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Editorial

Welcome to our latest edition of *In Touch*, in which we hope you will discover a sports-laden feast of information. Sport and exercise medicine is my favorite aspect of the therapy world and I am, therefore, unashamedly biased in my view of the content we are delivering in this edition.

As physiotherapists in private practice, we have so much to offer regarding the prevention and treatment of sports injuries, at whatever level those who come to us for help and advice participate, whether from couch to 5K, the Sunday morning kick around, right through to the elite athlete. The fact that, as private physios, we can offer early intervention and goal-orientated treatment pathways that successfully supports those who come to us to reach their goal for recovery and return to play, is something we should not only be very proud of, but should also be shouting about from the rooftops.

The articles in this edition, written by some of the best and most engaged people in our profession, reflect what can be achieved in relation to the treatment of sports injuries and share how they might be applied in our own clinics to achieve the patient's required outcomes.

My gratitude goes out to each and every one of our authors for giving their time and sharing their expertise, and making *In Touch* what it is: a highly regarded and valued journal full of clinical information aimed at supporting physiotherapists in private practice.

I hope you enjoy this edition as much as I and the team have done putting it together.

See you next time,

TOBIAS BREMER | EDITOR

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Sport injury prevention exercise programmes work but have many challenges

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Participating in physical activity and sport is beneficial for health and wellbeing. However, there is an inherent risk of injury. Injury prevention exercise programmes have been proven to reduce the risk of injury in a range of sports, though adherence to them is poor. Preventive interventions that involve research evidence with practitioner expertise and end-users' experience are deemed important to improve their adoption and sustainability. Increasing our understanding about the complexity of developing preventive programmes and implementing them is important to enhance their impact in real sporting settings.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Understand the common frameworks and models applied to develop sport injury prevention.
2 Be aware of the complexities and challenges at each step of the injury prevention process.
3 Develop an appreciation of the clinician's role in sport injury prevention.

Introduction

Physiotherapists are well placed to support people to lead healthy lifestyles and to be physically active. Participating in sport offers an opportunity to reduce sedentary time which confers numerous health benefits. However, there is an inherent risk of sustaining an injury. Indeed, the benefits of playing sport by far outweigh the risk of sport-related injury (Gosselin *et al* 2020). Nevertheless, more needs to be done by clinicians and researchers to reduce that risk. Sport injury prevention strategies may target sport policy / rule changes, exercise and training interventions, protective equipment and wearable technology (Vriend *et al* 2017). Injury prevention exercise programmes (IPEPs) have been proven efficacious and are applied in a range of different sports settings (Emery *et al* 2015). Understanding the efficacy and challenges of implementing IPEPs in sport is important to reduce the long-term health consequences and the economic burden on treatment (Gosselin *et al* 2020). The aim of this article is to review the frameworks that are applied in sport injury prevention and outline their associated challenges. The current evidence of efficacious IPEPs will then be considered and research about implementing and adopting IPEPs will be discussed.

Injury prevention frameworks and models

There are several sport injury prevention frameworks that exist, most notably the *Sequence of Prevention* (van Mechelen *et al* 1992) and *Translating Research Into Prevention Practice* (TRIPP) (Finch 2006). The TRIPP model overlaps the four steps of the *Sequence of Injury Prevention* and builds on it by necessitating that research advancements are made to understand the behavioural factors which contribute to the adoption of preventative interventions. It highlights that clinicians and researchers must realise the implementation context for the multifactorial complex nature of sport injury prevention to lead to real-world injury reduction. The existing evidence that has emerged from using these frameworks indicates a high level of concern about the impact of sport injuries, and a need to address the challenges of translating these concerns into intervention studies to prevent injuries in sport settings. It is worth noting that research in this field is lacking on female athletes and community youth players.

Step 1: injury and illness surveillance

Sport injury and illness surveillance is fundamental to determine the size of the problem in the first step of the prevention model and is where a vast amount of the sport injury research has been conducted. Data collection and reporting methods have advanced over the past decades, with an increasing focus on overuse injuries and illness (Bahr *et al* 2020). This, however, has largely benefited those in higher playing levels.

The lack of resources at lower playing levels, and particularly among community youth, impedes injury surveillance (Gabbe *et al* 2003), and is further hindered by considerable variation in surveillance methodology (Brooks & Fuller 2006; Clarsen & Bahr 2014), rendering data incomparable between studies using different methodologies.

Of note is the variation in the methods of reporting injuries (number, proportion and incidence), methods of data collection (medical personnel reported, self-reported and coach reported), injury definition (time loss, missed match, diagnostic assessment and surgery) and training and match injuries combined. The use of text messaging or short message service (SMS) (Ekegren *et al* 2014) are viable injury reporting methods that offer the potential to address some of the identified challenges in under-resourced settings, as they are relatively inexpensive and can capture injury data using a customisable system.

When considering the lack of personnel and resources available in community youth rugby, the SMS injury tracking method has shown to be valid, reliable and feasible for participants and injury surveillance researchers (Alfven 2010; Axen *et al* 2012). Due to the variation in the injury registration methods, there are discrepancies in the data. Standardisation of injury surveillance methods and use of systems that are reliable, valid and represent the target audience may allow for a degree of homogeneity in comparing injury data (Ekegren *et al* 2016, 2014). Clinicians should consider the methods used when determining and comparing which are the most significant injuries that occur in a particular sport.

Step 2: aetiology and mechanisms of injury

Following on from epidemiological enquiry, modifiable injury risk factors are identified which can be used to inform the development of appropriate preventive interventions. Injury risk screening of intrinsic factors is used to support clinical judgement, and while there are a number of benefits of pre-participation screening, such as detecting existing health conditions, baseline testing and review of medication and supplements (Ljungqvist *et al* 2009), it is unlikely that musculoskeletal screening will be able to predict athletes at high risk of sustaining a future injury (Bahr 2016; Whittaker *et al* 2017). This signifies a shift in our understanding about the benefits of screening. It was previously recommended that research be conducted on screening to identify those athletes at risk, and prompt intervention to change outcomes (Ljungqvist *et al* 2009).

A meaningful debate has been deliberated regarding the effectiveness and efficiency of screening tests which outlines some of the complexities involved with its role in injury prevention (Bahr 2016; Hewett 2016; Verhagen *et al* 2018; Whittaker *et al* 2017). It is argued that there is value in continuing to offer screening assessments to determine which combination of tests are most useful in which context, and to incorporate repeated measures and monitoring of variables over time (Verhagen *et al* 2018). In addition, outcomes from a single testing session carried out in pre-season screening can change throughout the season, therefore associating pre-season data to injury prevention may be misleading (Baroni & Costa 2021).

A fundamental issue that needs to be pointed out is the importance of the context in which worthwhile screening can feasibly take place. In the community youth sport context where the coach is usually a parent of a child in the team and is also likely to be the first aider, having done a basic level qualification, it is practically impossible to meet these recommendations for screening (Donaldson & Finch 2012). Since there is minimal cost and discomfort to the athlete, the benefits of IPEPs should be targeted to sports teams and not based on those at-risk athletes as identified by screening tests.

Clinicians reading this might notice that these frameworks are research models, and it is less clear how they explain how injuries work. Sport injuries are complex and require a dynamic model to help understand the causes and mechanisms. In Meeuwisse's dynamic, multifactorial model of sport injury, an athlete is predisposed to injury by intrinsic risk factors, such as age, strength, and previous injury. They are then exposed to external risk factors, e.g. field conditions and equipment, in the sporting environment which makes them susceptible to injury (Meeuwisse *et al* 2007).

An inciting event can lead to an injury, or no injury can occur during the sporting exposure and adaptation may happen. If injured, the athlete can recover and return to their previous status, with potential adaptations that changes their risk factors to future potential injury. There could also, of course, be maladaption or incomplete recovery from injury.

It is clear from these complex interactions that sport injuries cannot be predicted. The complex systems model for sport injuries features in this multifactorial complexity, as well as bringing in the nature of team sports and training load (Bittencourt *et al* 2016; Gabbett 2020, 2016). It recognises that many factors may influence each other, for example restricted ankle dorsiflexion may overload the knee and thereby change the athlete's risk profile that leads to injury or adaptation. This approach moves away from identifying the isolated risk patterns that support clinicians to better understand the complexities of how risk factors interact.

In a recent Delphi study of 305 international experienced sport physical therapists from 32 countries, baseline / pre-season screening results were agreed

> "CONSIDER THE METHODS OF DATA COLLECTION USED WHEN DETERMINING AND COMPARING THE MOST SIGNIFICANT INJURIES THAT OCCUR IN A PARTICULAR SPORT"

to be important when planning IPEPs (Mendonça *et al* 2022). In addition to this, the athlete's injury history, psychological and mental factors, age, recovery strategies, the highest injury rates of the sport, financial support, number of participating athletes, and type of sport should also be included in the planning of IPEPs.

Overuse injuries in sport do not have a specific, identifiable, inciting event responsible for the injury and therefore do not fit the typical injury reporting definitions. Athletes may continue to train, or modify their training by refraining from the most aggravating activity in the early stages of the injury and, at a later stage, will seek medical consultation for the injury (Bahr 2009; Clarsen *et al* 2014). They may even make attempts to avoid time loss from their sport by postponing rest and recovery to the off season outside of the injury surveillance coverage.

In an attempt to derive greater information regarding overuse injuries, the Oslo Sports Trauma Research Centre (OSTRC) overuse injury questionnaire (Clarsen *et al* 2014) was developed to address these challenges. The four parts of the questionnaire evaluate the consequence of overuse injury and include data on sports participation, training volume, sports performance and pain. Regularly administering the questionnaire (weekly) allows clinicians the ability to monitor the impact of overuse injury over time.

Steps 3 and 4: developing and testing IPEPs

Informed by the findings from steps one and two, preventive interventions can then be developed in step three and subsequently evaluated in step four.

Interventions such as IPEPs as part of a warm-up routine have shown to be efficacious in preventing less severe, although more frequent, musculoskeletal injuries (Emery *et al* 2015; Leppänen *et al* 2014; Thorborg *et al* 2017).

There are a number of preventive exercise programmes that have shown efficacy in reducing the risk of lower limb injury in sport. These include the Prevent Injury and Enhance Performance Programme (PEP) (Gilchrist *et al* 2008; Mandelbaum *et al* 2005), the FIFA Medical Assessment and Research Centre (F-MARC) 11+ (Grooms *et al* 2013; Soligard *et al* 2010), HarmoKnee (Kiani *et al* 2010), the Knee Injury Prevention Programme (LaBella *et al* 2011), the Anterior Knee Pain Preventive Training Programme (Coppack *et al* 2011), and the Activate Injury Prevention Exercise Programme (Attwood *et al* 2018; Hislop *et al* 2017).

There are fewer efficacious upper limb IPEPs used in sport, namely the OSTRC Shoulder Injury Prevention Programme (Andersson *et al* 2017) and the FIFA 11+ Shoulder (Al Attar *et al* 2021), which have been developed and evaluated in handball and soccer players respectively. A recent meta-analysis on sport injury prevention provides a concise review of the topic for specific sports and injury types (Stephenson *et al* 2021) with shoulder IPEPs reviewed by Wright *et al* (2021).

Steps 5 and 6: description and evaluation of IPEPs

The common features that emerge in the majority of these preventive programmes include sport-specific running-based exercises, targeted resistance training, perturbation and plyometric exercises. It is apparent from the Lauersen *et al* (2014) meta-analysis, that multicomponent preventive programmes that compose of strength and proprioception with exercise progressions, lead to reduced overall injury risk. These components are therefore considered important across IPEPs in sport.

It is less clear how the mechanisms of these multicomponent IPEPs work, and this warrants further research to better understand their acute-chronic effects (Barden *et al* 2021). Specific exercises within these IPEPs have been shown to be effective in preventing injury, such as those incurred in the hamstring, head, and neck. Meta-analysis data of 15 studies showed that IPEPs that included Nordic, eccentric hamstring exercises reduced hamstring injuries by up to 51% (Dyk *et al* 2019). In another recent review of six studies, it was deemed clinically worthwhile to include neck strengthening exercises, as greater neck strength was associated with a lower risk of sport-related concussion. These findings offer a good evidence-based justification for their respective inclusion in primary prevention of hamstring and head and neck injuries in sport (Elliott *et al* 2021).

Implementation of IPEPs

Returning to steps 5 and 6 of the TRIPP model, we can see that it advances its predecessors by moving beyond efficacy of preventative interventions and towards understanding the enablers and barriers in the implementation context. Issues of poor compliance and adherence to preventive programmes have been shown to affect the effectiveness of injury prevention exercise programmes in a range of sports (Steffen *et al* 2013; van Reijen *et al* 2016). A number of the issues that have been reported to reduce adherence to IPEPs include the lack of coach / player buy-in, prolonged duration of the routines and some exercises inducing fatigue (O'Brien & Finch 2017). The barriers to implementing evidence-based IPEPs further includes the financial cost of the programme, the lack of confidence from coaches in their ability to implement

> "MUTLICOMPONENT PREVENTATIVE PROGRAMMES THAT COMPOSE OF STRENGTH AND PROPRIOCEPTION WITH EXERCISE PROGRESSION, LEAD TO REDUCED OVERALL SPORTS INJURY RISK"

it, and the complexity of the exercises (Minnig *et al* 2022). In contrast, implementation is better facilitated if coaches are aware of the efficacy of the IPEP, if there is shared motivation from the coach and athlete to complete the IPEP, and if the IPEP is easy to integrate into practice schedules.

New evidence suggests that rescheduling part of the FIFA 11+ intervention to the end of the training session improves compliance and reduces the number of severe injuries, enhancing the effectiveness of the 11+ programme (Whalan *et al* 2019). Using this approach to scheduling may allow for coaches to complete their planned training sessions and add in the preventive exercises programme at the end. Who the IPEP is delivered by, i.e. the delivery agent, is considered to have an influence on the implementation of the intervention. There is agreement that the head coach and strength coach were those who most frequently deliver the IPEP as part of a warm-up routine, while the physical therapist frequently delivered individual prevention sessions (Mendonça *et al* 2022).

