprinting (Brockett et al., 2002). The hamstrings are also susceptible to strain during powerful eccentric muscle contractions because of their biarticular nature (Brockett et al., 2004). Substantial eccentric contraction occurs late in the swing phase of gait as the hamstrings decelerate both hip flexion and knee extension (Montgomery et al., 1994). It is during this swing phase that most hamstring injuries are believed to occur (Verrall et al., 2001).

Hamstring injury may also occur at the initial stage of the stance phase of gait (Orchard, 2002), although this method of injury may be more likely in athletes with poor technique or gluteus maximus weakness. Gluteus maximus should be the primary hip extensor in sprinting (Simonsen et al., 1985), while the hamstrings should act more as a transducer of power between the knee and hip joints (Jacobs et al., 1996). However pathology such as chronic low back pain is known to cause significant alterations to hip extensor recruitment, causing the gluteus maximus to be inhibited and hamstrings overactive (Vogt et al., 2003). This may predispose to injury by requiring the hamstrings to contribute more force to hip extension rather than acting in its transducer role. However, hip extensor recruitment in back pain subjects has not been measured in a sprinting situation. Likewise weakness or activation deficiencies of lumbar erector spinae, multifidus and transversus abdominus muslces, as shown to occur with low back pain, could compromise lumbar intersegmental functional stability about the neutral zone (Hodges and Moseley, 2003; Biedermann et al., 1991; Hodges and Richardson 1998). Earlier activation of biceps femoris has been noted after low back pain (Hungerford et al., 2003). This indicates that biceps femoris may contract in order to stabilize the TLF system in compensation, which would increase the likelihood of injury. Therefore precise lumbar-pelvic neuromuscular control is essential as the speed of gait increases in order to maximise running efficiency and prevent hamstring overloading.

Recurrent injury

Some of the risk factors associated with injury recurrence are already implicated with the initial injury (Croisier, 2004). Re-injury can result from assessment errors and premature return to sport during the remodeling phase of repair. Scar tissue and adhesions will accumulate when treatment is ineffective, predisposing to re-injury. Previously injured muscle is more susceptible to eccentric damage than uninjured muscle (Brockett et al., 2004).

Risk factors for injury

Several risk factors have been hypothesized for hamstring injury including hamstring muscle strength and balance, warm-up, fatigue, flexibility, body mechanics, sports specific activities, psychosocial factors and running technique. Injury may occur due to a single factor but is more likely to be multi-factorial, which suggests that a multimodal and multidisciplinary ap-

proach is necessary for management and prevention of injury.

Muscle strength and balance

Several authors have suggested injury to be related to relative weakness and hamstring:quadricep muscle imbalance (Burkett 1970; Heiser et al., 1984). However it is unclear whether concentric or more functional eccentric testing is most appropriate (Aagaard et al., 1998). One study reported that concentric isokinetic variables did not identify previous hamstring injury whereas the eccentric ratio did (Dauty et al., 2003). Some studies have shown strength deficiencies to be significantly associated with injury (Yamamoto, 1993; Orchard et al., 1997), while another larger study did not (Bennell et al., 1998). There is therefore insufficient evidence to suggest that hamstring weakness or hamstring:quadricep imbalance are infact risk factors for injury due to this conflicting evidence.

Warm up

Although warm up before activity has been recommended to prevent muscle injury (Garrett, 1990), hamstring strains still occur after significant warm up (Verrall et al., 2003). A warm up of isometric contractions has been shown to increase the amount of force and length of stretch that the muscle can absorb prior to tearing in animal studies (Safran et al., 1988). A decrease in muscle stiffness is also known to occur with warming (Strickler et al., 1990; Noonan et al., 1993). This increases the muscle length to failure, creating more resistance to stretch induced injuries. Lumbar spine flexibility has been found to increase with warm up procedures. However this increase can be lost within 20 minutes of sitting (Green et al., 2002). Considering the attachment of the hamstrings to the TLF this could have implications for athletes taking a half time break or sitting on the bench between play. In summary a warm up routine appears to be of benefit for injury prevention, however a lack of evidence exists regarding best practices.

Fatigue

Muscle fatigue may play a key role in pathogenesis of hamstring injury (Heiser et al., 1984; Hawkins and Fuller, 1999; Verrall et al., 2003). Muscle fatigue is associated with multiple factors, including the central and peripheral nervous systems and local factors (Roberts and Smith, 1989; Wong et al., 1990). Fatigue involves reduction in glycogen content of muscle fibres (Baldwin et al., 1999; Febbraio and Dancey, 1999), increased neural activation to fatigued muscles during sprinting (Nummela et al., 1994) and alterations in perceptual state through changes in central nervous system neurotransmitters and neuromodulators (Newsholme et al., 1992; Davis and Bailey, 1997). Fatigued muscle is less capable of producing force than non-fatigued muscle (Mair et al., 1996) and is therefore more prone to stretch injury in eccentric contractions. Hamstring fatigue induced by repeated maximal sprint running can result in a significant change in running technique (Pinniger et al., 2000), which may play a role in injury. An injury surveillance, performed by the English Premier League soccer reported a significant increase in injury at the end of each half, suggesting fatigue or repetitive mictrotrauma as a causative factor (Woods et al., 2004).

