The Female Athlete
ACL injuries in women’s football
Interview with Dr Ritan Mehta
Celebrating the contribution of women to Sports Medicine
Menstruation and performance
Eating disorders in female athletes
Editors Note

It gives us great pleasure to welcome you to the very first edition of the Undergraduate Sports and Exercise Medicine Society (USEMS) quarterly e-Magazine, brought to you by the Hull York Medical School Society for Sport and Exercise Medicine.

Since its inception in 2012, USEMS has introduced hundreds of students to the wonderful specialty of Sport and Exercise Medicine. Through the society’s presence on social media, streams at BASEM conferences and bi-annual USEMS conferences, students throughout the United Kingdom have been inspired to carry the torch for the next generation of sports medicine professionals. Through launching this e-Magazine, we hope to reach even more people who share our passion for the discipline.

“Too often in sport, doctors are men and they don’t understand” - Paula Radcliffe

The theme of the 1st edition is The Female Athlete, a topic which we feel is of increasing importance in sports medicine. The number of women participating in elite sport has risen considerably in the last fifty years, and as the quote from Paula Radcliffe suggests, sports medicine hasn’t necessarily responded sufficiently to meet this growing demand. We can see in the graph below that the proportion of women competing at the Olympics has increased exponentially in the past few decades, while the recent 2015 FIFA Women’s World Cup propelled the women’s game into the global conscience.

While we were carrying out background research for this edition, we sought the counsel of many experts on the subject of The Female Athlete, including two doctors who have worked for the England Women’s national football team. Furthermore, we have compiled educational articles on key subjects such as ACL injuries in women’s football, the effects of menstruation on performance, and eating disorders among female athletes.

In addition to highlighting specific medical issues pertaining to the female athlete, we have also used this edition to celebrate the role of women in sports medicine. We were fortunate to be able to speak to Dr Ruth Highet, one of the most influential sports doctors in the southern hemisphere. Our profession is greatly enriched for the work carried out by female sports physicians, and we need to continue to actively encourage more women to choose sports medicine as a career. Nevertheless, it was disconcerting to see the sexist chanting aimed at Dr Eva Carneiro during a Premier League football match. Dr Carneiro has been an exemplary role model to aspiring sports physicians, and it was uplifting to see how the sports medicine community rallied around her during her recent adversity.

We hope you enjoy reading this e-Magazine as much as we enjoyed producing it. If you have any questions or comment, don’t hesitate to get in touch by emailing seanocarmaide@gmail.com.

All the best,
Fadi Hassan and Dr Sean Carmody
Co-Editors
Twitter has increasingly become a medium for supporting professional development in sport and exercise medicine. It provides access to the latest research, a place to interact with clinicians and researchers, and the chance to engage in conference discussions from remote locations.

Listed below, we have compiled a list of some of the sports medicine-related Twitter accounts that all undergraduates should consider following. The list is by no means definitive as there are multiple other excellent accounts worth following, but our list will certainly give you a good place to start.

In no particular order, here’s our list:

**British Journal Sports Medicine** (@BJSM_BMJ)

I’m not sure we’re allowed to pick a favourite, but if we had to, the BJSM account might just shade it. It is expertly run by a team of tweeters who tirelessly share the latest research, podcasts, and upcoming events in the world of sports medicine.

**Yann Le Meur** (@YLMSportScience)

The French Sport Scientist has gained legendary status for his educational infographics. His little white men are now as essential to the aspiring SEM physician as Brukner & Khan’s Clinical Sports Medicine.

**Nigel Jones** (@theboxingdoctor)

The England Rugby doctor has been a champion of sports medicine education for years, and this was recently exemplified by the insightful Q&A he hosted on Twitter with the British Association of Sport and Exercise Medicine.

**Andrew Murray** (@docandrewmurray)

One of the most popular SEM accounts on Twitter; Dr Murray’s tweets are a mixture of inspiring ideas, exercise medicine info-graphics or images of the impressive Scot himself out training for another grueling long-distance challenge.

**John Orchard** (@DrJohnOrchard)

Undoubtedly one of the most influential researchers in sports medicine over the past decade. He is always happy to engage in discussion on social media regarding contentious issues in sport.

**David Dunne** (@Dunne_Nutrition)

Team Wiggins, Harlequins, British Canoe; we’ve lost track of all of the high quality sports teams the young Irish man provides nutritional support to. However, amidst all this, he still finds the time to share some nuggets (not of the chicken variety) of knowledge for high performance nutrition on his Twitter account.

**Rod Whiteley** (@RodWhiteley)

Working as a Physiotherapist at the renowned Aspetar Sports Medicine Hospital in Qatar, Rod Whiteley regularly updates his Twitter account with the latest cutting edge research in sports medicine.

**Kristian Thorborg** (@KThorborg)

There is a hotbed of sports medicine talent in Scandinavia, and among these is prolific tweeter and researcher Professor Kristian Thorborg, whose special interest is in hip, groin and knee related injuries.

**Raymond Verheijen** (@raymondverheije)

Never short of a controversial opinion, Raymond Verheijen has written influential texts on periodisation and injury prevention in football.
Lise-Ann O'Neill (@LiseannONeill)

Physio actively working in football, and a die-hard Irish soccer fan. Lise-Ann has done admirable work promoting the role of women in sports medicine.

Dr David Geier (@DrDavidGeier)

US-based Orthopaedic Surgeon with an interest in sports medicine. Dr Geier regularly posts blogs on the latest issues in sports medicine.