It is important to recognise that the delivery agents are integral to optimising the overall impact of injury prevention, and that the delivery agent may vary at different playing levels, for example, in youth sports the role of the parent is also recognised as important to support implementation of IPEPs. Involving the athlete's parents in the injury prevention process serves as a way for them to assume some of the responsibility for their child's sport injury prevention (Emery *et al* 2006).

There are also numerous contextual factors that need to be considered when implementing an IPEP in sport, and valuable advice from researchers, practitioners, policy makers, and others in the target community about what may work best. It needs to be feasible, affordable, and sustainable (Hanson *et al* 2014). Allowing for this variability in how the IPEP is implemented is recognised as being important to the end user and likely to influence adherence to the intervention. This comes with an acceptance that, when applying research into practice, there is less control over how the intervention will be used in a real-life setting, and that the efficacious effect of the intervention will be reduced (Verhagen & van Nassau 2019).

Conclusion

The injury prevention framework offers a useful structure to apply when considering preventive interventions in sport. The complexities of monitoring injuries at all playing levels needs focused efforts to address the outlined issues. Future opportunities to increase the adoption of injury prevention should explore a range of methods to promote the benefits of injury prevention that stresses its value to the same extent of importance that is given to competition results. There is value in educating sport clubs about injury prevention to increase a team's chances of success. Many questions still need to be answered about the development and implementation of IPEPs in sport. However, there is a large amount of good quality evidence to support their efficacy and they should be continued to implement in sport.

About the author

Vincent is a physiotherapist and works full-time as a senior lecturer at the University of the West of England (UWE) in Bristol where he also is the evaluation lead and co-theme lead of the Knowledge Mobilisation and Evaluation theme within the Centre for Health and Clinical Research. His research interests are in sport injury prevention and the use of physical activity and exercise in the prevention and management of non-communicable disease.

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References

Full details of all references in this article can be found by accessing our *In Touch* autumn edition online at **www.physiofirst.org.uk/resources**

REVIEW SUPPORTING QAP

Having reviewed this article for how it might support Physio First members in obtaining and maintaining our Quality Assured Practitioner (QAP) status, my overall interpretation of the message is that it is important we understand our roles in injury prevention and act appropriately.

In his introduction, Vincent makes the point about how ideally placed physiotherapists are in being part of keeping people active, as well as advising on injury prevention strategies. Further in the article, in the section on developing and testing IPEPs, physios are also indicated as being important because we understand the value in, and the application of, physical preparation in the reduction of injuries.

As both a physio and an international gymnastics coach, I am in the unusual position of being involved in more than one of the roles this article highlights as being important. It implies that it is the job of the coach to ensure athletes are suitably prepared to compete in their chosen sport, and, in order to help with successful injury prevention and rehabilitation, it is up to us as physios to ensure we liaise appropriately with the coaching team.

In my own experience of both roles, I am aware that male artistic gymnastics has a comparatively low incidence of injury. This is down to a culture of ensuring that the athletes' level of physical preparation is significantly in advance of their skill level, and I hope it reinforces the importance that physical preparation plays in reducing the risk of injury.

Reviewer **Byron Clithero**

Myth busting misconceptions about anterior cruciate ligament injury management

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When it comes to managing the treatment of anterior cruciate ligament (ACL) injuries, there is a range of beliefs on how best to do so, and the research does not often feature in the physiotherapist's view on the subject, mainly because it is often contradictory. This article explores some of the misconceptions about ACL injury management and considers when it might be best to recommend a patient for ACL reconstruction, and when it might be more appropriate for a patient to be managed solely with rehabilitation methods.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Understand what misconceptions exist regarding ACL injury management options.
2 Consider the management advice you provide to patients with ACL injury and whether this is balanced and supported by appropriate evidence.
3 Learn the important points to cover when educating patients about ACL injury management options so they can make an informed decision.

Introduction

Some physiotherapists may feel confident discussing anterior cruciate ligament (ACL) injury management options with patients, including ACL reconstruction and initial management with rehabilitation alone. However, our recent study suggests that more than half of physiotherapists have beliefs when it comes to ACL injury management options that do not align with the research. Physiotherapists are not to blame for these beliefs. At surface level, the research is contradictory, with conflicting consensus statements, some of which are based only on expert opinion, highlighting that ACL reconstruction is the best treatment option to return to cutting and pivoting sports, and that the knee has a higher risk of secondary injury for the athlete who returns to sport without ACL reconstruction. On the other hand, consensus statements informed by systematic reviews of the literature recommend exercise-based rehabilitation as the first line treatment for most people with ACL rupture, before considering ACL reconstruction (Whittaker *et al* 2022; Saueressig *et al* 2022).

There are also many conflicts of interest when it comes to research on ACL injury management strategies. This includes authors who make their livelihood from performing ACL surgery and receive payments from companies that make money from selling the instruments and implants used for ACL reconstruction. Some authors publish papers that make strong clinical recommendations in favour of ACL surgery that are supported by biased, low-quality research. In addition, those who peer-review manuscripts for these journals are typically from the same profession and often have the same viewpoints and conflicts of interest as the authors of the papers.

We cannot expect physiotherapists who are full-time clinicians to be able to decipher which clinical recommendations are supported by high-quality research, and which are supported by inappropriate low-quality research designs. It is therefore not surprising that many long-held beliefs about ACL injury management options persist among physiotherapists.

The following addresses some of the myths physiotherapists might encounter when considering treatment strategies for ACL injury.

A ruptured ACL cannot heal without surgery

Most physiotherapists were taught at university that a ruptured ACL has no, or very little, healing capacity. This has shaped ACL injury management options.

In collaboration with a team of international researchers, I analysed data from the KANON randomised controlled trial and found that at least 30% of participants randomised to initial exercise-based rehabilitation had signs of ACL healing, i.e. continuous ACL fibres were evident on MRI two years after the ACL injury (Filbay *et al* 2022). This figure increased to 53% when people who had delayed ACL surgery after trialling exercise-based rehabilitation were excluded (Filbay *et al* 2022). People with signs of ACL healing on MRI reported better sports and recreational function, and better knee-related quality of life at two years, compared to those with no signs of healing on MRI. They also reported better outcomes than participants who had been managed with early ACL reconstruction (Filbay *et al* 2022).

With a team of multi-disciplinary clinicians, we trialled a novel non-surgical bracing protocol to establish whether this could facilitate healing of ACL rupture, by reducing the gap distance between the torn remnants of the ACL and immobilising the knee in this position (Filbay *et al* 2023). The findings from the first 80 patients to undertake the Cross Bracing Protocol were very promising; 90% showed signs of the ACL healing after three months of knee bracing and physiotherapist-supervised rehabilitation (Filbay *et al* 2023). Those whose MRI showed more signs of healing at three months had better outcomes, including return to sport rates, passive knee laxity, knee function and quality of life, when compared with people with fewer signs of healing on their three-month MRI (Filbay *et al* 2023).

Collectively, this research suggests that ACL ruptures can heal without ACL surgery, and ACL healing may be the key to better patient outcomes. More research is needed to understand who is most likely to experience optimal healing with rehabilitation alone, or other interventions such as the Cross Bracing Protocol.

ACL reconstruction is the best treatment option for return to cutting and pivoting sports

Following ACL reconstruction, only 55% of people on average return to competitive sport (Ardern *et al* 2014). Contrary to popular belief, individuals with an ACL rupture can return to cutting and pivoting sports when managed with exercise-based rehabilitation alone. Six studies compared return to sport rates between people with ACL injury who were managed with ACL reconstruction, and those who undertook exercise-based rehabilitation (Pedersen *et al* 2021; Grindem *et al* 2012; Fithian *et al* 2005; Keays *et al* 2022; Moksnes *et al* 2008; Frobell *et al* 2013). Importantly, four out of the six studies either advised people who were managed with exercise-based rehabilitation not to return to cutting / pivoting sports, or recommended non-surgical management because they were not motivated to return to these sports. Despite this, there was no difference in return to sport rates when results were pooled in meta-analysis.

ACL reconstruction will reduce the likelihood of knee re-injury

There is a common assumption that ACL reconstruction reduces the risk of further knee injury. However, the studies used to support this belief are typically retrospective reviews of surgeons' records. On MRI, they show greater meniscal damage in people presenting for surgery, months or years after ACL injury, compared to those who present early after ACL injury (Filbay 2019). It is unknown whether the people in these studies, who present months or years after ACL injury, have undertaken exercise-based rehabilitation (Filbay 2019). A 2020 systematic review concluded that "the clinical dogma that surgery is necessary to protect the meniscus in all patients with ACL injury is based on literature with serious scientific limitations" (Ekås *et al* 2020). This review found a very low certainty of evidence due to selection bias (84% of studies), misclassification bias (69% of studies) and detection bias (68% of studies) (Ekås *et al* 2020).

Subsequent knee injuries occur irrespective of management with ACL reconstruction, or management with exercise-based rehabilitation. Research has shown that subsequent knee injuries are prevalent after ACL reconstruction, with up to one in three young people experiencing a rupture of their ACL graft after surgery, and 27% suffering graft re-rupture after revision surgery. Up to 90% of individuals who experience an ACL graft rupture after ACL reconstruction also suffer meniscal or cartilage damage at the time of the injury. Preventing additional meniscal and cartilage damage following ACL injury is crucial for long-term joint health and this should be a key priority when managing people with ACL injuries, regardless of the management approach (Filbay & Grindem 2019).

ACL reconstruction reduces the rate of knee osteoarthritis

Systematic reviews have either found there is no difference in the rates of radiographic osteoarthritis whether people are managed with or without ACL reconstruction, or have noted a higher rate of radiographic osteoarthritis in those managed with ACL reconstruction. An umbrella systematic review and meta-analysis, i.e. a systematic review of all systematic reviews on the topic, found that people managed with ACL reconstruction had a higher prevalence of knee osteoarthritis, 10 years or more after the ACL injury (Webster 2021). However, most research has considered radiographic osteoarthritis which we know is poorly correlated with knee symptoms, and fewer studies have looked at symptomatic osteoarthritis and the comparison of this between management strategies.

Better outcomes are reported following ACL reconstruction

Multiple systematic reviews demonstrate that long-term patient-reported outcomes are similar between individuals who undergo ACL reconstruction and those who do not. These outcomes include sport and recreational function, knee pain and symptoms, and quality of life. Two randomised controlled trials have found that early ACL reconstruction is no better than management with exercise-based rehabilitation when it comes to knee function, pain, symptoms and quality of life at two- or five-year follow-

> "CONTRARY TO POPULAR BELIEF, INDIVIDUALS WITH ACL RUPTURE CAN RETURN TO CUTTING AND PIVOTING SPORTS WHEN MANAGED WITH EXERCISE-BASED REHABILITATION ALONE"

> "MULTIPLE SYSTEMATIC REVIEWS DEMONSTRATE THAT LONG-TERM PATIENT-REPORTED OUTCOMES ARE SIMILAR IN THOSE WHO UNDERGO ACL RECONSTRUCTION AND THOSE WHO DO NOT"

up (Frobell *et al* 2013, 2010; Reijman *et al* 2021). In line with trial findings, a recent systematic review and meta-analysis published in the *British Journal of Sports Medicine*, concluded that "current treatment recommendations and guidelines regarding ACL patients without serious concomitant injuries should be revised to a 'stepped care approach' with a primarily rehabilitation focused treatment approach as first line treatment" (Saueressig *et al* 2022). An exception to this may be patients presenting within the NHS with long-term persistent knee instability having undergone no prior rehabilitation (Filbay 2022). Such individuals may benefit from ACL reconstruction, according to a randomised controlled trial which found those managed with ACL surgery reported better 18-month outcomes than those who trialled rehabilitation (Beard *et al* 2022).

Conclusion

So, should we be recommending ACL reconstruction or exercise-based rehabilitation?

Currently, few patients receive an evidence-based balanced overview of their treatment options, which prevents them from making an informed decision that aligns with their values and preferences. Patients with ACL injury should be informed about the potential outcomes, and how they compare between treatment options, the pros and cons of each treatment option, and what to expect with each treatment pathway. In most cases, trialling exercise-based rehabilitation first is appropriate, and patients will still have the option of undergoing ACL reconstruction at a later date. If this is the treatment pathway chosen by the patient, they should be closely monitored and, if functional instability is present despite appropriate rehabilitation, it should be recognised that they are likely to benefit from undergoing ACL reconstruction.

The main downside of exercise-based rehabilitation is not knowing who will achieve a functionally stable knee, and who will end up benefiting from surgery. Trying rehabilitation first does not result in worse long-term outcomes, but it may delay the total recovery time by several months if a decision to have surgery is made later. On the other hand, choosing early ACL reconstruction is associated with the potential for surgical harms and complications, higher health costs, and a risk of graft rupture which results in poor long-term outcomes. Once ACL reconstruction has been performed, the individual no longer has the chance to heal their native ACL. We now know that some people who undergo exercise-based rehabilitation will experience ACL healing, and this is associated with favourable outcomes.

Physiotherapists have a critical role to play in informing patients about their management options. We recently surveyed more than 760 adults who underwent ACL injury management in Australia and found that only 10% of surgeons and 29% of physiotherapists had advised patients that outcomes were similar on average, following exercise-based rehabilitation, when compared with ACL reconstruction. Further, 87% of surgeons and 65% of physiotherapists informed patients that ACL surgery was the best treatment option for them, and even more surgeons and clinicians advised patients that surgery was their best treatment option if they wanted to return to competitive sport. We have a long way to go before ACL injury management aligns with evidence-based recommendations.

I, and my fellow researchers, are developing a patient decision aid for ACL injury management and a free online training course for physiotherapists to increase their knowledge around ACL injury management options. Educating physiotherapists and equipping them with the necessary resources to discuss management options with patients and deliver high-quality exercise-based rehabilitation, could have profound impacts on current practice.