Flexibility

There is no conclusive evidence linking poor flexibility to a risk of hamstring injury. Conflicting results have been reported by a number of studies, some prospective (Witvrouw et al., 2003) and retrospective (Worrell et al., 1991; Jonhagen et al., 1994) studies reported significant links while other studies have found no relationship (Ekstrand and Gillquist, 1983; Hennessey and Watson, 1993). Two studies have showed that a stretching program can statistically reduce the risk of hamstring injuries (Hartig and Henderson, 1999; Dadebo et al., 2004).

Body mechanics

Decreased flexibility of hip flexors and quadriceps have been identified as a risk factor for hamstring injury (Gabbe et al., 2005). There is some evidence to suggest that increased unilateral anterior ilium tilt and excessive lumbar lordosis are also risk factors for hamstring injury (Cibulka et al., 1986; Hennessey and Watson, 1993; Watson, 1995). The pattern of muscular imbalance described by Janda (1996) known as the lower crossed syndrome produces tightness of the hip flexors and lumbar erector spinae and weakness of gluteal and abdominal muscles. This imbalance can result in an anterior pelvic tilt, increased hip flexion and hyperlordosis of the lumbar spine. Decreased thoracic mobility in extension may also result in an anterior pelvic tilt (Leibenson, 2001). The altered biomechanics of an anterior pelvic tilt will affect the hamstring biomechanics and function, and may predispose these muscles to injury. Gluteus maximus weakness can result in a characteristic forward lean lurch when running, which is counterproductive to sprinting performance (Kunz and Kaufmann, 1981). Due to their biarticular nature, leaning forward will predispose hamstrings to injury because of the increase in their relative length. This would suggest that improving motor patterns and running technique may play an important role in the management of hamstring injury.

Psychosocial factors

Psychosocial factors should also be considered with any hamstring injury. The psychosocial model as causative and contributing factors to pain has been well established (Nahit et al., 2003; Keefe et al., 2004). Stress is known to increase muscle tension and negatively effect physical performance, including diminished fine motor control and fatigue (Gould et al., 1999; Visser et al., 2004). Stress may also affect healing rates and recovery through increased levels of pro-inflammatory interleukin -6 (Orshal and Khalil, 2004).

References available on request.

Barefoot Running & the Minimalist Running Shoe Debate

By Simon Bartold

International Research Consultant Asics Corporation

www.asics.co.nz

In 2010 Professor Dan Lieberman, an evolutionary paleoanthropologist from Harvard University, published the now-famous article in "Nature" which supported barefoot running, a concept that was vigorously embraced by the world media. Simon Bartold is a Podiatrist, and is the International Research Consultant with the Asics Corporation. Simon had the opportunity to sit down recently and talk with Professor Lieberman and got his take on the storm created by his research article.

This is a summary of Simon's report about the minimalist running shoe debate. A full version of his report is attached to this Bulletin. An interesting read!

"To say I was interested in what Dan had to say would be an understatement. I was fortunate to be able to have a long chat with Dan over lunch prior to his keynote address. He told me he felt he had been misrepresented by what the media had reported on his research, but still insisted that barefoot running was the best and most natural way to run. This despite the fact that he runs in a shoe called the Hyperspeed, a racing flat manufactured by a company called ASICS!

Not withstanding my confusion, his lecture was fascinating. It was not so much about barefoot running, but more about why and how humans came to be bipedal as we evolved from hominids (terrestrial and tree dwelling) to hominines (exclusively terrestrial). For anyone interested in gait, running, footwear or sports medicine, this is THE seminal question. And Dan Lieberman's theory is way out of left field.

The mainstream thought is that our ancient bipedal hominine relatives evolved as a result of climate shift and the gradual change in the Great Rift Valley of East Africa from tropical rainforest to open savannah. Dan Lieberman's perspective is entirely different. He does not believe that modern humans evolved to eventually run. He believes our genus, *homo sapiens,* evolved because *we could run*, and that gave us a massive advantage over other cursorial mammals and primates.

Asics apparel and footwear discount for NZSOPA members. For order form click here or open attachment in this Bulletin

Great stuff from my perspective, and spoiled only by his ongoing insistence that barefoot running is the way to go for 21st century man. On this issue, we will forever disagree, and I believe he brought no evidence to the table to support this concept.

The barefoot debate has been a healthy one though, and whilst it now appears clear the noise about running barefoot is subsiding and most agree running requires footwear, there has been a very interesting side debate in relation to modern athletic footwear. This debate poses the question 'have modern running shoes become over complicated', and, since the answer is almost certainly 'yes', what should we expect from the shoe of the future, and how do we define the 'minimalist' running shoe?"