Alicia Tomkinson (@piparina890)

If you can’t make it to a conference, don’t worry- Dr Tomkinson has earned an excellent reputation for live-tweeting SEM conferences. She has even picked up awards for the impact of her tweets.

Andy Franklyn-Miller (@afranklynmiller)

There are three reasons why you should follow Dr Franklyn-Miller, an early-adopter of social media in sports medicine; 1. Regular SEM podcasts 2. Weekly newsletter analysing the latest research in SEM 3. Keep abreast of the latest happenings at the world-class @SSCSantry sports medicine facility.

Dr Willie Stewart (@WillStewNeuro)

Concussion has arguably been the most topical point of discussion in sports medicine in recent years, and its negative outcomes have been clearly described by Dr Willie Stewart, a neuropathologist.

USEMS (@UndergradSEMS)

Self praise is no praise eh? Nevertheless, we’re confident our tweets are essential reading for any student interested in participating in sports medicine.

David Epstein (@DavidEpstein)

Author of the highly acclaimed The Sporting Gene, Epstein’s tweets are often centred around talent identification.

Ross Tucker (@Scienceofsport)

Like David Epstein, Ross Tucker, a sport scientist, has an excellent ability to make complex science understandable. Strongly against doping, Tucker’s Twitter comes alive during the Tour De France.

Dr Michael Evans (@docmikeevans)

Few physicians have done more to promote physical activity and positive lifestyle habits than Dr Mike Evans has through his engaging videos. They should be shown in GP waiting rooms up and down the country!

Dr James MacDonald (@sportingjim)

Emerging Media Editor of popular journal @CJSMOnline, and based in Ohio. Dr MacDonald’s recent tweets feature updates of his trip to the 2015 South African Sports Medicine Association Conference in Johannesburg- tough life!

Caroline Finch (@CarolineFinch)

World-class injury prevention researcher based in Australia, who regularly shares the latest research in the field via her.

Don’t forget to tweet us your thoughts on the magazine and how we can improve it in future editions!
Can you tell me how you first decided to become a sports physician, and was there a clear pathway for you to follow or was it a case of “the road less travelled”?

My interest in sports medicine began as a young house surgeon in the early 80s, having fallen in love with distance running after much of my childhood and adolescence being spent on tennis courts. Running overuse injuries followed, including ilio-tibial band friction that my medical seniors didn’t seem to be able to diagnose nor know how to treat other than taking anti-inflammatory pills and stopping running. As a young doctor, and runner(which was a relatively unusual combination back then) lots of my marathon-running mates would ask me about their injuries, expecting me to know something about how to treat them. Unfortunately my medical education to date had left me lacking in knowledge in that department! So I read every book I could lay my hands on that included any sports injury advice, and attended every conference and meeting even if vaguely related. Then through a mutual friend, who was a top NZ marathon runner, communicating with his Canadian coach, who so happened to be a Canadian Olympic and Commonwealth Games Team doctor, Dr Jack Taunton, I was advised there was ‘a path into sports medicine’ and Jack, via longhand letter, suggested I apply for a Fellowship to study there. Around that same time I also heard about the London Hospital Medical College Postgraduate Diploma in Sports Medicine, and with family living in the UK at that time, and subsequently being awarded a Smith and Nephew Fellowship of 6000 Pounds Sterling, I took off to London and haven’t veered off the sports medicine pathway since. The London course offered so many opportunities to participate in the medical management of both recreational and elite sport, including working at the 1986 Commonwealth Games in Edinburgh. I came back to NZ determined to follow this path.

However, I was still being told there was no such career as sports medicine, and that I’d have to become a rheumatologist or orthopaedic surgeon. Instead I did the 1st year of GP training, starting an evening sports medicine clinic in my own small apartment. I’d bought in Mt Cook, Wellington, and by the end of the year on the GP training program, I was up to 5 nights a week for my sports medicine clinic, so I knew I would be able to embark on full-time sports medicine. I had also moved on from marathon running into triathlon, and in fact the next year, I was selected for the NZ Triathlon team to compete in the 1990 Commonwealth Games so it was extremely full on but a memorable year personally, competing at the Commonwealth Games in Auckland, and also setting up the first multidisciplinary sportsmedicine clinic in Wellington at the Wakefield Specialist Medical Centre in Wellington South. This was modelled on what I’d seen operating at Jack Taunton’s UBC Sports Medicine clinic in Vancouver, Canada. Interestingly, I was also selected to work on the medical team at the same Commonwealth Games but was advised soon after my selection as a Team doctor, that I’d have to choose between competing and being the doctor. There was no doubt in my mind that I would compete at these Games, and look to medic at other future events but this decision meant I missed out on the Barcelona Olympics NZ medical team so my first significant NZ team commitment was the 1994 Commonwealth Games in Victoria, Canada. I subsequently was privileged to go away for the next decade with NZ Olympic and Commonwealth Games teams each 2 years.. these were all amazing experiences and many of the athletes looked after at those Games have remained friends for life!

I was among the first group of Kiwis invited to sit the Fellowship of the Australian College of Sports physicians in 1993 in Sydney and subsequently one of the first 3 Kiwis to get their FACSP that same year and become the first NZ woman sports medicine specialist. It took till 1999, that the expanding group of NZ FACSP holders were recognised by the NZ medical governing bodies as specialists but it was an exciting time to be involved as ‘sports medicine’ developed in NZ with more Fellows leaving their general practice and other positions to work fulltime in sportsmedicine.