About the author

Drawing on her lived experience of ACL injury and extensive research in the field, Dr Steph Filbay is recognised for promoting evidence-based management of ACL injury and developing strategies to improve outcomes for patients. She is a sought-after speaker, having delivered more than 100 keynote speeches, and other invited addresses in more than 10 countries. She is recognised internationally for her evidence-based expertise in ACL injury management, and is frequently commissioned by professional bodies, industry and healthcare providers to inform policy, advise on models of care and promote evidence-based practice to clinicians. Dr Filbay chairs and serves on national and international committees, has supervised 27 individuals at various career stages and received numerous awards, scholarships and grants for her research.

To follow Dr Filbay's research updates and access free resources, see contact details.

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References

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Chronic running injuries

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Running injuries can be divided into two categories – acute and chronic – but most running injuries related to the lower limb tend to be chronic in nature. This article explores how to identify the differences in running injuries, the treatment approaches that can be taken, and how management can ensure that the patient achieves their goals for recovery.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Understand the difference in running injuries that patients present with in our clinics.
2 Understand the interplay of different body parts in terms of diagnosis and management.
3 Learn how to improve the management of running injuries and patient outcomes.

Introduction by Tobias Bremer

Lower limb injuries stemming from running are a common presentation in a physiotherapist's daily clinic. In their systemic review, Van Gent *et al* (2007) report the incidence rate of lower limb running injuries as between 19.4% to 79.3%. More recently, Kakouris *et al* (2021) reported an incidence and prevalence rate of 40.2% ± 18.8% and 44.6% ± 18.4% (mean ± SD).

The three most common running injuries are reported by Francis *et al* (2019) to be patellofemoral pain syndrome (17%), Achilles tendinopathy (10%), and medial tibial stress syndrome (8%), indicating that lower limb injuries from running are very prevalent and, therefore, require a good understanding to be well managed.

Injuries can be divided into two categories; acute and chronic. The risk factors associated with acute injuries include supination traumas and muscle strains that can be sustained on uneven ground, such as during participation in trail running (Viljoen *et al* 2021), or at track events where there is jostling for position, especially around the track bends (personal communication).

However, most lower limb running injuries are chronic in nature and involve the tissues being overloaded over time owing to a variety of reasons. It is therefore important to understand the risk factors associated which lead to the development of these injuries.

In their systematic reviews on the risk factors and subsequent development of injuries, Van Poppel *et al* (2021) reported strong evidence that previous running related injuries were involved, and van de Worp (2015) reported a history of orthotics use as a component in the development of running injuries.

However, the risk profile differs when considering male and female runners (van de Worp 2015), which can result in conflicting evidence, beyond that of previous injury and use of orthotics.

Clinically, it appears that the running biomechanics change with injury, leading to further overload injuries over time. Equally, the use of orthotics is indicative of an attempt by the individual to address biomechanical inadequacies. It is therefore important to carefully analyse the risk factors and make a decision based on the patient's unique biomechanics, training load, lifestyle, age, ambitions and abilities.

In the following, **Sarah** focuses on some of the key, common running injuries that crop up time and time again, and how we set about managing them.

Shin splints

If you ask any runner, they will tell you that shin splints are one of the most common running injuries. If they've not experienced it, they will know someone who has. When I was growing up, I recall that my dad suffered with terrible shin splints, and then I did. Shin splints are what got me into physiotherapy, so for that I have to embrace them and say thanks.

Shin splints is a generic blanket term for any pain on the medial border of the tibia. This overload injury can range from something as simple as soft tissue inflammation and tightness, to a stress fracture and anything in between. The structures affected are the tibial posterior muscle and some of the smaller underlying flexor muscles too, including the flexor hallucis longus (FHL) and the tibia.

People who are new to running often suffer from shin splints through a lack of basic strength. Equally common is the elite runner who suffers from shin splints when they tip their training capacity over the edge. Contributing factors can also be the wrong running shoes or

shoes that have lost their support and cushioning, too much mileage too soon, and a body that basically isn't strong enough to support the training loads imposed. We also need to consider the athlete's bone health with particular regard to the runner's fuelling, including their diet and vitamin D intake. For both male and female athletes, we need to investigate their relative energy deficiencies (**REDs**), and, for female athletes, a key sign will be whether they are menstruating regularly.

Treatment for shin splints depends on the structure affected. If the bone is damaged, then pain dictates the first intervention. If weight-bearing and walking are painful, the leg should be immobilised in a boot and, only if it continues to be painful, instruct the patient not to weight bear on the affected leg. An immobilisation boot is not necessary when walking causes no pain.

Whilst there is science related to shin splints, medial tibial stress syndrome (MTSS), and stress reactions / fractures, here I explain my own thoughts on how I assess and treat runners who come to my clinic presenting with this type of injury.

HISTORY

Taking the patient history and getting them to engage can produce a great story that includes an explanation on the build-up, their training and when their symptoms first started. Remember, the build-up usually precedes the pain development, and this is where a training diary or access to the patient's Strava statistics can be really helpful as they will give you details of any change in load.

Key questions to ask include:

- When and where is pain experienced?
- Is the pain localised?
- Does the patient have night pain?
- Does the pain build up during running?
- Are their shoes new / old / carbon?

ASSESSMENT

When assessing the patient, look at the person not just the shin. Understand what the rest of their body is doing, how it moves, and get a feel for what may be causing the pain. Observe how they stand / walk and identify whether there is any excess pronation. Establish whether they can control a hop, and if / how the spine moves any tension, caused by central structures, down the leg, contributing to an increased load / tension in the calf and shin region. This assessment can be undertaken by using a straight leg raise (SLR) exercise to see if there is any change in tension from one leg to the other. Palpating the facet joints can determine if they are moving freely and, if so, it is worth offloading this area first to establish any tension changes.

A more local assessment will then include evaluating ankle mobility, whether the subtalar joint is moving, if the midfoot is mobile, and the range of the first metatarsophalangeal (MTP). Palpation of soft tissue and bone assists with identification of which structures are involved.

TREATING

Establishing which area to target first depends on the finding from the history and assessment. If there is some dural tension when the patient performs a SLR, and the lumbar spine feels tight, this is where I would normally start.
It is worth remembering that running produces chronic overload and stresses along the whole body chain. If we can offload an area by treating elsewhere first, then that can only be a good thing, and by reassessing at every stage, we can appraise whether local tone and tenderness has changed, for example, by checking to see if the ankle is moving better, and if there is less tension in the straight leg lift. If lumbar facets are being stubborn, consider mobilising the spine first to get them moving. Also consider the thoracic spine, the kinetic chain, and what may influence ankle mobility. If the lateral chain is "sticky", it can limit eversion of the foot. If the fibula isn't gliding, assess whether the tensor fasciae latae (TFL) is tight and pulling on Iliotibial band (ITB) and causing tightness of the fibula head. Remember, that everything is connected.

If, once everything possible has been released, the ankle moves better, this will help the deep flexors move more freely as they will not be pulling on a stiff joint. To capitalise on these gains, and address the soft tissue, mobilise the ankle locally. The medial shin can be released by any method that works best for the individual therapist. My preference is for deep soft tissue release (STR) and fascial tools. I have also revisited acupuncture, which achieves some nice release results, and found that some shockwave therapies can help the soft tissue element, especially in relation to desensitisation.

Everyone has their own set of skills, so the advice is to trust them and work them into the big picture. Think about which modality will work best when it comes to trying to change the structures required for the patient to achieve their goals for improvement.

REHABILITATION

Obviously, we should not forget this important part of our patients' treatment path. To go into this in detail is a whole other article, but the first step should always be simple balance and proprioception; look at calf capacity, then bias the tibia post and flexors. For a bone injury, the options will be whether or not to offload and, if so, for how long. Arranging for the patient to have a scan is always helpful in making this decision. If we get the basics of rehabilitation right, we can achieve foot and ankle control, and ensure that the leg is controlled properly from the distal end with the trunk and core.

> "PEOPLE WHO ARE NEW TO RUNNING OFTEN SUFFER FROM SHIN SPLINTS THROUGH A LACK OF BASIC STRENGTH"

CASE STUDY

My daughter is a hockey player and suffers badly from shin splints. She runs during the summer months and so is all quads

and prime movers. It took me 12 months to convince her that physiotherapy treatment wasn't just about hands-on and release work, but that she also had to help by doing the exercises. Her pain improved massively once she understood that message and stuck to a regular exercise regime. So, it's not all about hands-on manual therapy, but about finding the right treatment for each client. This is where knowing their story really helps.

Achilles tendonopathy

Achilles problems feature a lot in athletics and can present in a range of ways. With access to all forms of imaging ultrasound, MRI, and experts, I am lucky that I have the means by which to obtain exact diagnosis and, therefore, be able to treat patients with Achilles injuries much more effectively.

For the physiotherapist without this access, the advice is to try to identify the structure involved, consider whether it is the sheath or tendon, if the injury is acute, and whether there is crepitus. Also, establish whether the patient has experienced an "ouch" moment, and if a tear is suspected.

HISTORY AND ASSESSMENT

Again, the story is essential to work out why the injury happened, before embarking on off-loading and rebuilding. Many chronic Achilles tendons seem to be related to tension from elsewhere in the lumbar spine, and the foot and ankle. This puts the tissues under stress and can be one of the causative factors for injury. Biomechanics and the types of trainers the athlete wears can be big contributing factors. During assessment, make sure the trainers are supportive enough, but not too stiff, and check whether the foot is over-pronating.

TREATMENT

From a treatment point of view, physiotherapy has moved away from battering the tendon as it only results in them flaring up and is a bit like scratching an itch.

Whilst it is fine to get stuck into the calf and lower soleus that will be tugging on the tendon, we need to ensure that the tendon is moving freely and isn't tethered to other structures. In addition, always consider the possible involvement of plantaris. The foot is a key area as it needs to be able to create a stable point of take-off and, if it is weak and floppy, a lot of torsion will be placed on the tendons. Assess to ensure that the lower lumbar facets are gliding freely, and there is no dural tension down to the tendon.

Once offloaded and released, the key for treating tendons is to reload.

This is a good time for a reminder of how we take ContRoL (CRL) of an injury:

1. Cause – identify and address the cause
2. Release – ensure that the tight tissues and structures are released
3. Load – establish a basic load rehabilitation programme that can be developed as the athlete improves.

The best suggested way to explain to a runner the process of returning from an Achilles injury, is to break it down into function elements.

If they can achieve a simple single leg calf raise on one leg it indicates that it should be very easy for them to walk / jog slowly. If they are unable to do so due to pain, then modalities, such as shockwave treatment, acupuncture, etc., are recommended to reduce pain and inflammation in the tendon. Two feet work can then start as they are able. Once the patient can do 3x20 raises on one leg, they may find that their ability to jog improves.

The next phase is eccentric work on a step. Again, once the patient can achieve 3x20 single leg raises on a step, we can up the pace slightly.

Hopping is then required for sessions and faster pace work. If the athlete usually runs in spikes, then these can be reintroduced very gradually, bearing in mind that the lower heel drop can increase the load on the tendon. Some faster running shoes and off-road trainers can have the same effect, for instance, trails shoes have a deceptively low heel drop and this can catch people out when it comes to understanding Achilles problems.

Runners' knee

Think of runners' knee as anterior knee pain, as pain experienced at the front of the knee can be caused by an injury or issue behind the patella. This can be due to maltracking or degeneration changes, or be related to overload and changes in the patella tendon or fat pad.

The focus here is on the retro patella pain as this is something that is a lot more commonly seen in my clinic.

ASSESSMENT

Again, get a good story. Find out how the pain started, and about the athlete's training. Age details might indicate the possibility of wear and tear post patella. Establish if there has been any increase in loading, e.g. if the athlete is including more hills in their training, or longer runs that have increased the fatigue build-up and caused a lack of pelvic control that has allowed the knee to collapse in more than normal.

Ask the patient to stand, and then look at what is happening to the leg and patella. Notice whether they can control a single knee bend. Feel the patella to identify what might be happening and where it sits; is it being pulled laterally by tight lateral structures?

An overworking TFL will pull the ITB tight, causing the patella to sit laterally and the medial facet to be compressed, which results in painful flexion. The medial facet is not weight-bearing and so should only really come into contact no earlier than at 90 degrees knee flexion.

Another consideration is whether the athlete's glutes are working adequately to control the leg and pelvis, and if the vastus medialis oblique muscle can maintain the patella position. We can get a lot of information about this from observing a single movement. If we assess a single knee bend, we can see whether the foot, ankle, knee and pelvis

FIGURE 1: The Thomas test aims to assess range of movement in the quads and hip flexors

FIGURE 2: Checking the femoral nerve in side-lying

are maintaining good alignment. If, in this simple test, the foot collapses, the knee turns in or the pelvis drops, it is fairly certain that this will be happening during running. Assessing the quad and hip flexor range are also important. The Thomas test is good for measuring this, together with feeling the tension and range of both legs in prone. Note how the upper lumbar facets react, as these are where the hip flexors and nerves to the front of the hip and quad are located (figure 1). Any tension here can easily increase load in the knee.

TREATMENT

I spend a lot of time normalising mechanics and restoring hip extension in runners as, for me, this is the key for getting them back to their normal form and function. Once it has been established which structures are tight, we can start offloading and releasing them. Begin with establishing movement in the lumbar spine as this will allow more normal hip extension. Checking the femoral nerve in side-lying is a very effective method for ascertaining whether it, together with the lumbar spine are affecting hip extension (figure 2). For the majority of runners, these findings are positive.

If the mobility of the femoral nerve is inadequate, compare with the opposite side, and further mobilise the facets in side-lying, to improve the joint mobility and assist the femoral nerve to glide better.

Side-lying is also a better position than supine for the assessment and restoration of patella mobility as it is more reliable for testing what is happening during running. By performing a medial glide of the patella in this position, we can see what the mechanics are like. Again, this can be compared with the person's good side. Additionally, for a tight TFL, side-lying better accommodates the ability to mobilise and release the lower end of the ITB as it inserts into the patella and retinaculum.

Reassessment can then be carried out with the Thomas test and one knee bend to see if the symptoms have changed.