In his article, attached to this Bulletin, Simon discusses the history of running, biomechanics of running and the evolution of the running shoe from 'cushioning and motion control' to 'motion enhancement'. Find out why he suggests mid– and forefoot running technique is essential to athletic performance, and how the 'minimalist' running shoe assists with achieving this goal. The reference for the Lieberman article is also included.

Asics Education Fund Report

NZSOPA Bulletin, December 2010

Biomechanics of Cycling and Running

Report by Kirsty Walker

Kirsty Walker was the recipient of the August 2010 round of the Asics Education Fund. She received funding to cover course registration and accommodation costs for 2x two-day courses in Sydney on 18th and 19th September 2010.

- Optimization of Biomechanics in Running, - presenter Jason McLaren.
- Optimizing Biomechanics in Cycling, -presenter Trish Wisbey-Roth

Kirsty's report from these courses is printed below. She provides an excellent reminder that we need to step outside the clinic and observe athletes in their training and competitive environment. She has provided some examples of functional exercise progressions for gluteus medius strengthening and these can be found in the attachments with this Bulletin.

Background

I was fortunate enough to be the recipient of the Asics education fund to attend one day workshops in Sydney on the biomechanics of running and cycling. The running workshop was present by Jason McLaren a functional biomechanist who in the past has worked for Asics and now works for Skins. The cycling workshop was presented by Trish Wisbey Roth a sports physiotherapist who works with the Australian cycling team. Currently I am the principle physiotherapist at a company called bioSport which is based in Aucklands CBD. We are a physiotherapy and biomechanical conditioning studio and we specialize in the disciplines of cycling running and swimming. Since the companies inception 3 years ago we have done hundreds of cycling and running biomechanical assessments. Attending these courses gave me the opportunity to expand on my current knowledge base; confidence that the approach and understanding we have in our clinic is aligned with the best practice; and knowledge on how we can fine tune our approach even more.

Day one: Running

My recommendation for anyone interested in attending this workshop is to brush up on your basic physic's principles if it's been a few years since you last dealt with topics such as moments of inertia, torques etc. Otherwise trying to drag this information back out of your memory banks as Jason talks is quite difficult. It was all presented at a level that we as physio's are more than capable of understanding, but for many it is probably not a language used on a daily basis and a bit of review beforehand will mean you better absorb the huge amount of information he gives.

The following is a summary of the main points outlined on the course. Many of these points are ones that we are already utilizing in our clinic, but some are new ones that we have now implemented and I can confirm that they are generally proving to be very successful.

- **There is no set recipe to running**; no two runners are the same as not everyone is exactly the same size and strength. Therefore, don't try and give them exact goals. Eg. You must hit the ground with 20 degree's of knee flexion. Instead look at what the knee does throughout the stance/ absorption phase. Does it work nice and efficiently like a nice new shock absorber on a car or does it sag like an old worn shock absorber?
- **Force absorption**: How the knee works through the absorption phase is known as knee stiffness. The better the stiffness, the more efficient the force absorption.
- **Research interpretation**: Following on from the recipe comment, you can't take values found in current research as normative data as there is no research published to date that follows a standardized protocol with regard to biomechanical variables such as running surface, speed etc.
- **Different mechanics in sprinting vs endurance running:** Sprinting and endurance running require different biomechanics and therefore different specificity of exercises. Efficient sprinting requires strong glut max contraction on propulsion, ideally allowing the athlete to get full extension at the knee. Endurance runners shouldn't be at full knee extension on toe off and therefore utilize glut med more than max.
- **Changing movement patterns takes TIME**: Exercises need

Asics Education Fund Report continued…….

to be functional as you are changing a movement pattern, and movement patterns need time and practice to be acquired. They can be taught in one hour but change will only occur with many hours of practice. This needs to be outlined to the client at the onset to prevent unrealistic expectations and your gaps between appointments will be weeks not days.

- **Different running injuries in males vs females:** Epidemiological data of running injuries indicates that females have greatest incidence of knee injuries. This is linked to force absorption issues resulting in increased tibial acceleration and decreased lumbopelvic stability. Males have a greatest incidence of calf injuries this is linked to propulsion issues.
- **Newton's law** – for every action there in an inverse and opposite reaction. There are often issues with holding body position through flight phase, if the trunk is off balance in flight there will be an inverse mechanical reaction occurring within the body to correct this. This can lead to incorrect muscle pre-activation and consequently incorrect joint alignment and force absorption on ground contact. Often we become obsessed with what we see through the absorption phase as we know this is when the body is trying to cope with GRF but the reason it's not coping may be due to what's happening in flight and what's happening in flight might be due to what's happening on propulsion. So you might need to address propulsion first even though landing is the issue.
- **Joint angle specificity**: Static measures do not reflect dynamic measures and when looking at functional tasks whether in a dynamic or static nature you need to be within 20 degrees of joint position to the functional task to get a true indication of what that muscle does in that specific length tension. This also applies to getting a true sense of functional joint proprioception and neuromuscular stability. This principle then directly applies to your rehab exercises as well.
- **Arm swing** is a good indicator of contra lateral lumbopelvic stability, generally with abnormal arm swing you see abduction and horizontal adduction of the shoulder.
- **Velocity specificity**: Rehab exercises need to be specific (see comments above) and don't neglect velocity. Running requires increased velocity muscle firing so specific rehab for a runner should incorporate this too.