I remained at the Wakefield, in the multidisciplinary environment there, for 21 yrs until moving into the new purpose built indoor sports venue, the ASB Sports Center, in 2011. Something I’d aspired to for a long time was to move out of a hospital environment into a more positive sporting environment. This allowed moving in with sportsmedicine colleagues
whom I’d come to really appreciate the skills of over the years, into an amazing new sporting facility, alongside an excellent musculoskeletal radiology group, and the Wellington base of High Performance Sport New Zealand, the governing body that looks after our elite sportsmen and women in NZ. My dream!

What have been the highlights of your career in sports medicine?

Opening of my very 1st sports medicine clinic in Wellington at the Wakefield Hospital in 1990 (Wellington SportsMed and Rehab Clinic) ; 21 yrs later, opening with 2 physio business partners, the new Wellington SportsMed at the beautiful new sports facility, the ASB Sports Centre, in 2011. My trips away with NZ Olympic and Commonwealth Games teams in 1994, 96, 98 and 2000 are all wonderful memories and many of the close friendships forged during those trips are friends for life. Some of the international sports events I’ve been medical director for such as the World Triathlon champs, World Mountain Running champs, and loads of other international events have been amazing events to be part of. Being medical director over the years for a number of very successful NZ sports, has also provided fantastic opportunities to travel away with teams including a memorable trip with Bike NZ to Europe on a Prime ministers scholarship.

Again the friends forged amongst athletes and other medical providers have been a huge part of the enjoyment in being part of those events! I’ve also loved the opportunities to be involved in teaching registrars, junior doctors, and loads of other sportsmedicine providers , in the past. I have never ever wished I’d gone into any other medical career as don’t think I’d have found anything that provided the variety of lifetime opportunities that sports medicine has for me.

What advice would you give to a young woman aspiring to pursue a career in sports medicine?

Sit your part 1 exams, or other entry exams into whatever postgraduate program, you plan on undertaking as soon as possible after graduating.. these exams will only become more difficult each year after graduation as you’ll have less memory of all that study you did for final Med exams. If you are passionate about sport , and love working with people helping them achieve their goals, being part of their lives, you will love sports medicine. For women, it can allow a career, that it is possible to have children and continue in, and be able to choose your hours if you work in a team environment. Once children come along though, it is much harder to do the team travel so if this something you’d like to do, try and get involved as early as possible. Similarly it becomes much harder running your own practice once you develop a large practice and have children in the mix.

There was a recent paper by Costello et al., which identified that women are under-represented in sport and exercise medicine research. What can be done to support the contribution of women to research in this field?

In Australasia, especially in NZ , most of us are solely fee for service, so our income is totally patient based. This makes committing to research, which I’m sure most of us would love to do more of, if we had the skillset, very difficult , in view of no funding and research time taking us away from clinical time. Personally I’ve always struggled as well with trying to keep the waiting time down to see patients, and taking time out to do significant research would result in even longer delays. Long delays for patients then can mean you miss out on seeing the patients you really want to see early and manage appropriately, whereas the chronic musculoskeletal pains will come however long the wait. Add in childcare, especially for some of us, being solo mums, and there ain’t time left to do research. If possible to start research early as well, developing on from what you may have done as a requirement in your Fellowship, would mean, starting off in clinical practice with a leg in the water, so to speak. Creation of more salaried training posts in sports medicine what is really needed though to encourage women sports physicians into sport and exercise medicine research so that the research can be undertaken in salaried time as part of the normal week. Assistance with funding for women to carry out such research, when not earning from seeing patients, would obviously help in this regard, like any area of research.

In your opinion, what can sports medicine do to better serve the female athlete?

Better provide answers that are EBM to some of the common issues that we women sports physicians, still aren’t sure of the best advice to give our women athletes... eg role of the Pill in amenorrheic athletes and management of the low bone density female athlete; more easily available knowledge on radiation doses of all the various radiation types we submit our female athletes to and relative risks so we can more easily make decisions for our patients.. and many other issues!

Thank you for your time Dr Highet.

Dr Ruth Highet
“Medical Director of Wellington Sports Medicine, was the first woman to become a Sports Medicine Specialist in NZ and one of the first 3 New Zealanders to obtain their specialist qualification in Sports Medicine (FACSP) in 1993. An exceptional athlete in her day, Ruth represented New Zealand at the 1990 Commonwealth Games Triathlon and subsequently, the World Triathlon championships. With over 27 years in sports medicine, Ruth has been heavily involved in NZ sport at all levels. Her experience and expertise has been recognized in selections as NZ Team Doctor at the 1994 and 1998 Commonwealth Games as well as 1996 and 2000 Olympics. She is the past Medical Director for Bike NZ, NZ Golf, Softball NZ, and Equestrian NZ as well as having been the Medical Director for the NZ Academy of Sport Central, 2001-2007 while it operated in Wellington”
Football is becoming the leading sport for women worldwide with 26 million females registered with the Federation Internationale de Football Association (FIFA).

There have now been a number of prospective studies reporting injury incidence in women’s football across different levels of play. There have also been several studies conducted by FIFA and UEFA at international championships. (1)

The majority of time loss injuries in both men’s and women’s elite football affect the lower limb (77-93%). Knee injuries constitute 19-25%, ankle 13-26%. Groin injuries are 5 times more common in men’s football than women’s and it has been reported that ACL injury is between 2-6 times more common in the female footballer. Anterior Cruciate Ligament (ACL) injuries are season ending injuries. With good surgical technique and intensive rehabilitation, players are returning to competitive play six to nine months after reconstructive surgery. In my experience return to performance may take 1 year. It is important to counsel athletes on this, in my opinion there are no short cuts to safe return to play. Unfortunately the long-term effects of osteoarthritis seem inevitable regardless of whether the athlete has reconstructive surgery or not (2).