REVIEW SUPPORTING QAP

This article provides valuable insight into common lower limb injuries experienced by runners, and discusses the related risk factors, assessment and treatment approaches.

The importance of understanding and effectively managing these injuries in order to achieve optimal patient outcomes is highlighted. The sections on shin splints, Achilles tendinopathy and runners' knee offer clear and concise overviews of each condition, together with appropriate treatment approaches. The emphasis on individualised treatment and continuous learning through collaboration with colleagues adds credibility to the article.

The information here will benefit all physiotherapists working with runners and running-related injuries, and particular importance is placed on the individual approach and understanding the patient's circumstances, as well as having an awareness that running biomechanics alter with injury, resulting in the potential for further overload problems.

The take-home message from this article offers us the opportunity to improve outcomes and patient satisfaction for those who come to us with running injuries, which is always an added value to any clinical practice.

Reviewer **Katie Knapton**

FIGURE 3: Single knee bend

If they have, the patient will need to be instructed on how to control their glutes and pelvis. First steps to doing this can be with the single knee bend by a wall (figure 3), and the glut bridge. If these exercises change the maltracking, then Consider using tape to help maintain the range and tissue release gained in the clinic. McConnell taping with zinc oxide over a base is my preferred method, and I almost always glide the patella medially and ± a tilt if required.

Summary

The most important areas to note when it comes to running injuries are what has caused them, and then to look at the whole chain and restore normal or, in some cases, better movement and mechanics. There is no right or wrong way to treat; each physiotherapist must find out what works best for them and for their patient.

Working as part of a team where everyone has different strengths and treatment approaches offers the opportunity to pick up loads of lovely ideas, and on the occasion that our own treatment methods might not be achieving the desired results, there is always someone with whom the issue and alternative approaches can be discussed.

As physios, we should never be afraid to think outside the box, ask for help on something we don't know, and / or collaborate with colleagues who might have a different way of treating. Having attended a Physio First Skills Exchange event, I loved having the chance to participate in a community that offered a safe space to ask questions and share skills, and would certainly recommend it as a way in which physios can learn more about their strengths, identify what they don't know, and where, particularly physios who are sole practitioners, they can benefit from the sense of community and collaboration. The human body is quite a remarkable thing, and there will always be enough patients to go round.

About the authors

Sarah has worked in elite sport for more than 30 years, currently as a Consultant Physiotherapist to UK Athletics. She has worked at two Olympic Games, covered numerous European and World athletics championships, and was the Medical Lead for England Athletics at the Commonwealth Games in 2022. Sarah also works for 7Futures, a health and wellbeing company, and has written a book on running injuries entitled *Running Well*.
Tobias has worked in private practice for all his professional career. His particular interest in lower limb injuries and his own passion for running led to him developing his clinic specifically for runners of all types and levels; from couch to 5K, all the way up to elite athletes.

References

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Objectivity in the upper limb – does it matter?

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In activities of daily living, occupational or avocational, and in sports it is essential for any person to perform at the levels required. At the upper limb (UL) region there are a vast number of movements that occur either above, in line, or below the shoulder, with either an open or closed kinetic chain mechanism. Specifically in a sports setting, there is also the potential for contact and non-contact mechanisms to occur with objects or other athletes. The pain from injury, whether acute or chronic, can impede activity. Whilst the body is well equipped to heal naturally, in some instances dysfunction remains and there is often no recollection of the trauma, either with or without pain, that led to the dysfunction. This article poses the question of how we can measure function to appreciate dysfunction. It explores the various methods by which we can appreciate UL function in sports, and enhance our clinical approach.

LEARNING OUTCOMES
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1 The upper limb function can be described through mobility, handling, and sensory perception, and how to measure those elements.
2 Objectivity, in the presence or absence of a defined diagnosis, is quantitative information that adds value to our understanding of function.
3 Subjective information, i.e. pain and athlete readiness, are important components of UL injury management, but should not be considered in isolation. When added to objective measures, these can improve injury management.
4 Objectivity should be considered for various anatomical regions and beyond sports.

The function of the upper limb

The upper limb (UL) refers to the region of the body that includes the shoulder girdle, arm, forearm, and hand. The cervical and thoracic spine can also be included as they play important roles.

The UL performs various functions that can be broadly divided into three main areas; mobility, handling, and sensory perception.

MOBILITY

The UL allows us to perform a wide range of actions, such as reaching, lifting, pushing, and pulling. The mobility of the upper limb is achieved through the co-ordinated action of various joints, including the shoulder, elbow, wrist and fingers. These joints allow for motions to occur in various planes.

HANDLING

The UL is also crucial for handling, which involves primarily using the hand to grasp, hold, manipulate and release objects. In sports, this involves catching, throwing, passing, dribbling, blocking, hitting and other activities. The hand itself is an incredibly intricate structure; the thumb opposes the other fingers to perform pinch and key grips, enabling tasks that range from precision to power. It is important to remember that the wrist, forearm, elbow and shoulder all contribute to the co-ordination and dexterity required for handling objects of different shapes, sizes and textures.

SENSORY PERCEPTION

The UL provides feedback on the surrounding environment. The hand, particularly, is richly innervated with mechanoreceptors, thermoreceptors, and nociceptors, all of which transmit sensory messages to the brain that inform our perception of touch, temperature, pain, pressure and proprioception. These receptors contribute to our overall spatial and body awareness.

Measuring function

The same three main areas of UL function previously outlined are also the ones we should consider when measuring function, together with investigating the suitable methodologies for doing so.

MEASURING MOBILITY

Since the mid-16th century, therapists have used goniometers to measure the mobility of the UL. Inclinometers were subsequently introduced between the 18th and 19th centuries, although validity studies only appeared during the late 1970s. More recently, both devices appear to have been replaced with the advent of smartphone apps, with

studies comparing the reliability of more modern technology with the goniometer becoming popular in the 2010s.

Whilst measuring the UL of an athlete does not differ from doing so in the general population, as both have similar anatomical structures, in sports people the glenohumeral internal rotation deficit (GIRD) appears to be a widely discussed factor. Some athletes are more likely to develop GIRD than others (Ohuchi *et al* 2023). However, it appears that GIRD does not necessarily increase the risk or be linked to UL injury (Lubis *et al* 2020; Keller *et al* 2018).

In the field of biomechanics, there is a vast range of literature available on measuring kinematics of the UL during activities of daily living and sports. These studies allow a better understanding of the mobility that occurs at different joints during functional activities. For example, recent studies in boxing provide novel information on wrist kinematics on impact (Gatt *et al* 2023; 2021). In these studies, wrist flexion and ulnar deviation occurred concurrent on impact, with more movements occurring in straight than bent arm shots. Further adding rigid tape, to a boxing bandage, was observed to reduce wrist motion by up to 30% (Gatt *et al* 2023). These studies provide useful information towards an enhanced understanding of hand-wrist injury mechanisms.

MEASURING HANDLING

This can be complex owing to the various activities that occur both within and outside of sports pursuits. Handling activities require an appropriate level of force, with an equal or increased amount of load tolerance from the various structures in the UL.

Dynamometers are useful in measuring forces at the hand-wrist region, and hand-grip and pinch-grip dynamometers are commonly used to assess hand-wrist function. It should be noted that hand-grip measurement has been advocated for the assessment of function of the entire UL (Cooke *et al* 2021; Gatt *et al* 2018; Horsley *et al* 2016). A hand-held dynamometer (HHD) should be considered for assessing the entire UL, increasingly so in relation to the assessment of sports people. An HHD is portable and simple to use.

Free weights, e.g. dumbbells, are another method for assessing both isometric or isotonic actions, where either maximum strength or endurance can be measured. Isometric contraction produces muscle tension without a change in joint motion. Conversely, isotonic contraction produces a change in joint motion without a change in muscle tension, i.e. under the same tension.

Isokinetic dynamometry (ID), where the muscles contract at the same speed, is another assessment that has a particular value in sports, especially owing to the various speeds involved when the athlete executes activities to generate power. However, the limitation of ID is cost and expertise.

It has been observed, in assessment for shoulder rotator torque, that there is a very high correlation in the results from both HHDs and IDs (Chamorro *et al* 2021), indicating the HHD as a useful clinical tool. However, there are methodological flaws that should be considered when using HHDs, especially where the athlete is pulling against the practitioner's resistance rather than against a fixed point. Further, an HHD typically only provides metrics for isometric actions, as compared to measurements occurring throughout the entire arc of motion.

> "HAND-GRIP MEASUREMENT HAS BEEN ADVOCATED FOR THE ASSESSMENT OF FUNCTION FOR THE ENTIRE UPPER LIMB"

Assessment of tissue tolerance is measured by weight-bearing through the entire UL, using either force plates or weight-bearing scales (Królikowska *et al* 2022; Kuru *et al* 2022). Although force plates are typically used in a rather quasistatic manner, i.e. isometric testing, a more dynamic approach can be considered, such as in a countermovement push-up test that has been developed to measure UL function in boxers (Parry *et al* 2021).

Other methods for assessing UL function include either questionnaires (subjective) or assessing multi-joint tasks (objective). Questionnaires, such as the Upper limb Functional Index (ULFI) or the Disability of the Arm, Shoulder, and Hand (DASH), can add a numerical value to UL dysfunction, and may be considered when monitoring the progress of an injury over a long period of time. However, these questionnaires have been developed for the general population, with various tasks described that are not typically applicable to sports.

The reliability of the various UL multi-joint functional tasks proposed as a measure for return to sports is typically good. However, there is a question mark over whether they are truly relevant beyond the actual activities that someone is required to perform in their chosen sport. The seated medicine ball test (SMBT) can be a useful choice when considering a functional task for UL strength, as it has shown to have a strong to moderate correlation with IDs (Borms *et al* 2016). Comparatively, the upper quarter y-balance test (YBT-UQ) does not appear to be linked with UL strength (Borms *et al* 2016). Therefore, although there are various UL functional tasks available, an understanding of their clinical utility is required.

MEASURING SENSORY PERCEPTION

This is probably an area that is not particularly well executed in clinical practice and is mainly considered by many only when symptoms are likely to be linked to sensory dysfunctions,

especially in the hand. Pain hypersensitivity can, however, be influenced by many factors including chronic inflammation and / or trauma, and cognitive factors such as kinesiophobia and catastrophising (Georgopoulos *et al* 2019). In UL conditions, such as lateral elbow tendinopathy and carpal tunnel syndrome, the presence of central and peripheral sensitisation mechanisms has been observed (Fernández-de-Las-Peña *et al* 2010). In turn, pain hypersensitivity can be linked to poor recovery of pain (Shigetoh *et al* 2020) and can have an impact on the athlete's return to sport following shoulder surgery (Vascellari *et al* 2021).

Quantitative sensory testing (QST), an objective method of measuring pain hypersensitivity, is performed by applying various stimuli including light touch, vibration and temperature to the skin using validated equipment and standardised approaches (Georgopoulos *et al* 2019). The information from these tests provides objectivity of a person's sensitivity, and therefore adds to our current interpretation of function and prognosis.

When does measuring UL function matter?

Having described function and how to measure it, the question is then, when should we bother?

Consider the scenario of a squash player with a six-week history of 4/10 pain in their dominant wrist when undertaking sporting activities. They are unable to perform certain aspects of their sport at the required level. Wouldn't this be enough to provide some form of intervention and see how things progress? It surely only matters that the person feels that their symptoms are improving. This is the conundrum many will face, especially when function is targeted only as a numerical pain rating, i.e. subjective information expressed by the athlete. The difficulty is that this could lead to approaching our interventions through a lot of guesswork and potentially inferring a weakness that isn't there. We could conclude either small or large differences between limb sides in producing force or mobility, when the opposite could be the case.

Therefore, before we provide any form of intervention, more information beyond the subjective is required to inform our practice. To understand injuries / pathologies, I use this simple equation: **Prognosis = Diagnosis + Function.**

Our role as therapists is to ascertain, to the best of our knowledge, a prognosis. Diagnosis can be straightforward, but is often veiled by an array of variable hypotheses that can lead to a dead end, especially when scans result in no significant findings. Function, in this equation, is therefore imperative. Equally, we should never disregard potential structures (diagnosis), for example a distal tear of the biceps, or a bony injury such as a scaphoid fracture of the hand which, if missed, could be detrimental to an athlete's career. Of course, the subjective information from the athlete should be highly considered and continue to form part of the overall picture.

For function, it is best to consider using the simplest, cheapest and most time-effective measurement methods and equipment. Validity and reliability play an important role, albeit pragmatically – studies have not always been conducted on all methods.

By choosing a hand-grip dynamometer, to assess the injured squash player, using the methodology described by Gatt *et al* (2018), it can be established that there is a 30% difference in function, with a reported 4/10 pain over the dorsal aspect of the dominant wrist. The reduced force appears to match the patient's current pain levels. This difference cannot be reported as weakness, but rather an inability of the athlete to use their strength effectively, i.e. exert force, owing to pain inhibition. In considering the levels of force and pain, we now have a measure of the "gap" between the athlete's current abilities and their performance requirements.

Where baseline testing has been performed prior to the injury, the percentage changes between each side can be compared (Gatt *et al* 2018). However, in the absence of a previous baseline, normative values for hand-grip (Gatt *et al* 2018; Wong *et al* 2018), or in other areas of the UL region (Benfica *et al* 2018; Van Harlinger *et al* 2015) should be considered, dependent on the approach. The decision whether or not to send the patient for further investigations can be based on this one-off assessment, or a designated period of intervention and assessed progression may be considered using these measures, combined with the patient's subjective feedback.

The literature can be a guide when there is uncertainty how to proceed. The use of an algorithm specifically designed by Dorich & Cornwall (2021), using grip-strengthening for non-specific wrist pain, may be beneficial, and whilst there are other functional tests that could be added, typically less is better as long as the information gained from the tests chosen allows for appropriate planning.

Beyond providing us with a prognostic value, this form of objectivity supports the clinician in quantifying the approach to decision making regarding their interventions, e.g. a 30% difference enables safe loading within these parameters, rather than significantly underloading or overloading, which could be equally detrimental towards progression.