Day two: Cycling

Cycling biomechanics are complex as interaction between the body and the machine can be influenced by many variables and in turn influence other variables. For example a higher handlebar height may ease lumbar load and therefore allow the athlete to generate more power, but in turn it will also increase wind resistance decreasing efficiency.

Optimal cycling biomechanics are achieved by optimal bike size, riding position, pedalling technique, crank length, aerodynamics, lumbopelvic and trunk stability, muscular recruitment patterns and flexibility. I have a background as an ex elite cyclist and therefore I know my well around a bike and the various types of equipment, If you are interested in doing this course but have only a very basic bike knowledge I would recommend spending some time at a local bike shop and learning the basics of bike anatomy first including such points a appropriate torque settings for seat pillar bolts as it's very easy to destroy a $500 plus carbon pillar if you are not careful!

Main points from the workshop:

- **Maintaining a neutral lumbar spine**: For normal endurance cycling (road and mtb) efficiency comes from being able to hold the lumbar spine in neutral whist being flexed at the hips. Cyclist's with poor lumbar strength tend to hold themselves in excessive thoracic kyphosis with a flat lumbar spine. This results in the core stabilizing muscles being in inefficient positions to work and compensatory bracing patterns occurring. Over the course of a long ride as they fatigue or as they attempt to increase their wattage you will see inefficient movement patterns occurring such as increased pelvic rock with a coupled contra lateral thoracic rotation or pelvic drop and trunk lateral flexion most often to the side of the dominant leg. Trish cites the importance of a good musculoskeletal screen off the bike, testing specific joint ROM, muscle strength and balance but making sure your assessment is done in positions specific to cycling. For example thoracic rotation is often done sitting on the treatment bed, for a cyclist it is better done standing in hip flexion hands resting on the treatment table (bike position).
- **Don't neglect multifidis**! Extremely important for maintain neutral spine on the bike. Consider your muscular slings (Vleeming et al.) underutilization of one part of the sling can lead to over utilization of the other part of the sling upsetting correct spinal stability creating muscular coping patterns.
- **Eccentric activity**: Generally cycling is considered a concentric only activity however with correct pedal technique it actually has eccentric components. This is again due to newtons law as mentioned above. Stored elastic potential energy from push down is released as elastic recoil on upstroke, control of the elastic recoil requires eccentric hammy

Asics Education Fund Report continued…….

and calf control.

- **Posture-specific training**: Due to the bi-articular nature of hammies and gastroc they are always in a lengthened position with cycling yet we often try to strengthen them in a shortened state. EG a Nordic drop for a cyclist needs to be done in hip flexed position rather than hip extended.

•**Technique for efficiency:** Inefficient direction of force on the down stroke means loss of elastic recoil and therefore over activation of hip flexors on upstroke which can lead to lumbar extension shearing issues. If the push down of the pedal stroke is directed too vertically ie down to road, the inverse force generated is pressure up form road (GRF) this leads to increased road contact friction meaning increased resistance to forward motion. If direction of force is correct then you get elastic recoil that assists upstroke lessens the dead spot and therefore assists forward motion.

- **Pedal Technique**: Following on from the above two statements, bike set up can be perfect but if pedal technique is wrong then a large amount of inefficiency can occur. A good cue for correct direction of force with pedalling is to ask the cyclist to imagine they are rolling their foot over a ball.
- **Assess technique in a fatigued state**: Cycling is generally an endurance sport so you may need to look at them fatigued eg the end of a 100k ride. Also make sure you assess them at appropriate cadence an load, assessing them on a wind trainer with no resistance does not replicated the rough hard chip seal and head winds encountered on the NZ Ironman course.
- **Seat height** – 96-98% greater trochanteric height, if pathologies are present then err on the side of the lower height.
- **Adaptation time to new positions**: A good cyclist is very in tune with their bike and may find it difficult to adjust to a significant change in position. Explain to the client that it will take time to adjust to the new position and to expect it to feel odd at first. They may need to spend a week or more riding only at recovery pace, then another week gradually introducing some hills but still keeping the intensity low before then returning to higher intensity workloads (this could be 4 weeks down the track for the initial position change). This progressive loading also allows time for strength development from the exercises you have given them to do off the bike.
- **Example:** Trish gave an example of how in tune a high level cyclist is with their bike, a few years ago at the AIS they took a number of the elite women's road bikes and changed their positions. The then asked the girls to get on ride and re-adjust their set ups to what they felt was correct. Most riders got their setups back to within 1 mm of correct simply by knowing how they felt on the bike.