We also know from several studies that ACL injuries occur more frequently in female than male athletes. Arendt and Dick (3) showed that collegiate female soccer players had ACL injury rates 2 times that of their male counterparts. Other studies have put the rate at 2 to 5 times the rate in men’s soccer (4). Female basketball may be even greater with differences between 2 and 8 times. One study of female professional basketball players reported the difference to be 10 times greater in females compared to their male counterparts (5). An estimated 80,000 ACL tears occur annually in the United States (6).

Certainly in my tenure as Chief Medical Officer to the England Womens Football teams we dealt with too many ACL tears. I am pleased to say however that all the international players returned to play at the highest level and a number of them will be in the World Cup squad bound for Canada this summer.

The Anterior Cruciate Ligament (ACL) is a three dimensional fan shaped structure. It is attached to the anterior intercondylar area of the tibia just posterior to the attachment of the medial meniscus. It then passes upwards, backwards and laterally attaching to the posterior part of the medial surface of the lateral femoral condyle. Its fibres are non-parallel with interlacing fascicles. It has an antero-medial bundle, which is tightest in flexion resisting anterior...
tibial translation, and a larger posterior-lateral bundle tightest in extension resisting hyperextension. In cadaveric studies (7) we know that the ACL is taut when the knee is fully extended and that the ACL acts as the primary restraint to anterior tibial translation.

The hamstring group of muscles act as synergists to this ligament when the ACL is excessively loaded. The hamstrings activation must be in synchrony with the quadriceps. The hamstrings must contract before the quadriceps to negate the anterior tibial drawer of the quadriceps. It is this dynamic stability and how it can be optimised which may hold the key to protecting the ACL from rupture. It is important to note that the hamstrings are thought to protect the ACL from injury at larger knee flexion angles.

Pandy and Shelbourne (8) estimated, via a cadaveric model, the changing ACL forces at different knee angles with different degrees of quadriceps and hamstring tensions. They found that at near full knee extension the hamstrings could not provide sufficient posterior shear force to resist anterior tibial translations relative to the femur and thereby protect the ACL. Anatomically this is because the hamstring muscles insert into the tibia at a reduced angle when the knee is near full extension. Latterly more focus has been around the increased knee abduction moment and assessment of this is incorporated in most screening protocols (11)

Another aspect of much recent research has been looking at the static anatomical differences of knees of men and women, in particular intercondylar notch width. In general, women have smaller ACL’s and smaller notch widths, even when the woman and man are of equal size (9). This may play a part in increasing female athletes’ risk of ACL rupture. Authors differ in their interpretation of static measurements and in particular whether the narrower notch width simply reflects a smaller and more vulnerable ligament or whether a normal sized ligament is mismatched with a stenotic notch -so making it susceptible to tear

The hormonal influence on ACL function and rate of injury is complex and there is still no consensus in this area. Female sex hormones directly affect the ACL in its composition and biomechanical properties but they also affect neuromuscular control. This dual role may be responsible for the conflicting evidence of the relationship between the menstrual cycle and ACL injuries (10).

In essence though it is the dynamic stability of the knee that is the important factor if we are to attempt to reduce the incidence of ACL tears. There have been a number of ACL prevention strategies put forward including the PEP programme and FIFA11+. These have shown excellent results and injury prevention warm ups together with effective strength and conditioning should be part of any footballers weekly training schedule.

References and Bibliography

THE 2ND BASEM/FSEM ANNUAL CONFERENCE

"Hear the Dragon Roar"

Call for Abstracts
The British Association of Sport and Exercise Medicine (BASEM) and the Faculty of Sport and Exercise Medicine UK (FSEM) look forward to welcoming delegates to Cardiff this year at their second joint annual Sport and Exercise Medicine conference, Hear the Dragon Roar.

Leading practitioners in Sport and Exercise Medicine will chair a multi-disciplinary faculty presenting the latest developments in Sport and Exercise Medicine, including new and emerging research. The comprehensive programme will include a wealth of expertise from around the UK and abroad focusing on the management of complex conditions such as:

- The Disabled Athlete
- The Older Athlete
- The Adolescent Athlete
- Exercise for Health
- Contact Sports

The 2 day educational programme will include a keynote address each day and emphasis will be on evidence based medicine with a combination of instructional lectures and hands on workshops. The programme includes sessions run by ECOSEP, FSEM, UKADIS and USEMS and will feature scientific paper and poster presentation and a members’ topic session.

Who can attend the conference?

All healthcare professionals involved in the provision of sport and exercise medicine services to a sporting population and the general public.

Conference Objectives

To enhance delegates’ knowledge in managing health issues in sport, exercise and public health, to highlight the future developments and challenges for the specialty and to provide a networking opportunity for health professionals of many disciplines and at different stages of their career; to learn from and inspire each other.

Click here to view the full conference programme and register for the event

Follow conference news and updates using:

#hearthedragonroar
@basem_uk and @fsem_uk
“Hear the Dragon Roar”

About our Speakers

During the conference you will have access to many of our leading Sport and Exercise Medicine practitioners, multi-disciplinary guest speakers and experts on exercise and physical activity for health. All chaired by leading experts from BASEM and FSEM Membership and Fellowship.