Finding a balance

The key to applying objectivity with athletes is in considering the context and being judicious in any approach. Before

> "DIAGNOSIS IS OFTEN VEILED BY AN ARRAY OF VARIABLE HYPOTHESES THAT CAN LEAD TO A DEAD END"

thinking about the "what" and "how", bear in mind the "when". If the answer to whether objectivity will add value to managing the athlete is "yes", then it is worth considering. The right tool/s and a consistent approach is essential. When performing functional measures for the UL, the following two aspects should be acknowledged:

1. Are the measures providing confidence to the practitioner with regard to the overall management of the patient?
2. Are the measures being performed giving the patient / athlete confidence in their injury / pain management?

Particularly in the absence of a definite diagnosis, the practitioner confidence will come from enhanced communication and planning with the athlete, their coach, and the wider support team. For the athlete, confidence is in being able to provide quantifiable information of their current status and progress. As athletes use data to quantify their performance, they will be able to relate to the information provided regarding their injury and dysfunction. Adding "simple" metrics such as range of movement and force can, therefore, be useful when approaching "complex" scenarios. However, they should be considered a piece of the puzzle and nothing more. Including sensory testing can also add value, and optimise recovery and return to sport, in some athletes. However, these measures are not intended to replace effective communication, but rather add to this process.

Conclusion

The question posed in the title of this article is does objectivity in the UL matter? I have used objectivity in the UL for numerous years, adding clinical value to simple, and more complex, scenarios. This approach also adds value to the management of injuries in other regions of the body, and beyond the sports population. Even non-athletes need to perform avocational and / or occupational activities at optimal levels of function. Therefore, context remains key, and it should be recognised that it is not all about sporting activities. A phrase used by practitioners who commonly employ objective measures is "if we are not measuring then we are guessing". Guesswork implies rolling the dice on our understanding of dysfunction and the approach towards injury management. So, the first decision that every practitioner must make is when to measure.

About the Author

Ian is the Head of Performance Services and Lead Physiotherapist with Great Britain Boxing. He has more than 23 years of physiotherapy experience, mainly in sports, supporting athletes at major international events. He is an UL injury specialist with the prestigious UK Sports Institute (UKSI), whilst also providing private consultations on complex UL musculoskeletal injuries. Ian has a passion for teaching and delivering regular educational content worldwide on #allabouttheupperlimb. He is an accomplished author with several publications. Follow him on Twitter (@iangattphysio), Instagram (@iangattgattman) and LinkedIn (@IanGatt-theboxingphysio).

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References

Full details of all references in this article can be found by accessing our *In Touch* autumn edition online at www.physiofirst.org.uk/resources

REVIEW SUPPORTING QAP

This article is very thought-provoking for us as physiotherapists. It is an area that isn't addressed very frequently, and reading this article encourages us to consider our options when it comes to upper limb objectivity.

The author discusses the function of the upper limb, based on three main areas, and then further discusses how each area is measured for its function, including the use of various devices and methods, some of which may be new to the reader and so will be widening our clinical knowledge.

How will this article improve patient outcomes?
The author highlights some very interesting ways in which we can measure objectivity within the upper limb, from the everyday use of the goniometer and inclinometer to the more modern approach of using apps on our smartphones.

Whichever objective measure is used, retesting using the same equipment enables our patients to see how they are progressing in quantitative data. This will encourage better adherence to any exercise programme, and therefore improve their outcomes.

Reviewer **Louisa-Anne Houseman**

Pelvic and groin problems in cycling

MICHAEL J CALLAGHAN PhD MPhil MCSP

Professor of Clinical Physiotherapy at Manchester Metropolitan University. Clinical Specialist Physiotherapist at Manchester Royal Infirmary. Head of Medical Research & Innnovation at Manchester United FC

Although pelvis and groin injuries tend to be uncommon in cycling, when they do occur they can be difficult and recalcitrant problems and one of the major decisions the practitioners who are looking after cyclists or triathletes must make is to determine whether it is the athlete's body or their bike which is predominantly at fault. It should be noted that this article first appeared in our *In Touch* journal in 2013 and is republished on the basis that the content continues to be relevant in the understanding and treatment approach to cycling injuries.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Be aware of common cycling injuries.
2 Understand the importance of accurate bike set up and how it links to your clinical examination of the athlete.
3 Learn the sport-specific technical language to help communicate with the cyclist patients.

Introduction

Knowledge of bike fitting plays an important role in the care of the cycling athlete and the physiotherapist should be aware that there is a link between how the bike fits and the clinical examination of the athlete's body.

The pelvis is one of the three areas that make contact with the bike (figure 1). Discomfort or abnormalities here can interfere with the symmetrical riding pattern, which is considered to be the bedrock of not only delivering power to the pedals, but also avoiding injury.

Saddle position

A key component of cycling set-up is the saddle position, which not only affects the pelvis, but the whole lower limb position.

The saddle should be assessed in terms of the optimum height, the optimum tilt position and the optimum forward and backward positions as all these have an effect on the leg delivering the power on the down stroke of the pedal, and the position of the pelvis (figure 2).

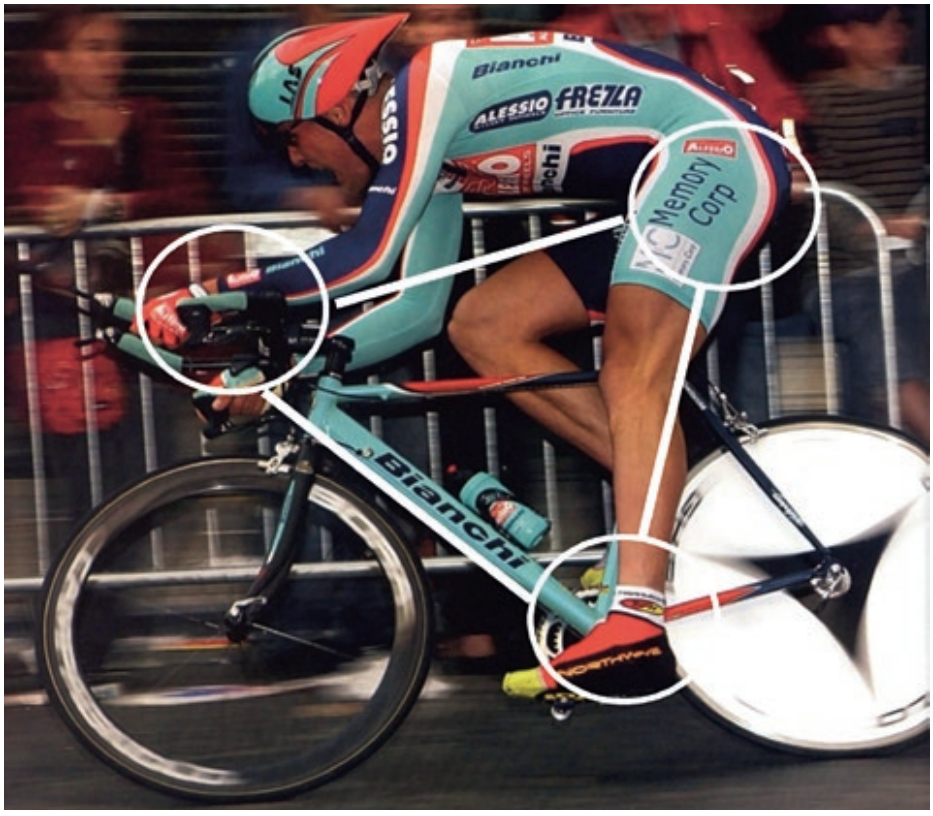

FIGURE 1: The white rings illustrate the three areas of body bike contact, these include the pelvis and buttocks

Saddle design

Although the saddle design has changed very little over the centuries, there have been innovations in their design by way of cut-outs, padding and gel inserts, all aimed at alleviating perineum pressure (figure 3). Most cyclists would usually buy these on a trial and error basis, as the biomechanical analysis of saddle fit tends to be available to only the highest elite cyclists.

The pelvis

For a normal cycling action, the maximum joint movements necessary are 110^0 hip and 110^0 knee flexion, with a smaller degree of ankle dorsiflexion. With each rotation of the pedal, the pelvis

FIGURE 2: Image indicating how the saddle position should be assessed

undergoes three planes of movement; firstly, when viewed from the back dipping down to one side; secondly, from the side, it tilts forwards and backwards; and, thirdly, from above it rotates left and right.

Biomechanical studies have demonstrated that there is very little movement in the pelvis in any direction even after one hour of intense cycling. Nevertheless, measuring these small movements during cycling confirms the stability of the pelvis and its role in contributing to the power delivery from the lower limbs. It also begs the question as to whether treating a "stiff pelvis" or sacroiliac joint is necessary when cycling involves so little movement in this area.

FIGURE 3: Types of saddle design

> "THE NECESSARY MAXIMUM JOINT MOVEMENT IN A NORMALLY CYCLING ACTION ARE 1100 FOR BOTH HIP AND KNEE FLEXION"

Discussing soreness and chaffing of the skin in the perineum area may be the subject of sniggers and muffled laughter, but it is a constant worry for cyclists, which is why they pay particular attention to both in their skincare and choosing their cycling shorts. When problems develop around the perineum, the rider may adopt an awkward position on the saddle in an attempt to ease pressure and discomfort which, if uncorrected, and with the repetitive nature of the sport in a maladapted position, may lead to any number of injuries in the lower limb and lower part of the spine, such as back pain, knee pain and Achilles tendinopathy. Obviously, local treatment for these musculoskeletal problems has to be accompanied with the alleviation of the sore perineum.

Groin strains or sports hernias, as commonly seen in contact and some non-contact sports, are rarely encountered in cycling due to the low impact ground reaction forces and smooth linear motion of the pedalling cycle. For this reason, cycling is a very useful rehabilitation sport for athletes from other disciplines following groin injury. However, cyclists may be prone to atraumatic overuse injuries, which is why bike set-up and cycling motion analysis become important aspects in helping with the overall diagnosis and cause of any problems. These include assessing

that the athlete is not over-reaching on the pedals with too much knee extension because the saddle is too high; too far back over the rear wheel; or too far forward over the pedals owing to it being incorrectly set in the fore / aft position (figure 2).

Ischiogluteal bursitis

A pelvic injury more commonly seen in cyclists, than in most other athletes, is ischiogluteal bursitis (figures 4 and 5). This can occur as a result of prolonged pressure on the ischial tuberosities from abnormal positioning on the saddle and / or poor saddle fit or a wrongly shaped saddle that puts asymmetrical pressure on the area of contact on the buttock and pelvis. It is usually unilateral.

Treatment involves a period of rest whilst the cause is investigated and corrected. In recalcitrant cases, an injection of corticosteroid can also be considered.

Proximal hamstring syndrome

This documented pelvic injury in cycling is also a new diagnosis for gluteal sciatic pain (Migliorini & Merlo 2011). The ischial tuberosity is the site of attachment for the sacro-tuberous ligament, the three hamstrings origins, and adductor magnus; the sciatic nerve lies laterally. Symptoms of proximal hamstring syndrome include local pain at the ischial tuberosity irradiating to the posterior thigh, which appears after physical exercise and typically during sitting, strongly suggesting cycling as a likely mode of onset. Differential diagnosis is required from piriformis syndrome, ischiogluteal bursitis, posterior femoral muscle compartment pain, scars in the hamstring muscles and lumbar referred symptoms.
The syndrome is closely linked to proximal hamstring tendinopathy which also presents with pain on the ischial tuberosity (Cacchio *et al* 2012). Therefore, while a differentiation test from piriformis syndrome, which overlies the sciatic nerve proximally, will help in the diagnosis, and the series of clinical tests advocated still need to be assessed for other gluteal type pains, MR imaging still remains the most helpful diagnostic tool in this area.

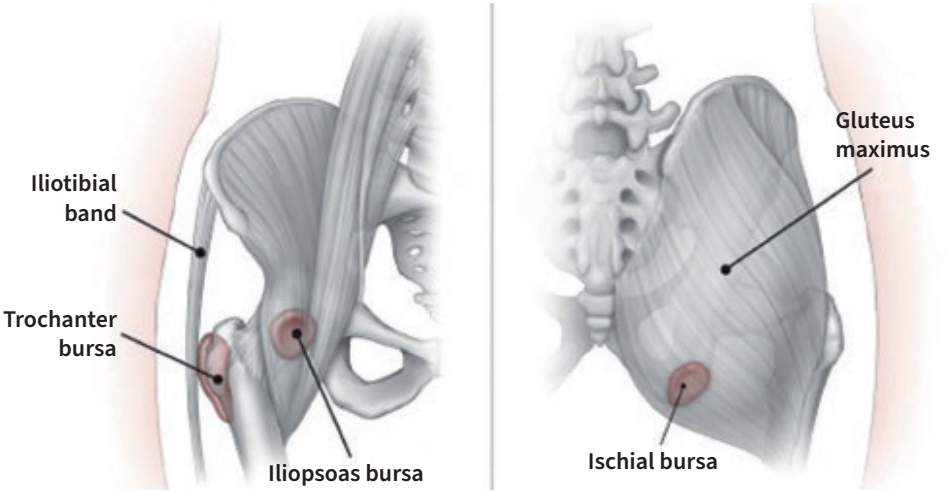

FIGURE 4: Front and rear view of the hip, indicating the ischiogluteal bursitis

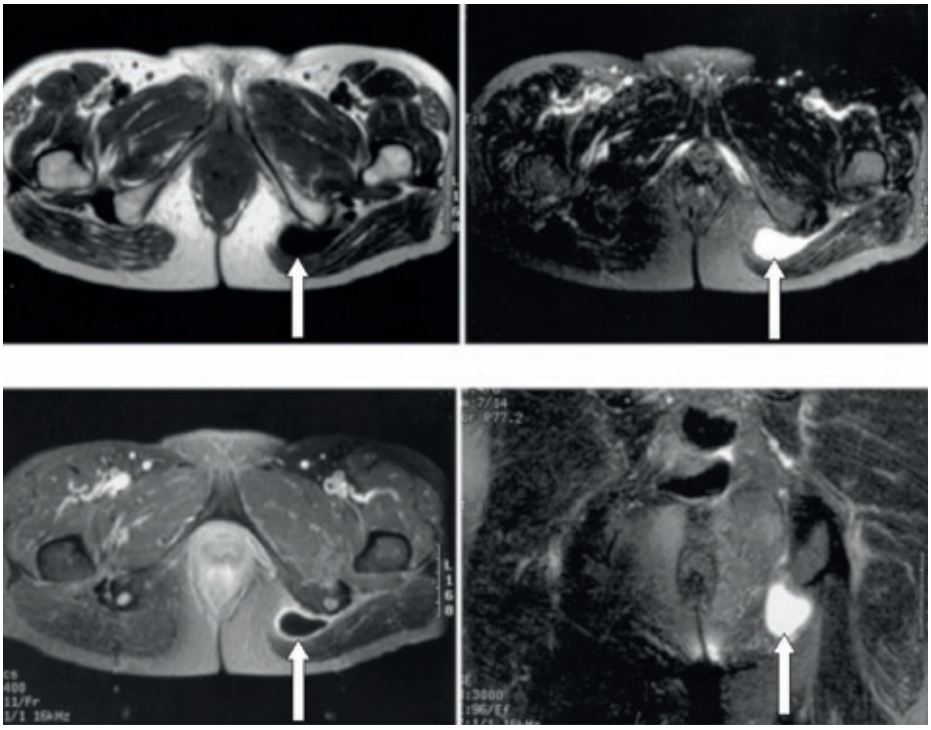

FIGURE 5: Indicates the right ischiogluteal bursitis on MR Images. Three axial views and bottom right coronal (rear) view (bursitis arrowed)

About the author

Michael Callaghan qualified in 1983 at Salford School of Physiotherapy and is now Professor of Clinical Physiotherapy at Manchester Metropolitan University. He is a Clinical Specialist Physiotherapist at Manchester Royal Infirmary and an Honorary Clinical Professor at the University of Manchester.