Summary

Overall I found both workshops extremely useful. Both presenters were very knowledgeable and open to answering any questions. I am very grateful to Asic's and the NZSOPA for the opportunity to attend the courses.

With the current recession it has been reported that gym memberships are on the decline and more people are dusting off the bikes and running shoes and heading back outdoors. Our society has recently rebranded itself with a catch phrase of let's get people moving. I encourage you all to step outside the treatment room and begin looking a bit more at how people move and how you can help. If you currently have any tricky cyclist or runners that you're struggling to get right please feel free to contact me at kirsty@biosport.co.nz and I'll do my best to point you in the right direction of what else you may need to look at.

Some examples of functional exercise progressions for gluteus medius strengthening are shown below and more exercise progressions for both runners and cyclists can be found in the attachment with this Bulletin.

OSTEOARTHRITIS

Osteoarthritis is a chronic and disabling condition and there is good evidence for physiotherapy intervention in the prevention and management of this condition. The NZSOPA "Special Projects Group" have summarized some of the available literature on this topic. With the changing face of health care in NZ, increasing attention is being drawn towards the prevention and management of chronic conditions. These articles may provide valuable marketing tools to GP's and patients to highlight the value of physiotherapy in helping patients with osteoarthritis to maintain function and quality of life.

OARSI recommendations for the management of hip and knee osteoarthritis Part III: changes in evidence following systematic cumulative update of research published through January 2009

Zhang, W., Moskowitz, R. W., Nuki, G., Abramson, S., Altman, R, D., Arden, N., et al. (2008). *Osteoarthritis Cartilage*; 16(2): 137-62.

Article Summary

This is a global, evidence-based recommendation for the treatment of osteoarthritis (OA) of the hip and knee from the Osteoarthreitis Research Society International (OARSI). Three hundred and fifty one articles were summarized in this review, 64 systematic reviews (SR), 266 randomised controlled trials and 21 economic evaluations. Articles ranged from 2002 to 2006. A variety of treatments were looked at including types of medication which is not included in this summary. Self-management, education and information were shown to have a minor but statistically significant improvement on stiffness, function and weight reduction. Research found that both strengthening and aerobic exercise are associated with pain reduction in OA knees and hips. Water based exercise is also shown to be effective. Weight reduction over 4 RCTs was shown to improve pain and physical function by an average of 20% following an average reduction in weight of 6.1 kg. Nine SRs have confirmed that acupuncture has some efficacy for pain relief, but this effect is diminished over time. Finally taking glucosamine sulphate (GS) resulted in a pain reduction of 58%. No conclusive evidence was found to show that glucosamine slows down the progression of the disease. However, an RCT of GS showed that the 5-year incidence of total knee replacement in patients who had taken GS 1500 mg/day for at least 12 months was less than half of that in those who had taken placebo.

Clinical Significance

This emphasises the importance of our role as physios for this group of people. Our knowledge of weight loss strategies, strengthening, aerobic exercise and our abilities to educate and perform acupuncture are useful modes of treatment.

Review by NZSOPA Special Projects Group.

Attitudes, beliefs & behaviours of GPs regarding exercise for chronic knee pain: a systematic review

Cottrell, E., Roddy, E., Foster, N. E. (2010). *BMC Family Practice;* 11(4)
http://www.biomedcentral.com/1471-2296/11/4

Article Summary

Multiple evidence-based guidelines recommend exercise as a first-line treatment for all patients with CKP or knee osteoarthritis (KOA). This systematic review aimed to identify the attitudes, beliefs and behaviours of General Practitioners (GPs) in the UK regarding the use of exercise for CKP/KOA. Four electronic databases were searched between inception and Jan ary 2008, using subject headings to identify studies examining the attitudes, beliefs or behaviours of GPs regarding the use of exercise for the treatment of CKP/KOA in adults aged over 45 years in primary care. Study quality was independently reviewed using two assessment tools. 20 were suitable for inclusion. Although 99% of GPs agreed that exercise should be used for CKP/KOA and reported ever providing advice or referring to a physiotherapist, up to 29% believed that rest was the optimum management approach. The frequency of actual pr vision of exercise advice or physiotherapy referral was lower. Estimates of provision of exercise advice and physiotherapy referral were generally higher for vignette-based studies (exercise advice 9%- 89%; physiotherapy referral 44%-77%) than reviews of actual practice (exercise advice 5%-52%; physiotherapy referral 13-63%). Advice to exercise and exercise prescription were not clearly differentiated.