Here are some of our speaker highlights:

- **Keynote speaker Mr Craig Phillips, Clinical Pilates Founder and Director of DMA Clinical Pilates and Physiotherapy Australia.**

- **Keynote speaker Dr Simon Kemp, Chief Medical Officer, Rugby Football Union.**

- Dr James Bilzon, Department for Health – The role of the upper body physical activity in the prevention of metabolic disease in spinal cord injured humans.

- Dr Justin Hughes, Vice President of the FSEM – The future of SEM, challenges in the new NHS.

- Dr Rod Jaques, President of the FSEM – Undergraduate Session, Staring into the crystal ball of SEM.

- Dr Isobel Moore, Post Doctoral Researcher, Cardiff Metropolitan University – Priority injury problems in rugby and football codes.


- Professor Nicola Maffulli, Keel University and Barts and the London School of Medicine and Dentistry – Intensive training in young athletes, too much may well not be too good.

- Dr Mike Callan, Principle of the Judospace Educational Institute – Head injuries in Japanese Judo, issues and proposed reduction strategies.

- Professor Len Funk, Consultant Orthopaedic Surgeon Wrightington Wigan and Leigh NHS Foundation Trust – Sporting shoulder, indications for operative intervention.


- Professor John Blundell, Chair in PsychoBiology University of Leeds - Energy balance appetite and obesity, the danger of sedentary behaviour and the power of physical activity.

Click here to view speakers’ biographies and see a full list of our conference chairs and speakers. Register for the event now.

#hearthedragonroar
BASEM and the FSEM are pleased to announce that The Institute of Sport and Exercise Medicine (ISEM) is once again supporting the Annual “Association and Institute Prize for Sport and Exercise Medicine” which will be awarded at the conference.

The organisers would like to invite submissions of abstracts for poster or podium presentation. Research from all clinical aspects of Sport and Exercise Medicine are invited; including any topics that relate to the health, well-being and function of patients or athletes.

**Prizes**

**Podium presentations:**
- First Prize - £300
- Second Prize - £125

**Posters:**
- First Prize - £300
- Second Prize - £125

All submissions should be sent, by email, to Nicky Birkinshaw at Nicky.birkinshaw@basem.co.uk

[Click here to view full call for abstracts details and instructions to authors](#)

[Register for the event now](#)

**Deadline for submissions**

Monday 5th October 2015
Successful applicants will be informed by Monday 26th October.
Thank you for agreeing to this interview. First of all, can you tell us about your background and how you got involved in SEM?

I qualified as a GP in 2007 and then went on to do an MSc in Sport and Exercise Medicine at the Centre of Sports and Exercise Medicine, Queen Mary University of London. It was following this course that I really got involved in sports medicine. I started working in football at Barnet Football Club in 2008 and then moved to Watford Football Club in 2011, where I am still the club doctor. I have been fortunate to have also had the opportunity to work in the international setup with the Football Association with both men’s and women’s teams over the past 5 years. In 2014 I took on the job as the Lead Doctor for England Women’s Football. I have also previously worked at the Olympic and Paralympic Games 2012 and in rugby and athletics.

In 2010 I left General Practice to specialise in Sport and Exercise Medicine. I completed the London registrar rotation in 2014 and am now a qualified Consultant in Sport and Exercise Medicine.

Within the setup of the women’s football team, what kind of responsibilities do you have?

I am employed by the FA for 3 days a week and the main responsibility is to ensure all the Senior England Women players receive optimal care while away with England but also when they are at their own clubs. An important part of the role is to liaise and work closely with the Women’s Football clubs. We are currently preparing for the World Cup in the summer of 2015 so we are working very hard to ensure the players are fit and peak in time for the tournament. We have undertaken a variety of tests including blood tests, medical questionnaires, concussion screening, fitness tests, physiotherapy screens and cardiac screens.

Another part of the role is to look after the development teams. I am in charge of overseeing the doctors for the Women’s development teams and make sure the development team players receive excellent medical care.

You mentioned you worked for both men’s and women’s football teams. How do you think they differ?

I haven’t worked in women’s club football, so it is difficult to compare fully. However, I suspect the biggest difference is the support. I have worked at league 2 and Championship men’s football clubs and they have a lot more support. The women’s club football is improving but only a few can match the set-up of elite men’s sides. Women’s football is still developing as is their medical set-up. It has made massive strides in the last 4 years but there is still a way to go for some clubs. Alongside that is the financial support for the players, a lot of male footballers are full time professionals but away from the England Women senior players, the large majority of female footballers are part time, working or studying alongside their training. So it is a challenge for the players because they are juggling a lot of commitments and I
have a lot of respect for what they do. The progress in women's football in the past few years has meant a lot of the top tier clubs are now becoming full time and hopefully this will continue down the divisions in the future.

Can you tell us about your relationship with the players?

I think it is vital to build a rapport with all the players and develop an open and trusting relationship. When I took over as the Lead Doctor my first objective was to build my relationship with the players. I ensured I made time to speak to them on medical and not medical matters to help build that bond. I have learnt from working in sport over the years that unless the players trust you there is no point in being there.

Do you think there are differences in the epidemiology of injuries between men and women in sport?