In the sports medicine context he has attended five Commonwealth Games and five Olympic Games and has worked as a physiotherapist at Everton FC, Wigan rugby league club and with the Great Britain cycling team. He is currently Head of Medical Research & Innnovation at Manchester United FC.

Professor Callaghan's area of research is the diagnosis, assessment and rehabilitation of the lower limb including the use of digital technology to improve this for clinicians and patients in a variety of pathologies. He has more than 200 peer reviewed publications and conference abstracts, has co-authored a book on patellofemoral pain, and written

nine other book chapters. He was the principal investigator in the two largest clinical trials of bracing for knee osteoarthritis.

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REVIEW SUPPORTING QAP

Figure 1 illustrates the three key areas of body bike contact. As in all physiotherapy approaches dealing with musculoskeletal cycling injuries, a holistic approach should include a biomechanical assessment of these key areas and an examination of the bike set up. Not only will this part of your patient assessment help to optimise performance and encourage a symmetrical riding pattern, it will also be instrumental in preventing injury.

The author states that the necessary maximum joint range of movement for both the hip and knee is 110 degrees flexion, which corrolates with common presentations of musculoskeletal cycling conditions such as ischiogluteal bursitis and proximal hamstring syndrome, the description of the pathophysiology, differential diagnosis and the management of these conditions. In addition, the factors such as limited pelvic involvement with cycling, and the bike set up, e.g. saddle height to avoid pain / soreness of the perineum and its implications is also discussed in relation to cycling-related conditions.

With the increased popularity of cycling, including e-bikes, and the emphasis for greener energy, this article continues to be very relevant for our current times.

Reviewer **Jennifer Michie**

Low-grade inflammation – what is it and why does it matter?

CHRISTOPHER NORRIS PhD MSc MCSP
Chartered Physiotherapist

Chronic low-grade inflammation (CLGI) is described with pathophysiology, blood tests, and clinical features defined. Risk factors for the development of CLGI are considered and the use of dietary changes and lifestyle features highlighted. Inflammatory changes in osteoarthritis (OA), chronic pain and psychiatric conditions are covered. Therapeutic interventions in the presence of CLGI including exercise, diet and lifestyle changes, and pharmacological interventions are considered.

LEARNING OUTCOMES
TO SUPPORT PHYSIO FIRST QAP

1 Chronic low-grade inflammation (CLGI) can occur through unresolved acute inflammation or as an independent state on its own.
2 Obesity can increase systemic inflammation through fat cell (adipocyte) action.
3 Regular exercise, lifestyle change and dietary manipulation can all reduce systemic inflammation.

Introduction to inflammation

Inflammation is part of the body's normal defence mechanism created by the immune system. It is a physiological response to threat posed by tissue damage (injury) or invasion by a pathogen (bacteria, virus). In a soft tissue injury, these changes can be termed damage associated molecular patterns (DAMPs), and when linked to an infection, they can be termed pathogen associated molecular patterns (PAMPs). In each case, the aim of the tissue changes is to restore metabolic balance (homeostasis) and promote healing and repair. Acute inflammation builds quickly and normally resolves within a short period. For example, when related to a sprained ankle injury, the affected tissues are initially hot and red, reflecting acute inflammation which calms down in a matter of days.

In the case of invasion by bacteria or virus, for example in acute pneumonia, the air sacs of the lungs are affected, and this can lead to a dry or productive cough, breathlessness and a high temperature. Rest will usually allow the inflammation to resolve, although more severe cases will respond to antibiotics. Generally, acute inflammation lasts from a matter of days to a few weeks and represents the initial finite stage of the healing process. However, if inflammation is maintained and does not progress to a natural healing resolution, it is referred to as chronic, or long-term, inflammation.

CHRONIC INFLAMMATION

Chronic low-grade inflammation (CLGI), also known as long-term inflammation or systemic chronic inflammation (SCI), can occur through unresolved acute inflammation or as an independent state on its own. Table 1 illustrates some causes of CLGI. It can occur where a substance causing the acute inflammation remains in the body, or as a result of a chemical toxin permanently being within a person's close environment. Some auto-immune conditions such as rheumatoid arthritis or lupus have low-grade inflammation as one of their features. In addition, lifestyle factors which increase the production of free radicals or other inflammatory mediators can be an aspect in the development or maintenance of CLGI.

Although chronic inflammation is a term relatively unknown to the general public, it is a feature of diseases such as heart conditions, obesity, cancer, diabetes, chronic respiratory conditions, and stroke that are responsible for the annual deaths of three out of every five people worldwide. In addition to death,

TYPE	FEATURES
Unresolved acute state	Failure to eliminate agent causing acute inflammation, such as infectious organism, fungi, protozoa, parasite
Exposure to irritant which cannot be eliminated	Foreign material such as industrial chemical which cannot be broken down
Auto-immune disorder	Immune system recognises part of the body as a foreign substance (rheumatoid arthritis, systemic lupus erythematosus)
Defect in inflammatory mediating cells	Auto-inflammatory disorder
Recurrent episodes of acute inflammation	Acute inflammation unresolved prior to onset of second episode
Oxidative stress and mitochondrial dysfunction	Production of free radicals, advanced glycation end products, uric acid crystals, homocysteine, oxidised lipoproteins

TABLE 1: Causes of chronic low-grade inflammation (data from Pahwa *et al* 2022)

chronic inflammation reduces the quality of life of more than 350 million people worldwide through joint disease such as arthritis (Pahwa *et al* 2022). Respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD), often seen in children and older adults respectively, can be exacerbated where CLGI is present.

How the body reacts to chronic inflammation

The chemical reactions which are a result of CLGI progress from the changes that occur in acute inflammation. Increased blood flow due to an expansion of vessels (vasodilation), and increased vessel permeability, is paralleled by changes to white blood cells. In acute inflammation, neutrophils migrate into an affected body area, but if the acute phase moves into a chronic stage, macrophages and lymphocytes begin to replace the neutrophils.

These different cells produce cytokines (proteins which affect the immune system), including Interleukin one and six (IL-1, IL-6), and tumour necrosis factor alpha (TNF-α). Importantly, the cytokines mediate inflammation, keeping the process active. Further, cytokines have an effect on the brain and can initiate changes such as sickness, behaviour and depression (Dantzer *et al* 2008).

In addition, there is an overproduction of C-reactive protein (CRP) that normally circulates at low levels and is produced by the liver in response to macrophage activity and circulating fat cells (adipocytes). The measurement for CRP is through a blood sample and expressed in milligrams per litre (mg/L), with optimal values being between 0.8mg/L and 3.0mg/L, although higher values are seen in later life. In acute inflammation, CRP values can increase to 5mg/L very quickly, i.e. within hours, and double every eight hours, peaking between 36 and 50 hours after the condition onset. Bacterial infection can see CRP levels as high as 100mg/L to 500mg/L.

With chronic low-grade inflammation, CRP levels may remain between 2mg/L and 10mg/L. High sensitivity C-reactive protein (hs-CRP) may also be used as a test, and its range is generally between 05mg/L to 10mg/L compared to a standard CRP test which typically measures in a range of 10mg/L to 1,000mg/L. Although more sensitive, and able to measure trace amount of CRP in the blood, hs-CRP is more often used clinically to analyse cardiovascular risk.

Another blood test which may be raised with inflammatory conditions is erythrocyte sedimentation rate (ESR). This classically measures the rate, expressed in millimetres per hour (mm/h), at which red blood cells drop in a standard (Westergren) tube. This, however, is a non-specific measure of inflammation, and a centrifuge test is commonly used to give a more rapid result. Where inflammation is present, red blood cells stick to each other more easily, and ESR will be higher 24-48 hours after condition onset. The level of ESR rises with age. From between the ages of 20 years to 90 years the optimal values for men are between 12mm to 19mm/h respectively, and for women between 18mm to 23mm/h (Pepys & Hirschfield 2003; Bray *et al* 2016).

Essentially, CLGI inflammatory factors in the blood are measurable at slightly higher levels than average, but still within a normal range. Local inflammatory factors seen in acute inflammation resulting from tissue damage or pathogenic invasion normally lead to resolved healing. These same factors, if unresolved, are associated with systemic chronic inflammation and can result in collateral body system damage (Furman *et al* 2019).

Several symptoms are associated with CLGI, but they can also be seen in other pathologies so are not specific to this condition. Pain in multiple body sites, chronic fatigue and insomnia, mood disturbances, low energy, gastrointestinal symptoms, skin changes, swollen lymph glands and frequent infections may all be seen in combination.

The risk demographic for chronic inflammation conditions

An increased bodyweight or body mass index (BMI) is often seen as a risk factor in the exacerbation of conditions such as arthritis of the weight-bearing lower limb joints. Typically, this is viewed through a biomechanical lens, with the suggestion that greater bodyweight increases joint loading and may drive symptoms.

However, the metabolic effect of obesity on inflammation must also be considered. Increased abdominal adipose tissue often observed in obesity leads to tissue hypoxia as the speed of enlargement of the abdominal region can exceed the tissue perfusion capacity of local blood vessels. In addition, adipocytes increase in size, filling with triglycerides, a change which shifts the cell fundamental characteristics (phenotype) to pro-inflammatory. The combination of low-oxygen availability of truncal fat and increased fat cell size leads to cell death (apoptosis), accelerating a local inflammatory reaction (Margioris *et al* 2013), which may be a significant factor in arthropathy.

Also relevant to rehabilitation is the fact that the ratio of white (metabolically inactive) to brown (metabolically active) adipocytes changes with obesity and exercise. Lean active individuals tend to have more brown fat cells. Additionally, obesity can increase transient postprandial inflammation due to the larger size of adipocytes (Blackburn *et al* 2006). White adipose tissue is typically found subcutaneously or within the trunk

> "INCREASED BODY MASS INDEX IS OFTEN SEEN AS A RISK FACTOR IN THE EXACERBATION OF CONDITIONS SUCH AS ARTHRITIS OF WEIGHT-BEARING LOWER LIMB JOINTS"

surrounding the viscera, while brown adipose tissue is found, in adults, within the paravertebral, axillary, and supraclavicular regions (Viranen *et al* 2009). Cells undergo programmed apoptosis when they reach a certain size, to maintain tissue homeostasis. This cut-off size is smaller in white adipocytes, and so triggers an earlier inflammatory response.

Interestingly, there is even a difference between white adipocytes found subcutaneously and those placed within the trunk, with the subcutaneous type being more resistant to apoptosis (Tchkonia *et al* 2005). General characteristics of white adipocytes include a single large fat lobule, few mitochondria, and storage of energy as triglycerides. They are typically found in high concentrations and are pro-inflammatory. Brown adipocytes have multiple small fat droplets, large numbers of mitochondria, a tendency to expend energy as heat and have an anti-inflammatory effect on cytokines (Margioris *et al* 2013).

With increasing age there is a general increase in inflammatory markers. Several factors may be of relevance to this change including free radical accumulation over a lifetime, increased visceral fat, reduced physical activity and co-morbidities such as diabetes. Whilst lifestyle factors such as diet and exercise have an anti-inflammatory effect, cigarette smoking lowers the production of anti-inflammatory chemicals. Cell senescence (cessation of cell division), combined with environmental factors and stress, build up over time. Immune cell phenotype alteration and increasing pro-inflammatory molecules, including cytokines, are commonly found in healthy seniors. Those free of chronic pathologies have a balanced increase in both pro- and anti-inflammatory chemicals, and it is the ratio between these two factors, rather than the amount of pro-inflammatory chemicals per se, that is important (Morrisette-Thomas *et al* 2014).

Additionally, sex hormones including testosterone and oestrogen suppress the production of pro-inflammatory chemicals, and lower sex hormone concentrations in later life may reduce this capacity. Emotional stress and sleep reduction is related to cytokine release, and poor sleep patterns are associated with CLGI (Pahwa *et al* 2022). In a systematic review of 72 studies, sleep disturbance and shorter duration sleep, i.e. < 7 hours per night, were both associated with higher CRP levels, whilst extreme long sleep duration, > 8 hours per night, was associated with higher levels of CRP and IL-6 (Irwin *et al* 2016). Sleep disturbance is not associated with age, but women may suffer a greater effect than men (Prather *et al* 2013).