Clinical Significance

Exercise appears to be underused in the management of CKP/KOA. While the study acknowledged some limitations including the paucity of studies directly examining attitudes of GPs and poor methodological quality, it highlights the ambiguity surrounding the expected role of GPs in exercise for patients suffering KOA. It appears that although the overwhelming majority (99%) of GPs believed exercise was important, almost one third (29%) believed "rest" was the best approach. In NZ, where many of these patients are paying privately for treatment, rest certainly would appear to be the least expensive option. Among the GP's who did promote exercise, there was also a discrepancy between "advice" and "prescription". Without specific exercise prescription, patients cannot be expected to independently balance exercise parameters with symptoms and compliance is likely to suffer. As physiotherapists and providers of exercise rehabilitation in NZ our challenge is to improve communication with, and education of GPs, present them with a referral pathway to physiotherapy for exercise prescription for patients with OA, and find ways of making this valuable treatment intervention affordable for the patient and cost-effective for the health system.

Review by NZSOPA Special Projects Group.

Quadriceps Arthrogenic Muscle Inhibition: Neural Mechanisms and Treatment Perspectives

Rice, D. A., & McNair, P. J. (2010). *Seminars* in *Arthritis* and Rheumatism; 40(3): 250-66

Article Summary

The marked weakness of the quadriceps muscles seen in arthritic patients is due to muscle atrophy and ongoing neural inhibition that prevents the quadriceps from being fully activated; this is known as arthrogenic muscle inhibition (AMI). This review investigated the reasons for AMI and interventions that may be used to overcome it. An extensive literature search included AMED,CINAHL, MEDLINE, OVID, SPORTDiscus, and Scopus. The results of this review showed that AMI can be contributed to by articular swelling, inflammation, pain, joint laxity, and structural damage.

Ways to combat it include cryotherapy, low frequency acupuncture-like TENs and high frequency TENs. These modalities showed a reduction in AMI long enough to provide opportunity to strengthen the quadriceps. Other relevant findings were that AMI often occurs bilaterally after unilateral knee trauma or pathology and that reducing joint pain does not necessarily reduce the severity of AMI. AMI tends to be more severe towards end range extension and end range flexion, with a reduction in mid range, where intra-articular pressure is lowest.

Clinical Significance

Quadriceps AMI contributes to muscle atrophy and can delay or even prevent effective strengthening, hindering rehabilitation. Persistent quadriceps weakness can impair dynamic knee stability, physical function and quality of life, increase the risk of injury to the knee joint, and contribute to the progression of OA. The fact that AMI often occurs in the contralateral, uninjured limb emphasises the need for a bilateral approach to rehabilitation and suggests that caution be applied when trying to measure quadriceps weakness by comparing the injured to the uninjured limb. Swelling has a very strong inhibitory effect on the quadriceps and clinicians should make every effort to minimize the swelling associated with joint pathology. The combination of strength training with TENs or icing of the knee joint may allow the quadriceps to be more fully activated, improving the effectiveness of rehabilitation.

Quadriceps weakness predicts risk for knee joint space narrowing (JSN) in women in the MOST cohort.

Segal, N. A., Glass, N. A., Torner, J., Yang, M., Felson, D. T., Sharma, L., Nevitt, M., Lewis, C. E (2010). *Osteoarthritis and Cartilage*; 18 (6): 769-775. doi: 10.1016/j.joca.2010.02.002

Article Summary

This longitudinal study examined the relationship between quadriceps strength and increased knee joint space narrowing (JSN) over a 30 month period, in people aged 50‑79 years. Baseline measures included PA and lateral x-rays, isokinetic concentric quadriceps and hamstring strength, BMI, and a physical activity questionnaire, with the x-rays repeated 30 months later. Complete fol-

low up data was collected for 3856 knees, with 978 showing increased JSN. Increased JSN was associated with a higher BMI, weaker quadriceps and hamstrings, and lower activity levels, across both sexes. Females in the lowest tertile of quadriceps strength had an increased risk of whole knee and tibiofemoral JSN (Odds ratios = 1.66 and 1.69 respectively). No association was found between strength and JSN for males.

Clinical Significance

This data comes from the Multicentre Osteoarthritis (MOST) study in the US, which is a large observational study with over 3000 participants with either knee OA or known risk factors for knee OA. Odds ratios are measures of relative risk, and tell us how much more likely someone who is exposed to the factor under study (quads weakness in this case) will develop the outcome (OA) compared to someone who is not exposed. For this cohort, females with weaker quadriceps were more likely to have worse JSN than females with stronger quadriceps. The quads are the primary dynamic stabiliser of the knee in the sagittal plane, and weakness in these muscles could increase compressive loading and shear stress at the knee, resulting in joint degeneration. Males had 57% stronger quadriceps and this was thought to protect them from increased JSN. The statistical power of this study is very high, with a large sample size resulting in narrow confidence intervals for the odds ratios. Overall, the results make intuitive sense – stronger muscles = less wear and tear on the knee joint - and from a physiotherapy perspective, it is nice to see good evidence for all those quad strengthening exercises we prescribe!

Review by NZSOPA Special Projects Group.