Yes, definitely. We are doing an audit at the FA, looking at all the international teams and assessing the injuries we get. It is too early to give any preliminary results from this data. From the literature we know there are injuries that are more prevalent in female athletes, in particular ACL injuries and that's the biggest worry in women's football. Research says they are anywhere between 2 and 9 times as common in women than men. Last year there were 6 ACLs in the FA Women's Super League (FA WSL) that I knew of, which is quite high in a league that has only 8 teams. Other things we worry about in women’s sport are stress fractures and the female athlete triad. This is something to think about and consider when working with female athletes. There is also some data suggesting concussion is more frequent in women's sport and women’s football specifically. However, the evidence for this is limited.

Nearly a third of the USA Women's 2011 World Cup squad had torn their ACL at some point during their career. Considering this, are there specific measures you have in place to prevent ACL tears?

We do screening tests with all of our international players. For the senior team we also do isokinetic tests looking at their quadriceps and hamstrings strength. We also look at their biomechanics with musculoskeletal screens and functional movement screens. So overall we do a variety of tests and have a multidisciplinary team involving doctors, physiotherapists, strength and conditioning coaches and sports scientists to identify individuals at high risk and then implement targeted interventions to reduce this risk. We ensure the information is shared with the clubs and we liaise with their medical staff to develop a programme aiming to reduce the risk. Furthermore, we do specific warm-up programmes aimed at reducing the risk of ACL injuries which are undertaken at all age groups.

You mentioned you work with multidisciplinary team involving different professionals. Can you tell us more about your relationship with them?

We have daily medical meetings to go through every single player and review their plan and medical history to ensure we know exactly what we need to do with each player. The team is very integrated, you cannot work in isolation in team sports and every one of them has different points to add, so it is about bringing all the points and all the team together to reach a consensus.

When the multidisciplinary team comes together to prepare for a tournament, what considerations would there be for the athletes to make sure the team is fully prepared?

For the World Cup in Canada this summer, we started our programme in October to get some baseline data and we have done some targeted testing in February. We also aim to do more tests in April to ensure they are at their peak before the tournament. In addition to that, FIFA want pre-competition medical assessments undertaken which include certain blood tests and cardiac screening. You have to also think about the environment in terms of the humidity, the temperature, time difference, and look at the travel logistics too. We also address things like jet lag, meal times, sleep times and make sure the athletes are well hydrated. Most importantly you need to prepare the equipment you will take and ensure you have all the medications you need, all the strappings and other equipment you take and making sure you have enough stock to last you the whole tournament. Finally, we prepare for emergencies by establishing contacts with local hospitals and running practice resuscitation scenarios.

In an interview with the BBC, Paula Radcliffe recently said, "Too often in sports, doctors are men and they don't understand". How would your respond to this statement and how can sports physicians better serve sportswomen?

Difficult question. Yes, I am a male doctor working in a female sport and yes a lot of female sports have got male doctors working with them but I don't think it is a gender issues. It is more about understanding the people you are working with and the injuries and illnesses that can occur, as well as making sure you are approachable. We are all trained as doctors to treat men and women and we should be able to treat male and female athletes. I understand that some women may find it difficult to talk to male doctors and I completely appreciate that in the same way some men may find it difficult to talk to female doctors but it is about having that trusting relationship and rapport to enable them to feel comfortable in approaching you with those sensitive topics. So I think it is a challenge and I cannot say I've had major issues with that from my experience but I understand there may be some reservation from the players. We do a lot of screening tests and I have a chat with each and every player, discussing a whole range...
of topics that can affect females. So I try to open those channels through which they can communicate and express any issues they might have.

**Are there ways to establish those communication channels more effectively, especially with junior female athletes?**

I think it’s really difficult and you’re making a really good point, in terms of the younger age group. It is easier with senior players as they are more confident and comfortable talking about their medical problems, but I understand this is more difficult in younger age groups. We have a mixture of male and female doctors working with the younger age groups but the easiest way to approach it is to tackle it head-on through education. We have educational sessions on international camps to discuss things with players and they’ll be informed about various topics from the female athlete triad to other issues such as doping and infection control. This can help inform them about these issues and to let them know that there is someone there in the team they can talk to.

**You said you’ve seen the senior athletes grow through the various development teams, do you think consistency in the backroom staff can help with the issue of communication?**

I think so but it is difficult in the international set-up because you only have them for short periods of time and also there are only in that age group for a short time. It is a challenge but the only way to do it is to have open and honest doctors who are happy to approach these subjects as well as informing them that there are other doctors they can also talk to.

**There has been a lot of literature on the effects of menstruation on performance. What are your thoughts and how do you address that during tournaments?**

It is difficult but the players are usually very good at managing themselves. Some may want to stop having periods while on international duty. It is not something that commonly happens and very few of our players would use hormonal interventions to do this. Menstruation can affect performance and people can feel quite unwell during but it is not ideal to stop every player’s periods as this can also have adverse effects. It is important to tackle it on an individual case by case basis.

**You worked at junior level with development teams in the past. Have you had to deal with the female athletes triad? If so, how did you address and manage it?**

Yes, I have had to deal with aspects of the triad. I think it is difficult to manage, particularly at an international level because you are not with them all the time. We recently brought in a questionnaire on the female athlete triad to the senior team, which we hope to transfer to development teams. This questionnaire has 12 questions on irregularities in menstrual cycles, concerns about weight, diet and history of stress fractures to pick up key factors and identify those at risk. I think this is a good place to start. We will evaluate the data we have and see if we can use the same questionnaire in younger age groups to raise their awareness and encourage discussions with them. I think raising the awareness at the younger age groups is the key in preventing stress fractures and to help those with eating disorders. I think if you’re not going to ask questions, you’re not going to know and we need to pick up early signs such as menstrual cycle irregularities.