Environmental and industrial toxins, and tobacco smoking, have also been cited as possible causes or co-factors of CLGI. Chemicals such as phthalates, polyfluorenes, bisphenols, flame retardants and aromatic hydrocarbons can promote inflammatory activity via oxidative stress or endocrine alterations beginning in utero (Furman *et al* 2019). Even prior to conception, paternal factors can have an epigenetic effect, transmitting risk for CLGI between generations, and programming the immune system prior to birth (Macpherson *et al* 2017). Additionally, exposure to a wide variety of microbes in early life lessens the likelihood of chronic inflammation in adult life, independent of socioeconomic status, current body fat level and other health behaviours (McDade *et al* 2010).

Dietary factors and CLGI

Several dietary factors are associated with reducing chronic inflammation and these are summarized in table 2. Use of a low-glycaemic index (GI) diet over 10 weeks has been shown to be associated with lower levels of CRP and IL-6 in obese adolescents (Rouhani *et al* 2016). Saturated fatty acids (SFA) are associated with higher levels of inflammatory markers (Bujtor *et al* 2021), as are trans fatty acids (TFA) also known as partially hydrogenated fats (Mozaffarian 2006). Monounsaturated fatty acids (MUFA) from nuts and seeds are associated with lower IL-6 levels, while omega-3 polyunsaturated fatty acids (PUFA) from oily fish have been shown to inhibit the activation of pro-inflammatory pathways (Calder 2015).

A diet higher in wholegrains and fibre (coarse grains) has been shown to favourably affect inflammatory biomarkers in obese children using a wholegrain diet over a six-week period (Hajihashemi *et al* 2014). Some studies have found an association between high intake of meat and dairy and inflammatory markers, but others have not. Diets high in refined grains, red meat, ultra-processed foods, trans fatty acids, and high-fat dairy typically found in a western diet have a positive association with pro-inflammatory markers (Khayyatzadeh *et al* 2018). Of the separate components found in these diets, the ratio of pro-inflammatory SFA intake to that of fats inhibiting the inflammatory response such as PUFA and MUFA may be significant (Bujtor *et al* 2021).

Sugar and sugar-sweetened beverages (SSB) are associated with obesity and Type-1 diabetes, but their direct link to inflammatory biomarkers is less clear. High SSB intake has been shown to be associated with increased CRP in young children, age three to 11 years, using a sample of 4,880 individuals. However, this was also associated with increased lipid profiles and waist circumference (Kosova *et al* 2013). A reduction of just 10% in body weight through use of a low-energy Mediterranean diet in obese females is associated with reduced plasma levels of cytokines (Esposito *et al* 2003), so weight loss may be a consideration in reducing CLGI.

Micronutrients including vitamins C, A, D, and E, beta-carotene, high levels of sodium, magnesium, zinc, selenium, polyphenols found in green and black tea, and curcumin found in turmeric have been linked to inflammatory conditions (Bujtor *et al* 2021; Pahwa *et al* 2022). Plant-derived flavonoids (naturally occurring polyphenols) have been used to modulate CLGI. Using a fruit / berry / vegetable juice powder TNF-α, CCL2 (monocyte chemoattractant protein), IL-1β, and reactive oxygen concentrations have been shown to significantly reduce CLGI over an eight-week period (Shiva Ayyadurai *et al* 2022), suggesting a possible alternative or adjunct to pharmacological management.

DIETARY FACTOR	EFFECT ON CLGI
Glycaemic index	Use of low glycaemic diet associated with lower levels of CRP. High sugar content of food associated with CRP levels in some studies
Fats	Saturated fatty acids and trans fatty acids associated with higher levels of inflammatory markers Omega 3 polyunsaturated fatty acids associated with lower levels of inflammatory markers
Mediterranean diet	Results in lower levels of C-reactive protein, interleukin 6 (IL-6) and tumour necrosis product alpha (TNF- α)
Fruit and vegetables	Colourful fruit and vegetables are often high in polyphenols and other anti-inflammatory compounds
Fibre	Both soluble and insoluble fibre lower IL-6 and TNF-α levels
Meat	Some studies show an association between high meat intake with raised IL levels
Nuts and seeds	Associated with lower risk of cardiovascular disease and diabetes
Whole / refined grains	Wholegrain intake associated with lower CRP and IL levels
Micronutrients	Vitamins D and E, zinc, selenium, and magnesium shown to either act as antioxidants, have anti-inflammatory effects or suppress inflammatory mediators
Other foods	Polyphenols in tea reduced CRP levels, curcumin from turmeric shown to reduce inflammatory disease in animal models

TABLE 2: Dietary factors in chronic low-grade inflammation (data from Bujtor *et al* 2021; Pahwa *et al* 2022)

CLGI in osteoarthritis

The pathogenesis of osteoarthritis (OA) is accelerated by several factors in CLGI, including an increased catabolic response of chondrocytes, and inflammation of the joint synovium associated with pain sensitisation (Scanzello 2017). Although not considered an inflammatory arthropathy like rheumatoid arthritis (RA), OA does have inflammation as part of its clinical picture. Synovial inflammation, instigating both joint swelling and pain, is found with mononuclear cell (MNC) infiltration, and production of pro-inflammatory cytokines including TNF-α is seen (Brooks 2003).

These cytokines, in turn, lead to the development of proteases and prostaglandins, together with matrix degrading enzymes. In parallel with inflammation and degradation, there is a reduction in the expression of joint lubricants, including lubricin and hyaluronic acid (Rahmati *et al* 2016). Chondrocytes are associated with the production of cytokines, nitric oxide (NO), prostaglandins, proteinases, and matrix metalloproteinases (MMPs), a group of matrix degenerating enzymes. These substances have a damaging effect by splitting type II collagen and accelerating cartilage degeneration (Goldring & Otero 2011). Activated synovial macrophages also drive inflammation, and NO that presents in the cartilage of OA patients is linked to cartilage chondrocyte apoptosis (Rahmati *et al* 2016).

As has been discussed, obesity can be related to CLGI through metabolic processes associated with adipocytes, and the mechanical factors related to obesity are also important in OA, especially when related to the knee. Chronic mechanical stress can also cause chondrocytes to produce degenerative enzymes. Intercellular signals through gap junctions may spread throughout several joint tissues, encouraging the release of MMPs and cytokines even in the presence of a low-level inflammation (Rahmati *et al* 2016).

CLGI in chronic pain

Chronic pain has been defined as a pain that lasts longer than it takes for damaged / pathological tissues to heal, i.e. for more than three to six months, and may be continuous or episodic in nature. Chronic primary pain cannot be directly explained by a pathology and is typically associated with psychosocial characteristics and functional impairment. Included within this pain category are conditions such as non-specific low back pain (NSLBP), fibromyalgia, and irritable bowel syndrome (IBS), where biological changes contributing to the creation of pain may not be present (Treede *et al* 2015). Zhou *et al* (2021) hypothesize that CLGI "may act as a functional link between chronic pain and psychosocial stress". Pathologies which can create chronic pain secondary to a defined pathology are shown in table 3.

Pro-inflammatory chemicals have been detected in both primary and secondary chronic pain patients, and anti-inflammatory cytokines are lower in patients without pain, and controls (Zhou *et al* 2021). In addition, injection of an immunogenic antigen, lipopolysaccharide, in healthy subjects has been shown to induce systemic inflammation and increase pain sensitivity, measured as pressure pain threshold, mechanical pain sensitivity, and cold pain sensitivity (Wegner *et al* 2014). As mentioned previously, ageing increases

PAIN AETIOLOGY	EXPLANATION
Cancer	Created by a tumour or metastases, or cancer treatment such as chemotherapy or radiotherapy
Post-surgical	Occurring after a surgical procedure
Post-trauma	Resulting from tissue disruption (e.g. burns)
Neuropathic	Lesion affecting the nervous system
Headache or orofacial	Primary and secondary headache, cranial neuralgia
Visceral	Pain perceived in the superficial body tissues which receive the same innervation as an internal organ
Musculoskeletal	Pain arising directly from bone, joint, muscle or a related soft tissue

TABLE 3: Sources of chronic secondary pain (data from Treede *et al* 2015)

> "PRO-INFLAMMATORY CHEMICALS HAVE BEEN DETECTED IN BOTH PRIMARY AND SECONDARY CHRONIC PAIN PATIENTS"

pro-inflammatory markers, and this parallels the incidence of chronic pain which is between 25%-50% in the general senior population, increasing to up to 83% in nursing home residents with cognitive decline (Cravello *et al* 2019). This figure is compared to between 7% and 22% in young adults.

Most parts of the nervous system are protected against circulating pro-inflammatory molecules, with only the nerve terminals and dorsal root ganglia resting outside barriers that protect the central nervous system, e.g. the blood brain barrier, blood nerve barrier, blood spinal cord barrier, the blood lymph barrier that protects the lymphatic system, and the blood retinol barrier protecting the eye.

In the main, they consist of endothelial cells and offer vascular permeability to balance the transport of materials into, and out of, the protected body regions. Several tissues, including the blood-organ barriers described, have signalling systems that do not require production of a membrane action potential, seen in nerve and muscle. Cells within barrier tissues form interconnected networks using gap junctions to transport small molecules between the cells.

Cellular examples important to the neuromusculoskeletal system include astrocytes, chondrocytes, osteoblasts, and synovial fibroblasts. Inflammatory chemicals can change cell signalling through the linked gap junctions by increasing permeability across the tissue barriers, leading to tissue dysregulation (Hansson & Skiöldebran 2015). Barrier breakdown has been identified as part of the pathological process in auto-immune diseases, multiple sclerosis (MS), age-related macular degeneration (AMD), neurodegenerative diseases, diabetic neuropathy, and inflammatory bowel disease (Ronnback & Hansson 2019).

CLGI in psychiatric conditions

Several psychiatric conditions are associated with increased pro-inflammatory markers including schizophrenia, post-traumatic stress disorder (PTSD), and bipolar disorder. In addition, both depression and anxiety are associated with CLGI, and antidepressant medication such as selective serotonin reuptake inhibitors (SSRIs) and serotonin and noradrenaline reuptake inhibitors (SNRIs) have been shown to produce some of their clinical effect by decreasing the release of pro-inflammatory mediators and increasing anti-inflammatory cytokines (Dionisie *et al* 2021).

The use of NSAIDS and cytokine inhibitors has been shown to be adjunctive to antidepressants and improve depressive symptoms when compared to placebo (Kohler *et al* 2014). However, not all subjects with psychiatric disorders show higher levels of pro-inflammatory serum chemicals, so subsets of patients may be identified who could respond to this type of intervention (Osimo *et al* 2018). The prevalence of low-grade inflammation (CRP > 3mg/L) in adult psychiatric inpatients was shown to be 32% for psychotic disorders, 21% in mood disorders, 22% in neurotic disorders and 42% in personality disorders (Osimo *et al* 2018). Additionally, elevated levels of maternal inflammatory markers in pregnancy are associated with a higher risk of developing schizophrenia as an adult (Canetta *et al* 2014).

Therapeutic interventions

Aiming therapy at a single painful joint may limit treatment effectiveness, given that systemic inflammation can be a part of the pathology of many musculoskeletal (MSK) pain related conditions. Lifestyle changes have an important part to play in preventing and / or managing low grade inflammation and so should be a consideration in the long-term planning of an overall care package, including the consideration of the dietary factors discussed in this article.

Exercise is an important component of many MSK treatment programmes and can have both direct (related to the injured body part) and indirect (systemic changes) effects on a condition. Muscle communicates with other tissues in the body not just through the nervous system, but through the release of myokines (a group of peptides including IL-6), establishing muscle as a secretory organ with endocrine functions (Pedersen & Febbraio 2008). Myokines influence several systems including cognition, fat, bone, muscle, skin, and endothelial cells. Additionally, myokines have important direct and indirect anti-inflammatory effects. Exercise induced IL-6 enhances lipolysis and fat oxidation, and the myokine Irisin may change white adipose tissue into brown (Severinsen & Pedersen 2020).

The production of anti-inflammatory cytokines is increased by IL 6. Starkie *et al* (2003) were able to show inhibition of subsequent TNF-α production in healthy subjects who, following a three-hour cycle ride, then ingested the endotoxin, E-coli bolus. Interestingly, the action of IL-6 on inflammation has been shown to be anti-inflammatory when it is produced by muscle, and pro-inflammatory when produced by adipocytes (Han *et al* 2020). Encouraging activity / exercise will, therefore, have effects not just on the individual body region treated. The anti-inflammatory effects detailed above, together with longer term changes in bodyfat and stress levels, will likely parallel reported changes in self-efficacy in chronic MSK and persistent pain conditions such as NSLBP (Norris 2020).

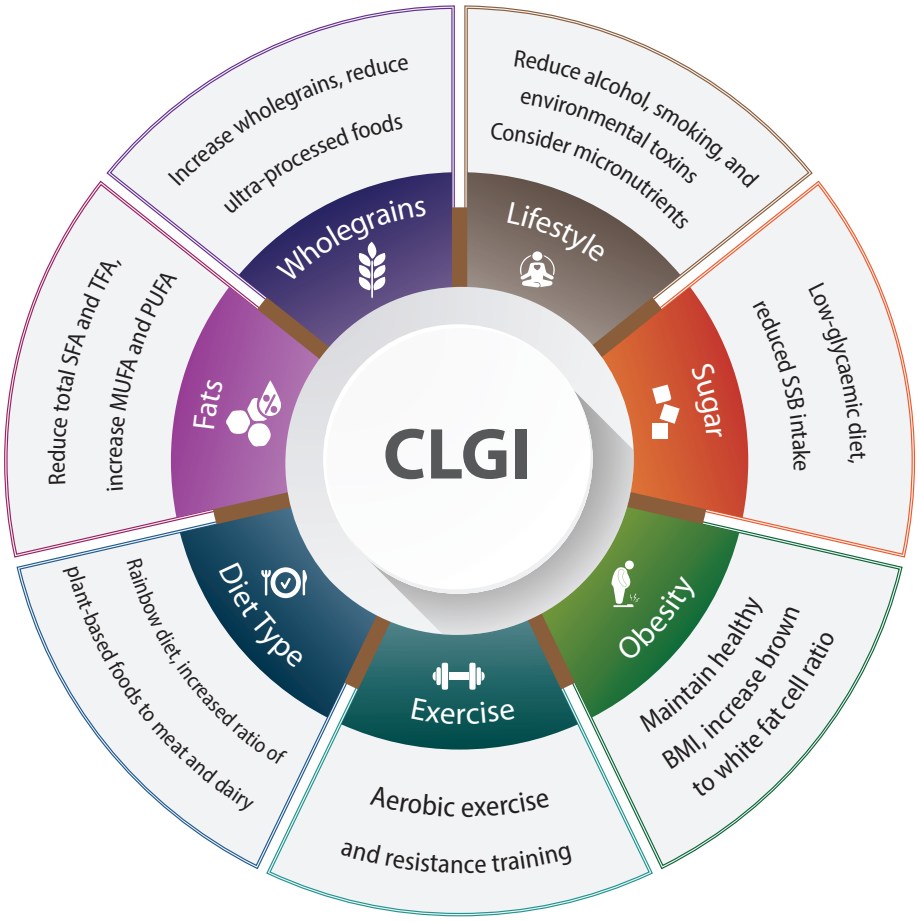

FIGURE 1: Non-pharmacological factors in the management of chronic low-grade inflammation

Common pharmacological management of CLGI can include the use of both corticosteroids such as prednisolone and dexamethasone, and NSAIDs such as aspirin and ibuprofen. These may be either localised via creams, drops, inhalers or systemic, e.g. taken as oral medication, injections, or intravenously. As with all drugs they can have side effects, so are often more useful for short- rather than long-term usage.

Additionally, disease-modifying anti-rheumatic drugs (DMARDs), such as the immunosuppressant methotrexate, or the aminosalicylate sulfasalazine may be used where chronic inflammation is part of a defined pathology, for example in RA, or in other auto-immune conditions such as spondyloarthritis (SpA), systemic lupus erythematosis (SLE), polymyalgia rheumatica (PMR) and gout. These will often allow the gradual reduction of steroids and NSAIDs. Statins such as simvastatin and atorvastatin, which are commonly used long-term for hypercholesterolemia, have also been shown to have an anti-inflammatory effect; directly by reducing CRP, and indirectly by lowering low-density lipoprotein (LDL) which is itself pro-inflammatory (Kim *et al* 2019).

Non-pharmacological interventions, mainly through diet and lifestyle factors, are summarised in figure 1, and should be considered as part of any MSK care package.

About the author

Christopher Norris has an MSc in exercise science and a PhD in spinal rehabilitation. He is the author of 13 books including *Sports and Soft Tissue Injuries* (5th ed, 2019) and *Back Rehabilitation* (3rd ed, 2023) both published by Routledge. He is an international lecturer and clinician, and has a private practice in Cheshire.

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References

Full details of all references in this article can be found by accessing our *In Touch* autumn edition online at **www.physiofirst.org.uk/resources**

A view from the Chair

Will AI technology replace physiotherapists?

Karen Lay Physio First Chairman

There has been much discussion recently on the rise of AI systems such as ChatGPT, and their use in many areas, including healthcare. New technologies can be both exciting and daunting and AI will have profound implications for the way we live and work.

So, could something like ChatGPT ultimately replace a physiotherapist?

ChatGPT's own response to this, as highlighted by Euan McComiskie in a recent *Frontline* article, is as follows:

"AI can augment and enhance the role of physiotherapists, but it cannot replace them entirely. The human touch, critical thinking and communication skills of physiotherapists are essential components of the care they provide, and these qualities cannot be replicated by AI."

Well, that's all right then! Although, I recall a presentation at a London conference 10 years ago on Education, Innovation and Technology, that speculated about the jobs of the future, with the implication that the jobs our children would end up doing had yet to be invented.

However, I think it is safe to say that, whilst AI technologies, with the appropriate safeguards in place, will be a useful and time-saving adjunct to physiotherapy, they will not ultimately replace us. Our skills of therapeutic touch, clinical reasoning and critical appraisal, alongside experiential learning and people skills, are a powerful combination, giving the ability to achieve profound change in our patients' lives. We know this instinctively, but how much better is it to be able to show these changes in outcomes by evidencing them and demonstrating our quality and value?

Our Physio First Data for Impact (DfI) and Quality Assurance kitemarks are being ardently discussed with the potential for profound changes that will both automate a lot of processes involved, thereby easing the burden of time for inputting data for our busy clinicians, AND enable patients to be far more involved in their health journey. This will assist us in evidencing our effectiveness and provide us with a useful tool for more detailed discussion with our patients in their goal achievement and our benchmarking.

OUR SKILLS OF THERAPEUTIC TOUCH, CLINICAL REASONING AND CRITICAL APPRAISAL, ALONGSIDE EXPERIENTIAL LEARNING AND PEOPLE SKILLS, ARE A POWERFUL COMBINATION

This development will have the potential to include a live dashboard to show the changes in our patients over their treatment time, and with reference to national averages for their condition and, in time, the prospect of comparison with the NHS recorded datasets; something that would be a powerful response to the suggestion of being replaced by an AI automaton, don't you think?

PPEF update

The PPEF Trustees were delighted to "meet" those who joined us online for our four Q&A sessions in preparation for applications for our Jubilee Award.

More than 100 people tuned into our Zoom events and we were overwhelmed with the amazing range of projects and subjects mentioned. Hopefully, we were able to provide answers to the diverse range of questions raised. At the time of writing, before the closing date for applications, the Trustees were looking forward to reviewing the applications. We want to thank everyone who took the time and trouble to attend our Q&A sessions and have completed applications for our award that will help the PPEF to meet our Objective of "the advancement of research and education in the field of physiotherapy for the benefit of the public".

Erratum

In our summer 2023 edition of *In Touch* (183), the article "The life and times of an ancient physiotherapist" by Brian Simpson stated that the Physio First accreditation scheme was the brainchild of Sue England. Sue has contacted us to advise that, although she was involved at the start of the scheme it was, in fact, Jean Kelly, then chair of the PPEF, who initiated it.

Skills Exchange
supporting our members and our profession

Our Physio First Skills Exchange initiative started as a recognition that our members, and the physiotherapy profession in general, were eager, following the period of the pandemic, to return to face-to-face networking and skill sharing, but perhaps in a different way to the "traditional" conference and lecture setting. With so much online learning available, we wanted to develop something that, in a safe space, connected our physiotherapy community of highly experienced, established members, and those who were newer to the profession, who might not only learn from experienced physios, but also offer their own insights into current thinking on treatment modalities. This article documents Physio First's journey towards an education tool that is developing into a benefit for our whole physiotherapy community.

In the beginning...

The idea for our Physio First Skills Exchange originated in discussions at our Executive and full committee meetings, on the next steps for our annual conference as we came out of the Covid-19 restrictions. Whilst our Physio First conference was always a well-received event, we found that we had to re-evaluate the format against a background of falling attendance numbers and a rise of online education resources; we needed to consider what would be of most benefit to our members.

This consideration also ran alongside the issues our members were experiencing regarding the recruitment of associates, and the lack of hands-on skills apparent in more recently qualified physios. We recognised that musculoskeletal (MSK) physiotherapy within the NHS was becoming ever more pressured, and it was clear that manual skills were not being practiced and were at risk of being lost.

From the analysis of data from our own DfI scheme, Physio First members know that patients value the wide range of tools we employ, and this includes our manual techniques, so the proposal was to link our community of experienced members, with new / recent graduates who might not have had a chance to learn practical, manual skills, so they could share knowledge with one another.

Our Education subcommittee, under the guidance of Susannah Solt, piloted a number of Skills Exchange events with universally encouraging feedback. This enabled us to refine and add to a "how to" toolkit to guide members to run an event in their local area and, with the generous support of PPEF, this has resulted in our Skills Exchange programme going "national".

What is Skills Exchange?

Our Skills Exchange events gather together groups of clinicians to discuss, practice, share and learn different approaches to patient treatment, with a strong emphasis on our manual therapy skills. Participants at each event work in two to four groups comprising of anywhere from four to eight people, with a facilitator who helps with the flow of the discussion and the practical elements. Each group considers the same case scenarios and groups are rotated to ensure that everyone has as wide a mix of experience as possible. At the end of the session, all participants get together for a summary chat that may include demonstrating a particularly interesting technique or exercise.

The ultimate aim for Skills Exchange is fun, social connection and informative content, and most include the availability of food.

Why a Skills Exchange?

As previously explained, Physio First was very aware that the opportunities to share and learn manual therapy skills was vastly reduced and, although we were re-evaluating our conference, we were still keen to host something that offered face-to-face connection

SKILLS EXCHANGE OFFERS THE OPPORTUNITY TO LEARN FROM OTHERS IN A SAFE, COLLABORATIVE SPACE

and networking. Skills Exchange, held regularly and nationally, also offered the opportunity for us to build on our supportive community of physios, who could take advantage of the "wins" that came with it, i.e. referrals to one another for specialisms, encouragement and sharing, getting to know other physios who might be interested in private work, opportunities to practice manual therapy with other physios and, most importantly, the chance to learn in a safe, collaborative space.

As many physiotherapy degree programmes are struggling to include manual therapy skills into their courses, students and junior physiotherapists are becoming less exposed to a skillset that we know is one of our most powerful tools in helping our patients to achieve their goals and that, in private practice, our patients often expect manual therapy to be part of their treatment. Formal education courses for physiotherapy tend to err on the passive, instructor-led model, rather than one of a shared environment. With Skills Exchange, our aim is to encourage members to utilise, experiment, learn from and share the skills we already have; and to know that there is never just one treatment approach for our patients.

For Physio First, Skills Exchange is also a huge opportunity to celebrate the many skilled physios and pool of clinical knowledge we have among our members, and to reach beyond our membership with a truly inclusive learning environment that provides prospects for networking and developing local connections.

THE OBJECTIVES OF SKILLS EXCHANGE

The development of our Skills Exchange has produced some clear objectives:

- To work in small mixed-experience groups of physiotherapists to consider a range of clinical scenarios
- To discuss and share clinical reasoning, treatment experience and ideas relevant to the scenarios, adding in assessment tools as needed
- To practice different hands-on treatment skills based on the scenarios and consider what other interventions might be appropriate
- To improve clinical outcomes / management of patients presenting with similar clinical presentations.

Photo from our Skills Exchange on 20 May 2023 in Dursley, Gloucestershire (courtesy of Jo Turner)

Who runs Skills Exchange?

Our Physio First Skills Exchange events are run by our members, with full support from our Education and Office teams. If you have a space big enough to accommodate two to four plinths that you can use in the evenings or at the weekend, you can host a Skills Exchange. Information on our Skills Exchange, including a video taken at one of our early pilots, can be found on our website **www.physiofirst.org.uk/events/skills-exchange**. We also provide every host with a Skills Exchange toolkit to guide you through the process, and an experienced member of our Physio First facilitator team will, where possible, be allocated to help support you in running the event on the day.

"… a very supportive environment – great to work and learn with other clinicians"

"Initially I felt very nervous with little MSK experience – the friendly facilitators and small group size put me at ease"

"Active participation, instead of just listening to a presentation… helped my confidence after lockdown"

Having attended one of our pilot events, Joanne Elphinston said:
"… I am so excited about the future of this concept … [physios] will find [Skills Exchange] rewarding way to connect with your peers, pass on your experience, learn new things, and be part of a vibrant and passionate community of practitioners"

… and from one of our hosts, Jo Turner:
"… [Skills Exchange] has a lot going for it; low cost, easy to organise, great for networking and increasing your clinical knowledge. Our team has requested another one"

Photo from our Skills Exchange on 1 July in Penzance, Cornwall (courtesy of Dominique Royle)

What do those who have already experienced Skills Exchange think?

The following is some of the feedback we have received from participants at our Skills Exchange events this year. More can be found on our website **www.physiofirst.org.uk/events/skills-exchange**.

Personally, as someone who has helped facilitate a number of our Skills Exchange events, I can happily confirm that they are great fun, open up opportunities to meet other local therapists, and make it easy to discuss patient scenarios and work through the different clinical reasoning approaches offered by each Skills Exchange participant. Every physio who attends has the opportunity to practice a variety of manual treatments and exercises and receive non-judgemental feedback on their techniques. In addition, our aim for Skills Exchange to support physio graduates, and newly qualified, less experienced physios in developing their confidence and manual therapy skills, also has the potential to help our own Physio First members with identifying suitable candidates when they are considering their own recruitment issues.

What can you do to be part of Skills Exchange?

To date, we have delivered around a dozen Skills Exchange events throughout the country; from Manchester to Penzance, and on a range of subject areas such as lumbar spine, and elbow, wrist and hand. We already have events confirmed for September and, with more events at the planning stage, we are confident that our Skills Exchange will be available to our members in all parts of the country.

Our aim is to develop this initiative further, to increase participation, and especially to encourage students to join us in order to help increase their exposure to manual skills. We are also looking at the possibility of expanding our Skills Exchange to incorporate mixed specialities, for example bringing neurology and MSK together.

You can help our Physio First Skills Exchange to become a known event for quality clinical learning, either by booking to attend one in your area at **www.physiofirst.org.uk/events/event-calendar** or, if there isn't one currently in your region, offering to host an event by contacting **minerva@physiofirst.org.uk.**

We would like to take this opportunity to thank PPEF for their support with this initiative, and we encourage our members to be involved and part of something that is exciting and unique in how it supports and nurtures our physiotherapy community.

KATIE KNAPTON
VICE CHAIR, PHYSIO FIRST

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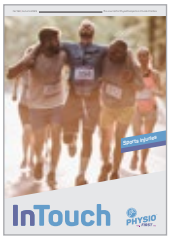

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