Effect of glucosamine on pain-related disability in patients with chronic low back pain and degenerative lumbar osteoarthritis: A randomised controlled trial.

Wilkens, P., Sheel, I.B., Grundnes, O., Hellum, C., Storheim, K. (2010). *JAMA*; 304 (1): 45-52

Article Summary

This double-blind, placebo controlled, RCT investigated the effects of glucosamine on pain-related disability in patients with chronic LBP and lumbar OA. 250 participants, recruited over 18 months, with primary pain in the lumbar spine of at least 6 months duration, and MRI evidence of lumbar spine OA, were randomised to receive either 1500mg/day of glucosamine sulfate or placebo for 6 months. Participants were able to use regular pain medication or NSAIDs, and continue other treatments (Physiotherapy, Chiropractor, massage etc), as required. Primary outcome measures included the Roland Morris Disability Questionnaire, VAS score for pain, and EQ-5D for health-related disability. There were no differences between RMDQ scores at 6 month (5.0 vs 5.0, glucosamine vs placebo) or 12 month (4.8 vs 5.5) follow up, and no differences between VAS and EQ-5D scores also at 6- and 12-month follow ups. In conclusion, no differences were found between glucosamine and placebo during the 1-year follow-up, with both interventions improving pain scores and functional status by a similar magnitude.

Clinical Significance

How many times have you, as a Physiotherapist, been asked about glucosamine? Glucosamine is hypothesised to have anti-inflammatory properties and restore cartilage, however this study provides evidence glucosamine for OA-related LBP is not indicated. As we all know, there is little correlation between the amount of degeneration in the lumbar spine and pain/disability levels. It is possible the pain/disability some participants were reporting was not originating from the lumbar OA. It would be interesting to see if people with more (or less) severe disability/LBP responded differently to the intervention, as no differentiation was made between higher and lower RMDQ scores. This was a high-quality study, with the authors reporting a drop out rate of only 6.8% overall, and adherence, measured by returned capsule count, over 80% in both groups. The use of other pain medications and adjunctive treatments was also very similar between groups. Adverse events from glucosamine were reported as mild GI complaints and minor skin irritations. Interestingly, glucosamine is a prescription-only medicine in Norway, where this study took place.

Review by NZSOPA Special Projects Group.

Effects of an acute hamstring stretch in people with and without osteoarthritis of the knee.

Reid, D., McNair. (2010). *Physiotherapy*; 96: 14-21

Article Summary

This study examined the effects of a stretching intervention on knee extension range of motion, passive resistive torque and stiffness in subjects with osteoarthritis of the knee compared to subjects without osteoarthritis. Fifty five subjects were recruited. Twenty eight of these had osteoarthritis of the knee diagnosed by x-ray as well as according to criteria set out by the American College of Rheumatology. Twenty seven subjects did not have osteoarthritis. Subjects were placed on the Kincom dynamometer with a pad under their knee and had three 60 second long stretches of the hamstring muscle group. Peak knee extension range of motion, passive resistive torque and stiffness were measured and compared between groups as well as before and after intervention. Results showed a significant increase all three outcome measures post intervention for both groups. The only parameter for which this increase was statistically significant between the osteoarthritis and non-osteoarthritis group was for stiffness in the last 10 degrees of knee extension. In conclusion, stretching of the hamstring muscles demonstrates immediate beneficial adaptations in individuals with and without osteoarthritis of the knee, and especially in elderly patients with respect to knee stiffness at end range extension.

Clinical Significance

This study is based on previous findings that people with osteoarthritis of the knee tend to have reduced knee extension range in part due to loss of extensibility of the muscles and joint capsule. The idea that hamstring stretching may demonstrate different responses between the two groups is an interesting one and it is unfortunate that statistical significance was not achieved, however range of motion improved in both groups. The changes at the knee associated with osteoarthritis are chronic by nature so perhaps the results of this study may have been different if the intervention was applied over several sessions. This would tend to match a clinical setting as well where programs are administered over 6 or 12 weeks, and certainly provides an indication that loss of knee extension due to osteoarthritic changes could be minimised. It is nice to see a study that has identified a simple intervention and attempted to explore it further. It makes us think about every intervention we apply and why we are using it.

Review by NZSOPA Special Projects Group.

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Bone Health Research Review™

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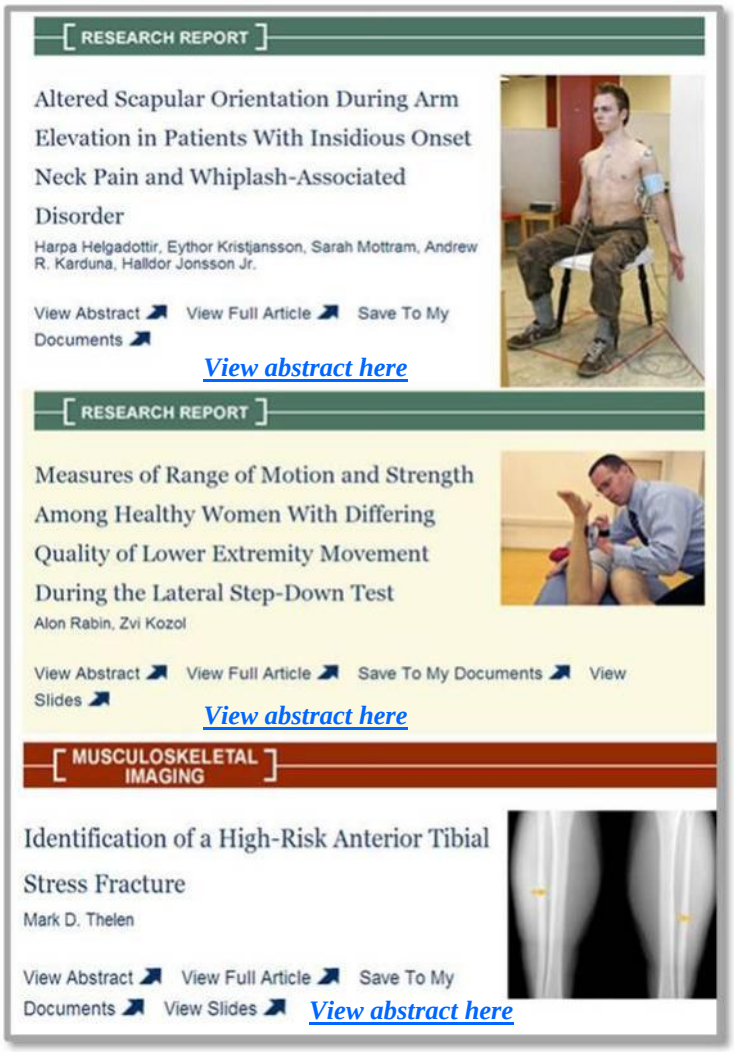

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Sports Medicine & Orthopaedic Journals —Open Access

NZSOPA Bulletin, December 2010

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Sports Medicine, Arthroscopy, Rehabilitation, Therapy & Technology	http://www.smarttjournal.com/
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Journal of Foot & Ankle Research	http://www.jfootankleres.com/
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Sports Science:

International Journal of Behavioural Nutrition and Physical Activity	http://www.ijbnpa.org/
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Journal of Human Sport & Exercise	http://www.jhse.ua.es/index.php/jhse
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Journal of Athletic Training	http://www.ncbi.nlm.nih.gov/pmc/journals/131/
Brazialian Journal of Biomotricity (Sports, Physical Education & Health)	http://www.brjb.com.br/

Musculoskeletal:

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Journal of Manual & Manipulative Therapy	http://www.ncbi.nlm.nih.gov/pmc/journals/600/
Current Reviews in Musculoskeletal Medicine	http://www.ncbi.nlm.nih.gov/pmc/journals/838/
Pain Research & Management	http://www.ncbi.nlm.nih.gov/pmc/journals/531/
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Orthopaedics & Surgery:

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Indian Journal of Orthopaedics	http://www.ncbi.nlm.nih.gov/pmc/journals/940/

Upcoming Sports & Related Physiotherapy Conferences

NZSOPA Bulletin, December 2010

NZSOPA Calendar

www.nzsopa.org.nz/calendar.html

14-19 December, 2010

5th International Congress on Science and Skiiing

Location: St Christoph am Alberg, Austria

Website: www.icss2010.at

18-20 December, 2010

International Conference on Sport Medicine and Sport Science

Location: Singapore

Website: http://www.waset.org/conferences/2010/sg/icsmss/

13-15 January, 2011

Volleyball Medicine Congress, 2011

Location: Bled, Slovenia

Website: http://www.fivbmedicine2011.org/

27-29 January, 2011

The Pan Pacific Conference of Medicine and Science in Sport

Location: Honolulu, Hawaii

Website: www.sma.org.au

15-19 February, 2011

The American Academy of Orthopedic Surgeons Annual Meeting

Location: San Diego, California

Website: www.aaos.org

12-13 March, 2011

'Health for the Football Player' - 20th International Conference on Sports Rehabilitation and Traumatology

Location: Bologna, Italy

Website: http://www.isokinetic.com/

17-21 March, 2011

Planning for Pain Management: The 36th Annual Meeting of the New Zealand Pain Society Inc.

Location: Hotel Grand Chancellor, Christchurch

Website: www.nzps.org.nz

7-9 April, 2011

IOC World Conference on Prevention of Injury & Illness

Location: Monaco

Website: IOC World Conference

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NZSOPA Bulletin, December 2010

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* Asics Education Fund - information, guidelines and application form
* Blog - recent topics
* Vacancies - locum and job & sports team position advertisements
* Resources - articles and reviews
* Book Reviews - read before you buy
* Snippets - sports medicine 'snippets'
* Archives - past submissions and meeting minutes