**When you identify individuals at risk and you try to approach them, how do they usually respond? Are there any barriers such as stigma that could negatively affect this conversation?**

No I think they are appreciative of it because you are taking an interest and you are trying to help them. They probably think it’s normal and do not identify it as a problem until you have the conversation with them and raise their awareness about the associated risks. When they come to international camps and we communicate and give them that support, you see that they are very grateful for it.

**What is the process involved if a female athlete became pregnant?**

If someone becomes pregnant then obviously you have to think about the health of both the player and the unborn child. So we would have a conversation and the player would be advised to stop playing football due to the risks associated with contact injuries. They would be encouraged to continue exercising as this is beneficial for them and it would be very hard for players to do no training at all. After the birth a graduated return to sport will be undertaken with advice from the whole MDT.

Thank you for your time Dr Mehta.
There has been much debate, and often controversy, regarding the effects of the menstrual cycle on athletic performance. Recently British tennis player Heather Watson said she lost her Australian Open round due to "girl things," sparking a global debate about menstruation in Sport. Subsequently, Paula Radcliffe was quoted as saying that "Sport has not learned how to deal with elite athletes’ periods" and that this was attributable to a “lack of learning” and understanding often from male doctors. The issue of "menstruation", and more generally “the menstrual cycle”, and sports performance is not a new one. Research into this topic first started in 1876 when Jacobi (1877) wrote "The Question of Rest for Women During Menstruation". Since then, there has been numerous studies published on the effects of the menstrual cycle on athletic performance and its various components including muscle strength (Elliott et al., 2003), cardiovascular function (Petrofsky, Al Malty and Suh, 2007), substrate utilisation (McLay et al., 2007), endurance capacity (Vaiksaar et al., 2011) and thermoregulation (Janse de Jonge et al., 2012). A recent (April 2015) literature search using the search term “effects of the menstrual cycle on athletic performance” yielded 101 returns, of which 24 were relevant based on the following inclusion criteria; eumenorrheic participants, tested in more than one phase of the menstrual cycle, with an outcome measure related to athletic performance. Interestingly, the same search limited to just menstruation (i.e., just the menstrual/bleeding phase of the cycle), produced 33 hits, of which only one paper met the inclusion criteria. These search results highlight two important issues; (1) the need for additional studies investigating the influence of different menstrual cycle phases on performance and (2) the difficulties in sourcing relevant literature in this area. It is obvious that many other studies have been published relating to this topic, as evidenced by more than 25 reviews in this area, however searching for these papers is not always straightforward.

To date, there is no consensus on how the menstrual cycle affects performance. This lack of agreement is primarily due to a number of methodological issues such as inconsistent phase definition (i.e., one author might call days 1-5 the menstrual phase while another calls days 1-14 the follicular phase) and identification (i.e., one study might identify a phase of the menstrual cycle by counting days, another might use basal body temperature measurement and another might use hormonal concentrations), intra and inter-cycle variability in hormone concentration (i.e., the concentration of oestradiol in a particular phase of the cycle might differ be-
tween the cycles of a given individual and/or between the cycles of different individuals) and type of performance test (i.e., endurance, time-trial, intermittent etc.). In addition, poor research design and experimental control may have produced incomparable data sets and conflicting results. These issues include not regulating (1) the training status of the participants, (2) the consumption of alcohol and caffeine and (3) the time of day that testing was performed, which are known to affect both the concentration of reproductive hormones and athletic performance. As such, it is often difficult to compare studies in this area in order to draw conclusions and produce evidence based guidelines. Gold-standard research design in this topic would therefore include: hormonal determination of menstrual cycle phase (i.e., the concentration of oestradiol and progesterone), measurements made in more than two phases for more than one cycle (i.e. at least two distinct phases, repeated for at least two cycles), tests performed at the same time of day under the same conditions (i.e., controlled prior exercise, caffeine and alcohol consumption and dietary intake) and homogenous populations (i.e., the same training status). Interestingly there is a lack of research in this subject performed on athletes, so future research should focus on well-trained and elite performers. Moreover, there are fewer studies on the direct effects of menstruation on performance than on other phases of the menstrual cycle, which also warrants further investigation.

It is difficult to elucidate the purely “performance-based” effects of menstruation, as menstruation is often associated with several physical, psychological and emotional symptoms. These include: fluid retention, abdominal pain and discomfort, headaches, backache, muscle and joint pain, breast tenderness, insomnia, dizziness, tiredness, nausea and weight gain, mood swings, feeling upset or emotional, feeling irritable or angry, depressed mood, crying and tearfulness, anxiety, difficulty concentrating, confusion and forgetfulness, restlessness and decreased self-esteem ([http://www.nhs.uk/Conditions/Periods/Pages/Symptoms.aspx](http://www.nhs.uk/Conditions/Periods/Pages/Symptoms.aspx)). These symptoms are often changeable both within and between individuals and can be difficult to quantify and, as such, are sometimes perceived as subjective outcomes. Treatment of menstruation-related pain and discomfort is usually with painkilling medication (e.g., Paracetamol, Non-Steroidal Anti-Inflammatory Drugs or codeine), gentle exercise, and application of a heat source to the abdomen or massaging the lower abdomen.

In summary, it is impossible to state the known effects of the different phases of the menstrual cycle on athletic performance with any degree of certainty at present. This is mostly due to the methodological problems stated in this report but is also partially due to the inherent variability in athletic performance at any given time (i.e., performance is affected by countless factors such as diet, prior activity, supplements, drugs, sleep, mood, environment, altitude, temperature etc.). Future studies should concentrate on specific aspects of performance, which if shown to be affected by the menstrual cycle, will be of sufficient magnitude to influence overall performance. Knowing this will allow athletes, coaches and medical professionals to limit any of the negative effects of the menstrual cycle not just on sports performance but also on overall health and well-being. Long-term health implications must not be ignored as elite athletes are known to suffer from disrupted and sometimes obliterated menstrual cycles, due to their high training loads and low energy availability, which results in down-regulated concentrations of the female sex hormones. These effects have many chronic health implications including infertility and reduced bone health. As such two sets of guidelines are needed; one of the effects of the menstrual cycle on performance and one on the effects of exercise on the menstrual cycle. In the absence of these clear evidence-based recommendations, those working with highly trained female athletes should monitor menstrual function on a regular basis (at least every 6 months), be aware of any medical symptoms associated with menstruation and try to limit the possible side-effects of the symptoms of menstruation, rather than menstruation itself, on performance.

Dr Kirsty Elliott-Sale

“I was awarded my PhD in 2001, on the effects of female reproductive hormones on muscle function, from Liverpool John Moores University. Since then, the majority of my research has focused on the interaction between sex hormone concentration and energy availability on muscle strength, bone metabolism and cognitive function in females.”
Introduction
The psychological benefits of sports participation have been widely acknowledged, ranging from improvements in self-esteem and self-efficacy, to improvements in perceived competence and autonomy. However, the elite sport environment in particular may increase the risk of certain psychological disorders. One area of recent focus has been eating disorders, where findings have consistently demonstrated that female athletes are at an increased risk in comparison to their non-athletic counterparts. Indeed, the evidence suggests that up to one in five elite female athletes meet the criteria for a clinical eating disorder, compared to one in ten non-athletic females (Sundgot-Borgen & Torstveit, 2004). The prevalence of eating disorders also seems to be higher in some sports than others; notably aesthetic, endurance and weight-category sports. These sports are often referred to as ‘lean’ sports, as body weight and shape are deemed to have an important influence on performance levels. Conversely, the prevalence of eating disorders is lower in sports where this emphasis is reduced, such as ball or technical sports (‘non-lean’ sports).

Risk factors for eating disorders
It is important to remember that athletes are vulnerable to eating disorders for the same reasons as anyone else; sport in isolation does not ‘cause’ eating disorders. However, there are a number of sport specific factors that have been identified as potentially precipitating or maintaining eating problems in athletes. For example, certain personality traits that are common in athletes are similar to those observed in eating disorder patients. Perfectionism is often encouraged within the sporting context as a means of achieving success; however it can be problematic when it is associated with high levels of self-criticism and rigidity. In addition, recent research has demonstrated that athletes who hold unhealthy beliefs towards exercise may be at an increased risk of an eating problem. Exercise can be a healthy form of mood regulation, but this can be problematic where athletes lack alternative ways of coping with stress or other negative emotions. The obligation to wear revealing sports attire and the emphasis placed on weight for performance are two further examples of how the sport context may lead to elevated body awareness, surveillance and subsequent dieting behaviour, which is highly predictive of a subsequent eating disorder.

Prevention and spotting the warning signs
Eating disorders are associated with significant morbidity and mortality. Coaches and other sports professionals may need information about the risks associated with food restriction and the importance of ensuring adequate energy intake among their athletes. Critical comments about weight, shape, and body composition within the sports context should also be discouraged.
Identifying athletes who are vulnerable to developing an eating disorder remains a challenge for clinicians and sport professionals alike. Sport body stereotypes can foster expectations for athletes to be a particular size and shape. For example, coaches may expect distance runners and gymnasts to be slim and, thus, may experience difficulties in noticing weight loss among these athletes. Similarly, eating disorder symptoms such as amenorrhea may be perceived as normal among female athletes and therefore not prompt early investigation into a potential eating problem. Further difficulties also exist in differentiating between athletes engaging in unhealthy exercise that could indicate an eating disorder and those who are merely committed to training. Screening measures such as the Compulsive Exercise Test or the SCOFF Questionnaire can be incorporated into regular medical examinations or pre-season evaluations. Low mood, deteriorating performances, recurrent illness and recurrent or non-healing injuries may also be signs of sustained energy deficiency.

Treatment issues
Athletes with potential eating problems are likely to express considerable resistance or ambivalence towards treatment. Athletes may deny that they have an eating problem, and express concerns about being excluded from training and competition. Coaches, therapists and other sports professionals who suspect an eating disorder should raise their concerns at an early stage to prevent further escalation of the eating issue. A direct, supportive and confidential approach will encourage the athlete to be open and honest. Milder, subclinical cases may be resolvable through nutritional and psychological support; specialist help will likely be required in more serious cases. Initial medical evaluations will help to inform decisions around continued participation in sport or modifications to training that are required. Coaches and/or athletes may be unhappy with the prospect of temporary exclusion, hence it is important to ensure that the medical team drive participation decisions.

Psychotherapy is the main form of treatment for eating disorders, with several different forms of therapy currently available, including Cognitive Behavioural Therapy, Interpersonal Therapy and Family Based Therapy for adolescents. Therapy is usually weekly, and lasts for between 20-40 weeks depending on the diagnosis, severity and mode of therapy. Recent research has suggested that the inclusion of the coach in the therapeutic process can help aid recovery, help to manage restrictions on exercise behaviour, and in facilitating a gradual return to sport.

Further reading: