



ABSTRACT FORM

Poster presentation at the 1st Swiss Sports Med & Sportfisio Conference – Bern, BernExpo, Switzerland
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TITLE	The influence of riders physical fitness on riding performance: A cross-sectional study
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Introduction: Poor riding performance (RP) can be caused by medical issues of the horse and various other factors such as inadequate equipment or deficiencies in the training. The most neglected factor in current research is the physical fitness (PF) of the rider. The aim of this study was therefore to investigate the association between PF and RP.

Materials and Methods: 115 Swiss riders were assessed with regard to PF and RP. Seven domains of PF (balance, endurance, flexibility, reaction time, speed, strength, symmetry) were assessed by a physiotherapist. Based on a video recorded riding test individual RP was rated by two national riding judges (RJ). The riders' demographics were collected using an online-survey. A linear model for RP that included the domains of PF and potential confounders was fitted to the data. Inter-rater reliability of the RJ was investigated by calculating the intraclass correlation coefficient. Significance level was set at $P < 0.05$.

Results: Inter-rater reliability of RJ was judged to be "good" to "excellent". Endurance, strength, and symmetry were positively associated with RP, whereas flexibility was negatively associated. The model explained 19.1% of the variance in RP. The effects of all the domains were significant ($p < 0.05$) with the exception of symmetry. No association with RP was found for the balance, speed, and reaction time.

Conclusion: Findings suggest that PF is positively associated the RP. PF training should therefore be included in current training concepts. Future research should investigate whether similar conclusions could be drawn with regard to juniors and top athletes.

TITLE	Skin surface temperature profiles across rugby union playing positions following different cryotherapy modality exposures.
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Introduction
Characteristics vary between playing position in rugby union, demonstrating a diverse range of physical attributes. The relationship between adipose thickness and required cooling application suggests an adjustment to duration is required to produce deep tissue cooling. Differences between modality efficiency are unknown when comparing application across playing positions. In deliberation of the diverse physical traits of rugby union and the known interference adipose tissue has on the ability to cool deeper tissues, evidence is required to understand modality effect in order to provide optimum outcomes post-injury in this population.

Materials and Method
21 healthy male rugby union players volunteered to take part. Wetted Ice, Crushed Ice or CryoCuff[®], were applied for 20-minutes over the anterior thigh. Participants were randomised to application, receiving all three, separated by 7 days. Skin surface temperature (T_{sk}) was measured via thermal imaging (ThermoVision A40M, Flir Systems, Danderyd, Sweden) alongside Thermal Comfort and Sensation questionnaires.

Results
Significant differences noted ($P < 0.05$) in T_{sk} for all modalities in the ability to cool within therapeutic range compared to baseline. Significant differences reported in T_{sk} post between modalities for whole group ($P = 0.01$). Significant differences noted between forwards and backs playing position when comparing all three modalities ($P < 0.05$). Thermal Comfort and Sensation response scores demonstrated significant changes baseline compared to post for all three modalities ($P < 0.05$).

Conclusion
In order to achieve desired physiological responses to cooling, optimum cryotherapy protocols in rugby union populations should consider the notable differences occurring in T_{sk} between modalities across whole team and positional factions.

TITLE	The effect of knee joint cooling on quadriceps concentric muscle strength: considerations for application.
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Introduction
Cryotherapy is used in sport for the management of injury, however the effects on concentric strength appears contradictory when considering the effect of joint cooling distal to the anterior thigh. The effect of knee joint cooling therefore on quadriceps concentric muscle strength will provide considerations for use in practice.

Materials and Methods
Fourteen healthy male participants (age 20.24±1.51 years; body mass 80.34±11.34Kg; height 179.45±6.59cm) received 800kg of crushed ice applied over the anterior knee for 20-minutes. Concentric quadriceps muscle strength using an isokinetic dynamometer measured concentric peak (PKT) and average torque (AvT) strength at pre, immediately and 20-minutes post-intervention. Skin surface temperature (T_{sk}) were measured with a handheld thermometer at the patella at the same timepoints.

Results
Significant main effects reported for PKT, for time post-ice application ($P = 0.02$, $\eta^2 = 0.161$). Post-hoc revealed pre-ice application PKT significantly higher ($P < 0.003$) than all other timepoints. Quadratic regression revealed a strong correlation ($r = 0.82$), displaying a minima of 17.28-minutes and maxima of 34.56-minutes post ice application. AvT post-ice application demonstrated significant main effects for time post-ice application ($P = 0.03$, $\eta^2 = 0.152$). Post-hoc revealed pre-ice application PKT significantly higher ($P < 0.005$) than at all other timepoints. Quadratic regression revealed a strong correlation ($r = 0.80$), displaying a minima of 18.38-minutes and maxima of 36.76-minutes post ice application. T_{sk} reduced significantly, immediately post intervention ($P < 0.05$) without returning to baseline measures at 20-minutes post ($P < 0.05$).

Conclusions
Strength parameters are not fully recovered at 20-minutes post ice application on the knee, these findings have potential implications for participation in activity immediately following ice application.

TITLE	Comparison of neuromuscular hamstring activity of people with acute anterior cruciate ligament rupture and at one-year follow-up – a pilot study.
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Introduction
Rupture of the anterior cruciate ligament (ACL) has direct impact on passive and active knee stability and specifically stretch reflex excitability, associated with "giving-way" episodes. Moreover, strength and functional performance are reported to be altered up to several years post-injury. This pilot study aimed to gain more insight in restoration of hamstring reflexes and muscle activity during stair descent and artificially induced tibia translation over time.

Materials and Methods
Nine participants with isolated ACL-rupture were measured three weeks after injury and one year later. They descended from a six-step stairway (10 trials), and hamstring stretch reflexes were elicited (30 trials per extremity) by artificially induced tibia translation in standing position. Electromyographic activity of the biceps femoris (BF) and semitendinosus (ST) muscle were recorded. Normalised root mean square values were calculated in four timeframes (preactivation, short, medium and late latency response).

Results
Neuromuscular activity of the hamstrings revealed statistically significant differences between the participants' injured and intact knee at baseline and follow-up. Reflex activity in ST was found to be 27.41% higher in participants' deficient knee at baseline. No differences were found in BF and ST activity in any timeframe comparing baseline with follow-up.

Conclusion
Altered hamstrings reflex activity in acute ACL patients and one year later imply compensatory mechanisms of ACL synergists. One year of standard rehabilitation did not change hamstrings activity significantly. Since neuromuscular training has proven to enhance reflex activity and functional stability, results underline the special importance of neuromuscular training contents in ACL rehabilitation.

TITLE	Outcome and Return to Sports in Haglund-Deformity: Haglund-Resection versus Kelly-Keck Osteotomy – comparison of cohort
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Introduction: Haglund deformity including bony Haglund exostosis, subachilleus bursitis and insertional tendinopathy of the achilles tendon is frequent in sports, most of all in long distance runners and ice hockey players. For surgical correction of Haglund deformity, two techniques are described: Resection of the Haglund-exostosis (HER) and Kelly-Keck osteotomy (KKO) of the calcaneus. So far, no study has compared both techniques.

Methods: 22 patients (mean age 45yrs, mean follow-up time: 4.0 yrs) were compared in two cohorts (12, resection; 10, osteotomy) and analyzed blinded with regards to a) return to sport level and return to sport time, b) patient satisfaction and clinical result, c) functional result (isokinetic strength measurement of the calf), and d) ultrasound imaging (hMSUS) of the achilles tendon and heel region.

Results: Return to sport activity (4.7 vs 11.0 weeks, $p < 0.001$) and return to running (15 vs 26 weeks; $p = 0.04$) were significantly faster in the HER group. Even return to professional sports level was achieved in most of the athletes. Satisfaction rate was 83.6% in the HER and 90% in the KKO group. Minor complications such as wound healing problems were found in 27.3%. In one patient (4.5%), dislocation of the calcaneal fragment was found due to a fall (KKO group). Plantarflexion strength was significantly reduced for 30°/sec and for 120°/sec in KKO patients ($p = 0.02$). In the KKO group, also the range of motion was significantly reduced to the contralateral side. In Ultrasound, no recurrence of subachilleus bursitis was found. HER group showed significant changes and scar formation due to the surgical site. 12.5% of patients showed tendon thickening as signs of tendinopathy.

Conclusion: Both techniques lead to high success and satisfaction rates. For elite level athletes, one should bear in mind that KKO might lead to biomechanical changes of the hindfoot including loss of plantarflexion strength.

TITLE	FUNCTIONAL ASSESSMENT OF NEUROMUSCULAR CONTROL DEFICIT IN THE FEMOROACETABULAR IMPINGEMENT SYNDROME
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INTRODUCTION
Recent research has shown impairments in hip muscle strength in patients with FAI (Femoroacetabular Impingement) syndrome. The purpose of this study was to investigate whether FAI syndrome was associated with a decreased of lower limb neuromuscular control.

MATERIALS AND METHODS
This study was composed of 24 athletes. Participants were divided in a FAI symptomatic group and a match control group. Lower limb neuromuscular control was evaluated by two functional tests: the single leg squat (SLS) and the simplified version of SEBT (Star Excursion Balance Test).

RESULTS
Analysis of the apparent hip adduction during the SLS showed a statistical difference between i) the FAI symptomatic hip group and the control group ($10.39^\circ \pm 5.84$ vs. $4.22^\circ \pm 3.81$, $p = 0.014$) and ii) the FAI contralateral non symptomatic hip group and the control group ($9.52^\circ \pm 5.75$ vs. $4.22^\circ \pm 3.81$, $p = 0.035$). The knee valgus did not show significant differences ($p = 0.057$). The functional performance during the simplified version of SEBT indicated a significant difference ($p = 0.015$) between the symptomatic limb (84.07%) and the control group (92.1%).

CONCLUSION
Results demonstrated a neuromuscular control deficit in the symptomatic lower limb mainly localized in the hip joint associated with a decreased stability also in the contralateral hip. Assessment of neuromuscular control could be of interest, an impairment of this one could increase the risk of hip position inducing impingement. This information is important for counselling athletes with hip abnormalities in order to propose them a prevention program to improve neuromuscular control.

TITLE	Vestibular and optokinetic responses in post-concussive syndrome
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Introduction
Post-concussive syndrome (PCS) is a medical condition occurring in patients presenting a constellation of non-specific post-traumatic symptoms that persist beyond the expected time frame for clinical recovery (i.e., 10-14 days). Reports of dizziness and nausea are common in PCS and may have different origins. Often patients specifically report increased sensitivity to visually induced motion sickness. In this study we focus on the central processing of visual and vestibular stimuli, evaluating whether rotatory chair testing can provide indications to objectify the reported symptoms.

Material and Methods
Using a rotating chair surrounded by a full-field optokinetic drum, 49 PCS patients were exposed to: 1) angular velocity steps in darkness (60°/s for 90s) to quantify gain and time constant of the vestibulo-ocular reflex (VOR); 2) sustained optokinetic stimulations (50°/s for 30s) to evaluate gain and time constant of the afternystagmus (OKAN). Two repetitions of both tests were performed, changing the stimulus direction. Eye movements were recorded with video-oculography.

Results
OKAN time constants in PCS patients (median[MAD]: 16.7[5.1s]) were significantly larger ($p < 0.01$) than in healthy subjects from published normative databases (10.9[2.5]s). No differences were observed for the other parameters.

Conclusion
An increase in the OKAN time constant is observed in PCS patients. The emerging evidence of a correlation between visual motion sensitivity and OKAN time constant in healthy subjects suggests a similarity between PCS and visual motion sensitive individuals. Our findings therefore propose a novel way to objectify visual-induced motion sickness in PCS patients and support possible therapeutic approaches derived from motion sickness desensitization research.

TITLE	Evaluation of sport specific adaptations at the shoulder joint and core stability among elite female volleyball players with and without overuse related shoulder problems
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Introduction: Shoulder problems are common in overhead athletes and associated with sport-specific adaptations at the shoulder joint. Yet published values outlining the differences between symptomatic (S) and non-symptomatic (nS) overhead athletes, and indicating the degree of risk for shoulder injuries, vary widely. It is also thought that symptomatic athletes may overload the shoulder girdle in an effort to compensate for insufficient core musculature.

Materials and Methods: Sixty elite female volleyball players with and without overuse related shoulder problems were examined. Passive shoulder ROM in IR and ER, isometric strength of shoulder IR and ER, scapular control and core endurance were measured. Side, group and subgroup comparisons were made and correlations between core stability and ER strength deficit, strength ratio ER/IR and scapular dyskinesis were described.

Results: All players showed significant adaptations in ROM, strength and scapular control of their dominant shoulder (Ds). Players in the S subgroup had significantly weaker IR strength than nS players (mean difference, 7 N; 95% CI, 0.54 to 13.05; $P \leq .034$; $r = 0.295$) and tended to have ER strength deficit. In addition, the lower the ER strength deficit, the better the core endurance in the side plank position (Ds: $r = 0.30$; 95% CI, 0.11 to 0.53; $P \leq .035$).

Conclusion: Elite female volleyball players showed typical sport-specific adaptations at their Ds. The level of adaptations did not differ between S and nS players, except for those S players without previous shoulder surgery/pathology; they were weaker in IR strength.

TITLE	Effect of activity trackers on weight reduction and movement behavior of overweight adults A systematic literature review
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Introduction: Overweight is a growing, serious and widespread health problem. Possible conservative therapy strategies include changes in nutrition, movement and behavior. Fitness or activity trackers, which are a growing market nowadays, are one possibility to support behavior change in the above-mentioned areas. This systematic literature review aimed at investigating the effect of activity trackers concerning weight reduction and behavior change for physical activity in obese adults.

Materials and Methods: The systematic literature search was done in the databases PEDro, Ovid, Embase, Google Scholar and PubMed. Controlled studies reporting interventions with activity trackers in adult participants (age 18 and over) with a body mass index (BMI) of 25 kg/m² or above were included. The quality of studies was analyzed with the Cochrane Risk of Bias tool.

Results: Initially, 1181 studies were found. Of those, eight prospective, controlled and randomized interventional studies of different methodological quality could be included. In total, 1040 participants who met the inclusion criteria could be analyzed. In two of the eight included studies, a significant difference in favor of the intervention group was found. However, no significant group differences were found regarding movement behavior for the outcome „physical activity“.

Conclusion: The use of activity trackers is especially recommended for weight reduction purposes. However, due to limited comparison of the results, it remains unclear whether activity trackers implemented in physiotherapy positively influence behavior changes in physical activity. Further research should include recommendations regarding the duration of interventions, accompanying interventions and type of activity trackers.

TITLE	Artificial Intelligence-based training and recovery monitoring among competitive swimmers
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Introduction
Even if the benefits of training monitoring are now well recognized, monitoring systems rely most of the time on a few parameters and are based on the assumption that the interrelation between data is linear and deterministic. However, in training science, interrelations between variables are mostly of nonlinear character calling for analysis method like Artificial Intelligence (AI).
To propose an innovative AI-based monitoring system of several training and recovery parameters assessed regularly during 26 weeks of a swim season.

Materials and Methods
38 swimmers have daily filled these parameters in a web platform. We projected different parameters combinations on three-dimensional Euclidian space, constructing separation hyperplanes representing a positive and a negative predictive performance area.

Results
The separation hyperplanes accurately discriminate improvement vs non-improvement for the 5 tested parameters combinations. While graph patterns could be pretty different from a swimmer to another, there is probably no one-size-fits-all parameter to track. In all likelihood some parameters would be more important for a given athlete, while another athlete should monitor different ones. However, internal training load metrics seem to be generally more related to improvement/non-improvement than external training load.

Conclusion
This training monitoring system should be able to predict at any week during the whole season if a swimmer is located in the positive or in the negative predictive area of performance. Moreover, it should indicate athletes and coaches which parameters can be modified in order to reach the positive predictive performance area.

TITLE	The effectiveness of multicomponent lower extremity injury prevention programs in team-sport athletes. An umbrella review
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ABSTRACT

Objective To identify which exercise combinations are most effective as part of a lower extremity injury prevention program for team-sport athletes.

Design Umbrella review.

Data sources A comprehensive literature search was performed in PubMed, Scopus, Cochrane Library and PEDro databases. Studies published between January 2000 and March 2017 were included in this umbrella review.

Study eligibility criteria Moderate- to high-quality systematic reviews that investigated the effectiveness of a combination of two or more exercise components, i.e. strength, agility, plyometrics, balance, stretching, technique, warm-up and functional activity, regarding injury incidence/rate of lower extremity injuries in team-sport athletes. The methodological quality of the included systematic reviews was independently assessed by two reviewers using the Assessing the Methodological Quality of Systematic Reviews (AMSTAR) measurement tool and the Grading of Recommendations Assessment, Development and Evaluation (GRADE) guidelines was used to assess the overall quality of evidence for particular outcomes.

Results Twenty-four systematic reviews met the inclusion criteria. Multicomponent exercise interventions were effective in reducing the injury incidence/rate of lower extremity, knee, anterior cruciate ligament (ACL) and ankle injuries, but not groin injuries. Strength and balance exercise components were included in ten of eleven effective injury prevention programs for the lower extremity, knee, ACL and ankle injuries.

Summary/conclusion Lower extremity injury prevention programs in team sports are effective in preventing lower extremity, knee, ACL and ankle injuries. Lower extremity muscle strength and balance exercises should be prioritised in lower extremity injury prevention programs for team-sport athletes.

TITLE	Exercise therapy for the non-surgical management of femoroacetabular impingement syndrome: preliminary results of clinical effectiveness and imaging predictors
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Introduction: To investigate the effectiveness of exercise therapy for femoroacetabular impingement (FAI) syndrome, and differences in hip function, strength and morphology between responders vs. non-responders to therapy.

Materials and Methods: Patients with FAI syndrome underwent 12 weeks of standardized and progressive exercise therapy. Good therapy outcome (responders) vs. poor therapy outcome (non-responders) was determined at week 18 using the Global Treatment Outcome. Hip function was evaluated using the Hip Outcome Score (HOS) activities of daily living (ADL) and Sport at baseline, week 6, 12 and 18. Hip muscle strength and dynamic pelvis control were evaluated using dynamometry and video analysis, respectively, at baseline, week 12 and 18. Hip morphology was evaluated with imaging at baseline.

Results: A total of 31 patients (mean age: 24 years) were included. Sixteen patients were responsive and 15 were not responsive to exercise therapy. Only responders improved HOS ADL and HOS Sport by 10 (95% CI: 7 to 14, $p < 0.001$) and 20 points (95% CI: 15 to 25, $p < 0.001$), respectively, and hip abductor strength by 0.27 Nm/kg (95% CI: 0.18 to 0.36, $p < 0.001$). The prevalence of patients showing good dynamic pelvis control only increased in responders (44%, $p = 0.029$). The prevalence of severe cam morphology was higher in non-responders than responders (40% vs. 6%, $p = 0.043$).

Conclusion: Half of patients with FAI syndrome benefits from exercise therapy at short term. Responsiveness to hip abductor strength and dynamic pelvis control improvements is associated with good therapy outcome, whereas the presence of severe cam morphology is associated with poor therapy outcome.

TITLE	Management of acute adductor strains in ice hockey players with three eccentric exercises: a case series
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Introduction: In ice hockey hip adductors injuries are the most common non-contact injuries and represent the second cause of absence from competitions. Moreover, the re-injury rate has been reported to be 23.5%. During skating, the hip adductors are required to contract eccentrically, reaching their maximum length and also their peak activation. A rehabilitation program that restores eccentric strength at long muscle length, therefore, may be beneficial, as demonstrated for hamstring injuries in running-based sports. Accordingly, the purpose of this case series is to describe the conservative management of elite ice hockey players after acute hip adductors injury.

Materials and methods: 14 elite ice hockey players, diagnosed with acute adductors strain, were treated with three different exercises from day 3 after injuries. The exercises were intended to emphasize the eccentric stimulus at long muscle lengths. A modified Copenhagen hip adduction exercise was used to test the ability of the players to return to train.

Results: The mean return to play time was 11 days (range 7-19 days). On average, injured athletes missed 4 games (range 3-7 days). During the 6-18 months follow-up no re-injury was observed.

Conclusion: A conservative management that include early eccentric loading at long muscle length, as described in this case series, may be of clinical importance when managing elite hockey players with acute adductors strain.

TITLE	Effect of heel raises and ankle plantar flexors isokinetic fatiguing protocols on running economy in recreational runners.
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Introduction

The calf muscles contribute to a great extent to propulsion and shock attenuation during running. Gait patterns alterations due to ankle plantar flexors fatigue often result in increased injury risk and performance failure. Running economy (RE) is the steady-state oxygen uptake related to a specific velocity and constitutes a functional parameter which is influenced by biomechanical alterations. The aim of the study was to assess the effect of 2 calf muscles fatigue protocols on RE in recreational runners.

Methods

18 recreational runners (8 females and 10 men, 28.3±6.8yrs, 69.9±11.7kg, 174.7±9.5cm) randomly performed two ankle plantar flexors fatigue protocols (Heel raises at 0.5Hz (HR) and isokinetic repetitions at 30°/s (ISOK) to exhaustion) separated by two days rest. Before and after each protocol RE was measured at two sub-threshold speeds (8 and 10km/h for women, 10 and 12km/h for men).

Results

The subjects performed 37.0±8.9 and 100.0±56.5 repetitions of HR and ISOK respectively. RE did not change significantly between pre- and post-fatigue protocols: +2.0% and +0.1% after HR and -1.6% and -4.9% after ISOK at low and high speeds.

Conclusion

Fatigue protocols to exhaustion using heel raises or isokinetic contractions did not result in RE alterations in recreational runners. These findings may be of interest in rehabilitation in the view to implement plantar flexors strengthening or fatigue programs without any risk of altering running economy.

TITLE	The effect of the multidirectionally unstable shoulder on the kinetic chain and effects on the musculoskeletal apparatus
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Introduction:

The multidirectional unstable shoulder (MDI) is an elusive subject, as much for patients as for professionals. Despite various studies, the diagnosis has hardly changed since Neer and Foster (1980). One reason is the broad and elusive nature of the highly variable symptoms about the shoulder, as well as in other anatomical locations. A potential explanation for this lies in the concept of the kinetic chain (KC), which describes the transmission of force in the body. The hypothesis of this study is that MDI causes an interruption of the KC, which causes a loss of power in the periphery.

Methods:

Five people with clinical and radiological unilateral MDI will be measured by their force of the lower extremity. To obtain objective results, we choose the lower extremity to be as far away from the shoulder as possible and the force is measured using Biodex and force plate. To strengthen the measurements and to test whether the KC can be closed immediately, a second measurement with tape stabilization of the shoulder is performed. The measurement personnel are blinded.

Results:

The multidirectional instability of the shoulder has an effect on the kinetic chain with potential secondary effects on the function of the musculoskeletal apparatus.

Discussion:

Including the kinetic chain into addressing MDI allows the explain some of the more elusive symptoms of the disease. It also means that new ways to assess for MDI should be considered. Also, other chronic, seemingly recalcitrant musculoskeletal problems may be found to trace back to MDI.

TITLE	Prävalenz von unbekanntem, asymptomatischen kardialen Pathologien bei stellungspflichtigen Schweizern
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AFFILIATIONS	Armeestab Sanität, Rekrutierungszentrum Aarau

Einführung: Im Rahmen der für Schweizer Männer obligatorischen militärischen Aushebung wird u.a. bei jedem Stellungspflichtigen ein 12 Kanal Ruhe EKG durchgeführt. Dabei geht es, genau wie in der Sportmedizin, um die Früherkennung von bisher asymptomatischen bzw. nicht bekannten Pathologien, welche im Rahmen erhöhter körperlicher Belastung im Extremfall fatal sein können.

Methodik: In der Periode vom 01.02.2017 bis zum 30.04.2018 wurden am Rekrutierungszentrum Windisch 10779 Stellungspflichtige aus den Kantonen Aargau, Basel Stadt und Basel Land, Luzern, Ob- und Nidwalden, Solothurn und Uri untersucht. Jedes entsprechende EKG wurde von einem oder mehreren militärmedizinisch erfahrenen Ärzten begutachtet; im Zweifelsfall wurde ein Facharzt für Kardiologie beigezogen.

Resultate: Insgesamt zeigten 32 Elektrokardiogramme Auffälligkeiten und wurden kardiologisch weiter abgeklärt. Dabei handelte es sich um T-Negativierungen (14), Rhythmusstörungen (5), Schenkelblockbilder (5), WPW Syndrome (4), QT-Zeit-Verlängerungen (2) sowie ST-Senkungen (2). In insgesamt 7 Fällen wurde bisher eine kardiologische Behandlung notwendig bzw. hatte die Auffälligkeit einen direkten Einfluss auf die militärische Tauglichkeit (zum Zeitpunkt der Verfassung des vorliegenden Abstracts war in weiteren 6 Fällen eine abschliessende Beurteilung noch nicht möglich).

Schlussfolgerungen: Die Zahl der relevanten identifizierten Pathologien entsprach somit in etwa den Erwartungen vor Studienbeginn (0,1%). Aus unserer Sicht konnte damit klar gezeigt werden, dass das Ruhe EKG im Rahmen der militärischen Rekrutierung einen wichtigen Beitrag in der Prävention der kardialen Mortalität bei jungen Schweizer Männern leistet. Es sollte nach Möglichkeiten gesucht werden, wie dieser effiziente Untersuchung vermehrt auch der jungen weiblichen Bevölkerung zugänglich gemacht werden kann.

TITLE	Effect of heel raises and isokinetic fatigue protocols on ankle plantar flexors maximum voluntary contraction in recreational runners.
AUTHOR(S)	Klopfenstein A ¹ , Marchand P ² , Salvador M ³ , Gojanovic B ² , Fouchet F ² .
AFFILIATIONS	¹ Faculty of Medicine, University of Lausanne, Switzerland ² Swiss Olympic Medical Center, Hôpital La Tour, Meyrin/Genève, Switzerland ³ Institut des sciences du sport, Université de Lausanne, Switzerland

Introduction

The posterior lower leg region is often affected by overload injuries in runners. These pathologies are usually related to overuse and/or fatigue. Muscle fatigue is described as a decrease in the maximal force or power that muscles can produce soon after the onset of a sustained physical activity. The aim of this study was to assess the effect of 2 fatigue protocols on maximal voluntary contraction (MVC) in runners.

Methods

18 recreational runners (8 females and 10 men, 28.3±6.8yrs, 69.9±11.7kg, 174.7±9.5cm) randomly performed two calf muscles fatigue protocols (Heel raises at 0.5Hz (HR) and isokinetic repetitions at 30°/s (ISOK) to exhaustion) separated by two days rest. Protocols ended when subjects performed 3 consecutive repetitions with less than 50% of the maximal height for HR or less than 50% of MVC for ISOK. Before and after each protocol the ankle plantar flexors mean and maximum MVCs over 3 repetitions were recorded using a hand-held-dynamometer.

Results

The subjects performed 37.0±8.9 and 100.0±56.5 repetitions of HR and ISOK respectively. There were neither significant changes for HR and ISOK in mean MVC (-1.3% and +0.8%, p>0.05) nor in maximum MVC (-2.2% and -0.5%, p>0.05) between pre- and post-fatigue protocols.

Conclusion

Fatigue protocols to exhaustion using heel raises or isokinetic contractions did not result in MVC decrease in runners. It is assumed that fatigue is task specific in terms of contraction mode and contraction regimen (fatigue protocol in concentric/eccentric mode and resistance regimen vs. assessment in isometric mode and force regimen).

TITLE	Strength and range of movement deficits are associated with symptom severity in people scheduled for hip arthroscopy: A cross-sectional study
AUTHOR(S)	Matthew Freke, PT, M Phty st ¹ , Joanne Kemp, PT, PhD ² , Kay Crossley, PT, PhD ³ , Kevin Sims, PT, PhD ² , Trevor Russell, PT, PhD ² , Adam Sencow, PT, PhD ² .
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Introduction: Identifying the physical impairments associated with worse symptoms and greater functional limitations in people with hip pain could enable targeted rehabilitation programmes designed to improve quality of life. The objective of this study was to compare physical characteristics between subgroups of symptoms and functional limitation severity in individuals with hip pain scheduled for arthroscopic surgery.

Materials and methods: Hip range of motion (ROM) and muscle strength were measured in 114 individuals (48 women; aged 32 ± 8 years) with hip pain scheduled for hip arthroscopy. Pain and disability were measured with the International Hip Outcome Tool (iHOT33) subscale of Symptoms and Functional Limitation and a cluster analysis was used to identify mild, moderate and severe subgroups. Between-group differences were then evaluated using multivariate analysis of covariance, including sex as a covariate, followed by post hoc testing. Significance was set at 0.05.

Results: Lesser hip muscle strength in all directions was reported in the severe symptoms and functional limitation group compared to the mild group. Hip flexion ROM differed when comparing the moderate to both the mild and severe subgroups. Hip internal rotation did not differ between subgroups of severity.

Conclusion: Individuals with hip pain and severe scores in the iHOT33 subscale of symptoms and functional limitations present with significantly lesser hip muscle strength and hip flexion ROM than individuals with moderate or mild scores. Targeted programmes to improve hip strength and flexion ROM in more severe patients may help reduce symptoms and improve function.

TITLE	HOW DO PHYSIOTHERAPISTS ASSESS AND MANAGE GREATER TROCHANTERIC PAIN SYNDROME? - AN INTERNATIONAL SURVEY
AUTHOR(S)	French HP ¹ , Grimaldi A ^{2,3} , Woodley S ⁴ , O'Connor L ¹ , Fearon A ⁵
AFFILIATIONS	¹ School of Physiotherapy, RCSI, Ireland; ² Physiotec Physiotherapy, Brisbane, Australia; ³ School of Health and Rehabilitation Sciences, University of Queensland, Brisbane, Australia; ⁴ School of Biomedical Sciences, University of Otago, New Zealand; ⁵ UCRISE Faculty of Health, University of Canberra, Australia.

Background: Greater trochanteric pain syndrome (GTPS) causes recurrent, disabling pain over and around the greater trochanter. It has an incidence of 1.8/1000, is more common in older women than men and affects work participation and quality of life. Although physiotherapy is commonly employed for GTPS, there is no consensus on optimal treatment. This study aimed to establish current physiotherapy practice in assessment and management of GTPS and identify preferred methods for updating knowledge on GTPS management.

Materials and Methods: A cross-sectional anonymised online survey of registered physiotherapists in Ireland, Australia and New Zealand was conducted, following ethics approval.

Results: A total of 361 physiotherapists provided valid responses. Physiotherapists in Ireland, Australia and New Zealand approach GTPS diagnosis and treatment similarly. With respect to diagnosis, lateral hip pain with loading or sidelying were the most useful symptoms (86%); 86% used greater trochanter palpation and 73% use the single leg stance test. Only 25-37% used imaging to assist with diagnosis. Education (100%) and exercise (99%) were most common interventions, followed by manual therapy/massage (90%). Electrotherapies were used by 25%. Up to 70% of therapists always included gluteus medius/minimus strengthening; 75% included functional neuromuscular control exercise. The most common education topics were self- and load-management. Hands-on clinical experience and GTPS-specific courses were predominantly used to update knowledge.

Conclusion: Clinical examination was more important than imaging in diagnosis of GTPS. Education and exercise were the most common interventions used by physiotherapists. Results may inform future interventional studies to determine effectiveness of physiotherapy interventions.

TITLE	Muscle injuries in youth soccer – a prospective cohort study
AUTHOR(S)	Fromm L ¹ , Meyer P ² , Tscholl P ³ , Leumann A ⁴
AFFILIATIONS	1, University of Basel, Basel; 2, Orthoklinik Dornach, Dornach; 3, University Hospital of Geneva, Geneva; 4, OrthoPraxis Leumann, Basel

Background: Muscle injuries affect up to 72% of professional soccer players within one season and there are well reviewed, but muscle injuries in youth soccer players are not widely documented. The aim of this study was to investigate incidence, localization, pathomechanism and point of time of indirect muscle injuries in youth soccer players.

Methods: Prospective cohort study, 5 teams (U15, U16, U17, U18 and U21) with 110 young male football players (age 16.8 (14.3–21) years, height 174.5 (146.1–190.0) cm, weight 65.7 (35.5–84.6) kg) were monitored for 12 months. Every muscle injury was documented and monitored on a standardized evaluation score.

Results: In total, 53 muscle injuries were registered. On average, a player sustained 0.4 muscle injuries per season. There was only one re-injury (2%). The injury rate was 1.5 injuries per 1000h match- or /training hours, the match injury rate (6.9) being 7.7 times higher than the training injury rate (0.9). Sixty-nine percent were functional muscle injuries. Thirty-seven percent of all muscle injuries affected the hamstrings group and twenty-eight percent the adductors. The most common pathomechanism was overload (28%). Most of the injuries were recorded during the last 15 minutes of a game or a training (39.6%).

Conclusion: Muscle injuries are a substantial problem for players and clubs, also in young male football players. This study confirmed previous results showing that the injury rate during games is higher than during trainings and that hamstrings injuries are the most common muscle injuries in soccer. However, a prolonged study period is recommended to gain better statistical values.

TITLE	Outcome of muscle injuries in youth soccer – introducing the Muscle-Injury-Score
AUTHOR(S)	Fromm L ¹ , Meyer P ² , Vavken P ³ , Leumann A ⁴
AFFILIATIONS	1, University of Basel, Basel; 2, Orthoklinik Dornach, Dornach; 3, Alphaklinik Zürich, Zürich; 4, OrthoPraxis Leumann, Basel

Background: Muscle injuries are the most common injury in soccer and account for almost 30 percent of all time-loss injuries. The aim of this study was to investigate the muscle length as a risk factor to sustain a muscle injury and to grade and monitor muscle injuries during the rehabilitation.

Methods: 110 young male football players of 5 soccer teams (U15, U16, U17, U18 and U21) with (age 16.8 (14.3–21) years, height 174.5 (146.1–190.0) cm, weight 65.7 (35.5–84.6) kg) were monitored for 12 months in a prospective cohort study. Initially, muscle length in all players were measured. Every muscle injury was documented and monitored in a standardized protocol and graded clinically based on the Muscle-Injury-Score.

Results: 53 muscle injuries accounted for a total of 949 missed trainings and 179 missed matches, averaging in missing 18 trainings and 3.4 matches per injury. In 191 trainings (88.4%) and in 36 matches (81.9%) one player per team was missing because of a muscle injury. Injuries of the rectus femoris muscle were leading to the longest time-loss (39.3 days). There was no statistical significance in muscle length between the injured and the not injured players. The Muscle-Injury-Score correlated clinically relevant and statistically significant with the severity of the injury (r=0.54, p<0.001). Per point in the Muscle-Injury Score, the rehabilitation of a muscle injury took 5.8 days.

Conclusion: Also in young football players, muscle injuries are responsible for long time-losses. In this study, muscle length was not a risk factor for muscle injuries. The muscle-injury score allowed grading of muscle injuries and prediction of the time-loss.

TITLE	Subjective outcome and return to sport after bilateral sequential hip arthroscopy for femoroacetabular impingement
AUTHOR(S)	Morgan GAUTHIER ¹ , Philippe M. TSCHOLL ¹ , Angeliki NEROLADAKI ² , Didier HANNOUCHE ¹
AFFILIATIONS	¹ Department of Orthopedics and Traumatology, University Hospital of Geneva, Geneva, Switzerland ² Department of Musculoskeletal Radiology, University Hospital of Geneva, Geneva, Switzerland

INTRODUCTION: Few data exist on bilateral sequential hip arthroscopy for femoroacetabular impingement (FAI). Objectives were to evaluate subjective outcome, return to sport, and osteoarthritis progression in a consecutive case series. **METHODS:** All patients (n=18) that underwent bilateral sequential hip arthroscopy for FAI in a single institution between August 2011 and August 2018 to participate in this retrospective outcome study. Subjective outcome and return to sport were evaluated with Tegner Activity Scale (TAS), Sports Frequency Score (SFS) and Hip Outcome Score: Sports Scale (HOS-SS). Pre- and postoperative osteoarthritis were assessed on plain radiograph according to Kellgren and Lawrence (KL).

RESULTS: Ten patients were included (6 women, age: 27.4±12.4 years, follow-up: 4.5±1.1 years). Two hips required total hip arthroplasty during follow-up (3 to 5 years). No other major complication was recorded. Six transitory pudendal neuropathia were observed. Subjective outcome were rated very good in 11 hips, good in 6, fair in 1, and none poor. All patients would do the surgery again. TAS decreased from 5.7 ± 2.1 preoperatively to 4.2±2.0, however not significantly. SFS decreased from 3.4±0.7 to 2.1±1.0 (95% CI: -2.1 to -0.5, p=0.003). HOS-SS was 76.9%. Changing sport's activity was mainly due to medical advice (n=3) and lack of motivation (n=2), whereas hip pain was mentioned only once. KL increased from 0.4±0.6 to 1.0±0.9 (95% CI: 0.1 to 1.1; p=0.02).

CONCLUSION: Although level of sport's activities decreased, most patients showed satisfactory results and only minimal progression of osteoarthritis was observed.

TITLE	Effect of body weight support on physiological training thresholds
AUTHOR(S)	Geoboltsberger Sarah (MSc ETH Bewegungswissenschaften), Mauch Marlene (Dr. rer.nat)
AFFILIATIONS	Praxisklinik Rennbahn AG, Switzerland

Introduction

Running is a widely spread recreation activity. The occurring impacts can be reduced with an antigravity treadmill by exerting lower body positive pressure leading to body weight support (BWS). This is beneficial for early activity in rehabilitation as well as joint-protective training. This study aimed to analyse how characteristic physiological training thresholds can be transferred from an incremental test without BWS to supported running.

Materials and Methods

11 runners (7♂ and 4♀, 32.8±10.0 years) volunteered and gave written consent. They performed two lactate threshold tests on an antigravity treadmill with 100% and 75% of their body weight (BW). The discontinuous incremental test consisting of 3min stages increasing by 1.4 or 1.8 km/h conditional to fitness level was started at 7.2km/h and interrupted by 30s rests. Heart rate (HR), blood lactate (LC) and speed were measured. Physiological training parameters such as maximal performance (MAX), anaerobic (ANS) and aerobic threshold (AES) were determined.

Results

The performances at AES (9.9±1.5 to 12.8±1.9km/h), ANS (13.5±1.5 to 16.0±1.5km/h) and MAX (17.4±1.6 to 20.1±2.1km/h) were significantly higher with BWS (p<0.01). Neither HR values differed at AES (141±10 vs. 143±10/min BWS), ANS (168±9 vs. 164±10/min BWS) and MAX (188±9 vs. 187±9/min BWS) between unsupported and BWS running nor did LC deviate with values being within 5.5% at each training parameter.

Conclusion

The maximal LC and HR are similar with 75% and 100% BW which indicates that maximal exhaustion can be achieved with both conditions. While with BWS speed is higher at MAX, ANS and AES. However, the HR is equal at the characteristic physiological training parameters AES, ANS and MAX. Consequently, trainings on an antigravity treadmill should be controlled with HR and not speed. Concluding that training zones and physiological threshold determined in an incremental test can be transferred from unsupported to BWS running.

TITLE	Reproductibilité de la méthode d'analyse subjective du type de foulée V-Score et liens avec indices objectifs
AUTHOR(S)	Aristide Prodoliet ¹ , Mathieu Saubade ² , Vincent Gremaux ^{2,3} , Cyril Besson ²
AFFILIATIONS	¹ Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland. ² Swiss olympic medical center, Division de médecine physique et réadaptation, CHUV, 1011 Lausanne ³ Institute of Sport Sciences, Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland.

Introduction : La méthode d'analyse visuelle subjective appelée V-score a été développée pour distinguer les coureurs en deux catégories principales: « aériens » et « terriens ».

Objetif : 1/ évaluer la reproductibilité intra- et inter-testeur de la méthode V-score lors d'une course sur tapis. 2/ rechercher les corrélations de paramètres objectifs de la foulée par deux capteurs (Garmin FR630 et Physiolog de GaitUp) et la méthode V-score ; et rechercher une éventuelle différence entre les capteurs sur temps de contact et symétrie du pas.

Méthodes : Les paramètres objectifs de la foulée sont récoltés sur 4 courses de 1 minute à 9, 11, 13 et 15km/h, sur des sujets équipés des capteurs étudiés, et filmés 10 secondes sur des plans latéraux et postérieurs avec des caméras Go Pro. Le V-score est déterminé sur la base des vidéos par 2 investigateurs néophytes formés et 1 investigateur expert de la méthode.

Résultats préliminaires: Les pré-analyses intermédiaires sur 20 sujets montrent une différence entre la moyenne du temps de contact de la jambe gauche et de la jambe droite mesurée par le GaitUp et le temps de contact moyen mesuré par Garmin, avec Gait Up montrant un temps de contact inférieur de -21.4±32.8, -29.1±25.3, -33.8±24.4 et -31.4±23.2 ms à 9, 11, 13 et 15km/h respectivement.

Conclusion : Une différence semble exister sur les mêmes outcomes proposés par 2 capteurs commercialisés, probablement due aux algorithmes considérant le point de contact au sol et l'envol. Les analyses de reproductibilité et de corrélation sont en cours. L'hypothèse est que le temps de contact et l'oscillation verticale mesurés par ces capteurs seront respectivement plus courts et plus grande chez les aériens. Les résultats définitifs seront connus en septembre 2018.

TITLE	Chronic Exertional Compartment Syndrome of the First Dorsal Intersosseous and adductor pollicis of both hands successfully treated with incobotulinumtoxin A: a case report
AUTHOR(S)	V Gremeaux ^{1,2} , D Jacob ³ , V Fièvre ⁴ , A Dupeyron ^{5,6}
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	We report and discuss the case of a 24-year-old man practicing short-track and inline skating, presenting isolated low back pain described as a bilateral paravertebral severe tension after 7-8 minutes of high-intensity practice. A Chronic Exertional Compartment Syndrome of lumbar paraspinal muscles was suspected, and confirmed by an intramuscular pressure measurement (IPM) after pain reproduction. An MRI before and after a pain provocation showed a clear hypersignal of the superficial lumbar paraspinal muscles on post-exertion sequences. He benefited a bilateral fasciotomy, and was able to resume to ice-skating 3 weeks after surgery. He could perform high-intensity training for 20 minutes without pain at 6 weeks, with a 60% subjective improvement. A new IPM 3.5 months after surgery showed a marked decrease at 25mm Hg. Eight months after surgery, he had resumed to short-track to the previous level and could practice in-line skating with no restrictions.

TITLE	Chronic Exertional compartment syndrome of superficial lumbar paraspinal muscles surgically treated in a 24-years old ice-skater: a case report.
AUTHOR(S)	V Gremeaux ^{1,2} , D Jacob ³ , V Fièvre ⁴ , A Dupeyron ^{5,6}
AFFILIATIONS	¹ Swiss Olympic Medical Center, Locomotor Apparatus Dept, University Hospital Center, Lausanne, Switzerland. ² Institute of Sport Sciences, University of Lausanne, Lausanne, Switzerland. ³ IM2P, Clinique de Fontaine, 1, rue des Crétois, 21121 Fontaine les Dijon. ⁴ Centre Orthopédique Santy, Lyon, France. ⁵ Fédération de Médecine Physique et de Réadaptation, Faculté de Médecine Montpellier-Nîmes, CHU Carémieu, Nîmes, France. ⁶ Eurocom, Université de Montpellier, Montpellier, France.
	We report and discuss the case of a 24-year-old man practicing short-track and inline skating, presenting isolated low back pain described as a bilateral paravertebral severe tension after 7-8 minutes of high-intensity practice. A Chronic Exertional Compartment Syndrome of lumbar paraspinal muscles was suspected, and confirmed by an intramuscular pressure measurement (IPM) after pain reproduction. An MRI before and after a pain provocation showed a clear hypersignal of the superficial lumbar paraspinal muscles on post-exertion sequences. He benefited a bilateral fasciotomy, and was able to resume to ice-skating 3 weeks after surgery. He could perform high-intensity training for 20 minutes without pain at 6 weeks, with a 60% subjective improvement. A new IPM 3.5 months after surgery showed a marked decrease at 25mm Hg. Eight months after surgery, he had resumed to short-track to the previous level and could practice in-line skating with no restrictions.

TITLE	What is the prevalence of radiographic hip osteoarthritis and imaging defined intra-articular hip pathologies in athletes with and without pain? A systematic review and meta-analysis
AUTHOR(S)	Joshua J Heerey ¹ , Joanne L Kemp ¹ , Andrea B Mosler ¹ , Denise M Jones ¹ , Tania Pizzari ¹ , Mark Scholes ¹ , Rintje Agricola ² and Kay M Crossley ¹
AFFILIATIONS	¹ La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, College of Science, Health and Engineering, La Trobe University, Melbourne, Victoria, Australia ² Department of Orthopaedics, Erasmus University Medical Center, Rotterdam, The Netherlands

Background In athletes, hip osteoarthritis (OA) and intra-articular hip pathologies are thought to be associated with hip/groin pain. To improve the management of athletes with hip/groin pain an understanding of the relationship between pain and imaging findings is required.

Objective To undertake a systematic review and meta-analysis to determine the prevalence of OA and intra-articular hip pathologies in athletes with and without pain.

Methods Seven electronic databases were searched in January 2018 for studies investigating the prevalence of OA and intra-articular hip pathologies using Xray, MRI, MRA. Two independent reviewers conducted the search, study selection, quality appraisal and data extraction. Meta-analysis was performed when studies were homogenous, with a strength of evidence assigned to pooled results.

Results Twenty studies evaluated the prevalence of OA and intra-articular pathologies. The studies were generally moderate to high risk of bias, with only 3 studies adjudged to be low risk. In asymptomatic athletes, limited evidence identified a labral tear prevalence of 54% per person and moderate evidence of 37% per hip. In symptomatic athletes, moderate evidence of a labral tear prevalence of 32% per hip was found. Moderate evidence of a cartilage defect prevalence of 10% per person was identified in asymptomatic athletes. There was a low prevalence of OA in asymptomatic (0%-17%) and symptomatic athletes (2%).

Conclusion Hip OA and intra-articular pathology prevalence in symptomatic and asymptomatic athletes is variable. Labral tears and cartilage defects are seen often in athletes without pain. Hip osteoarthritis is rarely seen in athletes with and without pain.

TITLE	What is the prevalence and relationship of bony morphology and features associated with early hip osteoarthritis in sub-elite footballers with and without hip and groin pain
AUTHOR(S)	Joshua J Heerey ¹ , Joanne L Kemp ¹ , Rintje Agricola ² , Matt G King ¹ , Peter L Lawrenson ¹ , Adam I Semciw ¹ , Tania Pizzari ¹ , Mark Scholes ¹ , Kay M Crossley ¹
AFFILIATIONS	¹ La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, College of Science, Health and Engineering, La Trobe University, Melbourne, Victoria, Australia ² Department of Orthopaedics, Erasmus University Medical Centre, Rotterdam, The Netherlands
	Introduction: This study aimed to determine the prevalence of bony morphology/early Osteoarthritis (OA) features in football players with and without hip/groin pain and the relationship between the presence of pain and hip morphology/OA. Methods: 143 footballers (59% soccer/41% Australian rules football (ARF)); median age 26yrs; height 179cm; weight 78kg; 22% women) with hip/groin pain (>6/12 pain and +ve FADIR) and 47 control players (66% soccer/34% ARF; 26yr; 178cm; 76kg; 28% women) were evaluated for bony morphology and early OA features from radiographs. Between group differences for patient characteristics, morphology and OA were evaluated with parametric and non-parametric tests. Binomial logistic regression (covariates sex, body mass index (BMI)) determined the relationship between presence of pain, morphology and OA features: <0.05. Results: There were no significant differences in patient characteristics between footballers with and without hip/groin pain (p=0.427-0.974). The alpha-angle (AP 50°vs 48° p=0.72; Dunn 68°vs 66° p=0.274) and LCEA (31°vs 32° p=0.508) were not different between groups. The prevalence of morphology and OA features did not differ between groups: alpha-angle>60°: 65% vs 55% p=0.223; LCEA>40° 8% vs 6% p=1.00; osteophytes 7% vs 5% p=0.736; joint space narrowing (JSN) 9%vs 5% p=0.527. Footballers with hip/groin pain had no greater odds of an alpha angle >60° (OR 1.431;0.69-3.00), LCEA >40° (OR 1.13;0.30-4.4), Osteophytes (OR 1.52 0.32-7.26) or JSN (OR 1.794 0.38-8.47) than control players. Conclusion: • Footballers with hip/groin pain did not have a greater prevalence of bony morphology • The presence of bony morphology and OA features were not related to hip/groin pain

TITLE	Return to sport rates and performance after hip arthroscopy for femoroacetabular impingement syndrome: A cross-sectional cohort study of 189 athletes
AUTHOR(S)	Lasse Ishoi ¹ , Kristian Thorborg ^{1,2} , Otto Kraemer ¹ , Per Hølmich ¹
AFFILIATIONS	1) Sports Orthopaedic Research Center – Copenhagen (SORC-C), Department of Orthopaedic Surgery, Copenhagen University Hospital, Amager-Hvidovre, Denmark 2) Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C), Department of Orthopaedic Surgery and Physical Therapy, Copenhagen University Hospital, Amager-Hvidovre, Denmark
	Introduction High return to sport (RTS) rates in athletes following hip surgery for femoroacetabular impingement syndrome has previously been reported. However, data is lacking using a clear definition of RTS. Therefore, we aimed to determine the RTS rate in athletes following hip arthroscopy for FAIS, according to RTS consensus definitions. Materials and Methods Eligible subjects were identified in the Danish Hip Arthroscopy Register. A self-report RTS questionnaire regarding preinjury and present sport level was used to collect data. RTS was defined as playing the preinjury sport at preinjury level at follow-up. If RTS was successful, the associated self-reported sports performance was assessed as: 1) optimal performance including full sport participation, 2) impaired performance, but full sport participation, and 3) impaired performance including restricted sport participation. Results 350 eligible subjects were identified. Of those, 189 athletes (mean age at follow-up: 26.9±3.4 y) were included in the study at a mean follow-up of 33.1±16.3 months post-surgery. At follow-up 57.1% were playing the same sport at a preinjury level. Of those, only 1/3 reported optimal sport performance. The remaining 2/3 reported impaired sports performance. Conclusion Fifty-seven percent of athletes return to sport. This is considerably lower than the 82% previously reported in the literature. The lower RTS rate from the current study is most likely explained by the strict definition of successful RTS used in an athletic cohort from a nationwide register. Noteworthy, only 1/3 of athletes who successfully returned to preinjury sport at preinjury level reported their performance to be optimal.

TITLE	The impact of demographic and radiological findings on intra-articular hip cartilage pathology in patients undergoing hip arthroscopy: a cross-sectional study of 1550 hip arthroscopies
AUTHOR(S)	Lasse Ishoi ¹ , Kristian Thorborg ^{1,2} , Otto Kraemer ¹ , Bent Lund ³ , Bjarne Mygind-Klavsen ¹ , Per Hølmich ¹
AFFILIATIONS	1) Sports Orthopaedic Research Center – Copenhagen (SORC-C), Department of Orthopaedic Surgery, Copenhagen University Hospital, Amager-Hvidovre, Denmark 2) Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C), Department of Orthopaedic Surgery and Physical Therapy, Copenhagen University Hospital, Amager-Hvidovre, Denmark 3) Department of Orthopedics, Horsens Regional Hospital, Denmark 4) Division of Sports Traumatology, Department of Orthopedics, Aarhus University Hospital, Denmark
	Background Severe hip joint cartilage damage (modified Beck and ICRS grade 3-4) may affect post-operative outcomes. This cross-sectional study investigated if pre-surgical demographic and radiological data were associated with hip joint cartilage status identified during surgery. Materials and Methods Subjects were identified in the Danish Hip Arthroscopy Registry. The outcome variables were acetabular cartilage status (modified Beck grade 0-2 vs. 3-4) and femoral head cartilage status (ICRS grade 0-2 vs. 3-4). Logistic regression was applied to assess the association with: Age; gender; Lateral Center Edge Angle (LCEA) assessed as normal (25°<LCEA<39°), pincer (LCEA>39°), or dysplasia (LCEA<25°); Alpha Angle (AA) assessed as normal (AA<55°), cam (55°<AA<78°), or severe cam (AA>78°); joint space width (JSW) assessed as normal (JSW>4.0), mild reduction (3.1<JSW<4.0), or severe reduction (JSW<3.0). Results 1550 subjects (mean age pre-surgery: 34.4±10.0 y) were included in the analyses. For acetabular cartilage status, increasing age (odds ratio (OR) 1.03), male gender (OR 4.32), reduced JSW (mid: OR 1.87; severe: OR 3.74) and increased AA (cam: OR 2.18; severe cam: OR 4.36) was associated (p<0.05) with Beck grade 3-4, whereas pincer morphology (OR 0.65) was protective (p=0.07). For femoral head cartilage status, decreased JSW (mid: OR 1.94; severe: OR 3.88) and dysplasia (OR 2.96) was associated (p<0.05) with ICRS grade 3-4. Conclusion Several factors were associated with severe hip joint cartilage damage, most notably male gender, reduced joint space width, cam morphology, and dysplasia. On the contrary, pincer morphology was protective. These factors may be important for patient selection and surgical planning.

TITLE	Which athletic movements are most impaired following hip arthroscopy for femoroacetabular impingement syndrome? A cross-sectional study including 184 athletes
AUTHOR(S)	Lasse Ishoi ¹ , Kristian Thorborg ^{1,2} , Otto Kraemer ¹ , Per Hölmich ¹
AFFILIATIONS	1) Sports Orthopaedic Research Center – Copenhagen (SORC-C), Department of Orthopaedic Surgery, Copenhagen University Hospital, Amager-Hvidovre, Denmark 2) Physical Medicine & Rehabilitation Research – Copenhagen (PMR-C), Department of Orthopaedic Surgery and Physical Therapy, Copenhagen University Hospital, Amager-Hvidovre, Denmark
Background	Following hip arthroscopy for femoroacetabular impingement syndrome (FAIS) ~20% of athletes return to optimal sport performance. However, it is unknown if specific athletic movements are important for reaching optimal sport performance. This study aimed to compare self-reported problems in athletic movements between athletes reporting optimal sport performance and impaired performance following hip arthroscopy for FAIS.
Materials and Methods	Subjects were identified in the Danish Hip Arthroscopy Registry, and invited to answer 1) a return to sport questionnaire investigating self-reported sport performance and 2) the Copenhagen Hip and Groin Outcome Score (HAGOS) sport subscale investigating problems in athletic movements. Subjects were dichotomized based on self-reported sport performance (optimal performance vs. impaired performance). The proportion of athletes reporting no problems (none, mild) and problems (moderate, severe, extreme) on HAGOS sport subscale questions were compared between groups.
Results	184 athletes were included. 31 athletes (16.8%) reported optimal sport performance, whereas 153 athletes (83.2%) reported impaired sport performance. The minority (<20%) of those who reported optimal sport performance had problems in athletic movements. Contrary, subjects who reported impaired performance often had problems with high-load athletic movements such as running fast (64%), kicking/skating (58%), explosive movements (60%), and outer hip positions (70%).
Conclusion	Most athletes with impaired performance following hip arthroscopy for femoroacetabular impingement syndrome have problems in high-load activities such as running fast, kicking/skating, explosive movements, and outer hip positions. Such information may guide future focus on post-operative rehabilitation for femoroacetabular impingement.

TITLE	Patient-reported outcome and muscle-tendon pain 1 year after periacetabular osteotomy in 82 patients with hip dysplasia – are they related?
AUTHOR(S)	Julie Sandell Jacobsen, MSc ^{1,2} ; Kjeld Søballe, DMSc ² ; Kristian Thorborg, PhD ³ ; Lars Bolvig, MD ⁴ ; Stig Storgaard Jakobsen, PhD ⁵ ; Per Hölmich, DMSc ⁴ ; Inger Mechlenburg, PhD, DMSc ^{3,6}
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Introduction	Hip dysplasia is traditionally considered a joint disease, where periacetabular osteotomy (PAO) is the well-established treatment option. At present, there is a lack of larger prospective studies investigating PAO with patient-reported measures developed for young patients. The aim of this paper was prospectively to describe patient-reported outcome from before to 1 year after PAO; differences in muscle-tendon pain; and estimated associations between changes in patient-reported outcome and changes in muscle-tendon pain.
Materials and methods	In a cohort of 82 patients, outcome after PAO was investigated with the Copenhagen Hip and Groin Outcome Score (HAGOS); muscle-tendon pain in the hip and groin region was identified with standardized clinical tests; while associations between the two were analysed with multivariable linear regressions.
Results	HAGOS subscales improved from before to 1 year after PAO (p<0.001) with medium to very large effect sizes (0.66-1.37). Muscle-tendon pain in the hip and groin region decreased from 74% (64; 83) before PAO to 35% (25; 47) 1 year after PAO (p<0.001). Significant associations were observed between change in HAGOS and change in muscle-tendon pain ranging from -4.7 (CI -8.4; -1.0) HAGOS points to -8.2 (CI -13.1; -3.3) HAGOS points (p<0.021).
Conclusion	PAO results in medium to very large patient-reported improvements 1 year after PAO; but compared with healthy subjects; self-reported hip function is low and negatively affected by muscle-tendon pain. We should therefore reconsider the traditional understanding of hip dysplasia as solely a joint disease, and address the role of muscle-tendon pain.

TITLE	Does the physical activity profile change in patients with hip dysplasia from before to 1 year after periacetabular osteotomy?
AUTHOR(S)	Julie Sandell Jacobsen, MSc ^{1,2} ; Kristian Thorborg, PhD ³ ; Per Hölmich, DMSc ² ; Lars Bolvig, MD ⁴ ; Stig Storgaard Jakobsen PhD ⁵ ; Kjeld Søballe, DMSc ⁵ ; Inger Mechlenburg, PhD, DMSc ^{5,6}
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Introduction	Knowledge of physical activity profile among patients with hip dysplasia is lacking. The aim was to test if patients with hip dysplasia change the physical activity profile from before to 1 year after periacetabular osteotomy (PAO), measured by accelerometer-based sensors and self-reported physical activity. Furthermore, to estimate associations between change in accelerometer-based physical activity and change in self-reported activity to participate in preferred physical activities (PA).
Material and methods	Physical activity was objectively measured with accelerometer-based sensors, and self-reported PA was recorded with Copenhagen Hip and Groin Outcome Score (HAGOS) in 77 patients with hip dysplasia. Associations between accelerometer-based physical activity and self-reported PA was analyzed with linear regression analysis.
Results	Accelerometer-based measures showed that the percentage of time spent on physical activities at very low, low, moderate and high intensity levels remained unchanged 1 year post surgery compared to pre surgery (changes from 0.3% (95% CI -0.1; 0.8) to -1.6% (95% CI -4.1; 0.9), p=0.164). In contrast, self-reported PA increased 1 year post surgery compared to pre surgery (22 (95% CI 14; 29) HAGOS PA points, p<0.001). No association between accelerometer-based physical activity and self-reported PA was found (p=0.30).
Conclusion	Patients with hip dysplasia do not seem to change their physical activity profile 1 year after PAO if measured with objective accelerometer-based sensors. This is interesting since self-reported PA indicates that patients' ability to participate in physical activity is increased; suggesting that this increased participatory capacity is not manifested as an increase in objectively measured physical activity.

TITLE	DOES THE FITBIT FLEX™ PROVIDE A RELIABLE AND FEASIBLE METHOD OF MONITORING PHYSICAL ACTIVITY PROGRESSION?
AUTHOR(S)	Denise M Jones ¹ , Kay M Crossley ¹ , Ilana Ackerman ² , Harvi F.Hart ^{1,3} , Joanne L Kemp ¹
AFFILIATIONS	¹ La Trobe Sport and Exercise Medicine Research Centre, School of Allied Health, College of Science, Health and Engineering, La Trobe University, Melbourne, Victoria, Australia ² Monash University, Melbourne ³ Department of Physical Therapy, The University of Western Ontario

Background	Personal activity monitors provide a potential means to capture quantitative physical activity data. Validity, reliability and feasibility of these devices in active patients is unknown.
Objective.	To examine the validity of the Fitbit Flex™ step count, assess inter-device reliability and feasibility for use in free-living data collection.
Methods	Sixty-four healthy participants (56% women) aged between 19 and 50 years (mean 34 +/-8 years) were recruited. Thirty participants completed a treadmill protocol at jogging and running speeds wearing three Fitbit™ devices using video analysis of step count as the criterion measure. Forty participants used 2 Fitbit™ devices (Flex™ and Flex2™) for two weeks. Inter-device reliability for step count, engagement and acceptability were assessed.
Results	At speeds of 8 to 14 km/h Mean Absolute Percentage Errors were <1% for the Fitbit Flex™. Standard Error of Measurement between Fitbit™ devices was <7 steps with good to excellent inter-device reliability (0.723 to 0.999; p <0.001). The two generations of Fitbit™ devices showed excellent inter-device reliability (0.937, p <0.001) during free-living data collection. The average number of days data collected from the 14-day period was 11 (SD 4). Inability to wear the devices due to work or sport (22%) was the primary reason reported for loss of data.
Conclusion	The Fitbit Flex™ provides a valid account of steps taken jogging and running speeds attainable by non-elite runners on a treadmill. Devices of the same and subsequent generations provide equivalent output facilitating comparison between devices and between time points and pooling of data.

TITLE	Concussions & Equestrian Sports
AUTHOR(S)	Melinda KEISER, Switzerland
AFFILIATIONS	Osteopath dipl. CDS-GDK, CAS in Sport Rehabilitation

Introduction
Each year in Switzerland, equestrian sports injure more than 8'000 people. Horse riding is the second sport injuring women. Most of these injuries result of a fall. Cerebral injuries range from a simple concussion to a lethal damage. Their severity is greater than those related to cycling, motorcycling and motor vehicles. Mortality is higher than with soccer, rugby or ski. Injuries related to horse riding represent a significant socio-economic cost. Concussion recognition is a challenge. Every person involved in equestrian environment should know clinic and guidelines. When suspected, concussion's evaluation and care should be prompt and appropriate.

Materials and Methods
As part as my CAS in sport rehabilitation, I built a transverse survey which was designed with the Fédération Equestre Internationale. The sample (n = 33, 15 women, 18 men) consists of national or international athletes.

Results
« Behavior score » is higher (79% correct) than « knowledge score » (61% correct). 94% of the participants feel concerned about concussion. 64% of the sample never received information. Among the aware, 60% received information by a healthcare professional, 40% by their family, none by their coach. 62% of the diagnosed athletes never received information about concussion. 88% of the sample have never heard about a concussion recognition tool.

Conclusions
Athletes, entourage, officials and medical staff are essentials in concussion's prevention and detection. They should suspect concussion and adopt an appropriate behavior. The information's broadcast is currently insufficient. The more trained people, the better will be the athlete's support and recovery.

TITLE	Is greater midfoot mobility associated with a successful outcome with foot orthoses compared to hip exercises in managing patellofemoral pain? A randomised clinical trial
AUTHOR(S)	Matthews M 1,2, Rathleff MS 3,4,5, Claus A 1, McPoil T 6, Nee R 7, Crossley K 8, Kasza J 9, and Vicenzino B 1
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Introduction	Persistent pain conditions, such as patellofemoral pain, are an everyday burden for millions of people. Improving treatment outcomes is paramount. Foot orthoses and hip exercises are two recommended evidence-based treatments, but which is better and who benefits most from either treatment remains unknown. Preliminary evidence suggests those with patellofemoral pain and greater midfoot width mobility report a successful outcome with foot orthoses. The aim was to (i) evaluate if midfoot width mobility is associated with success with foot orthoses compared to hip exercises, and (ii) compare the treatment outcomes between foot orthoses and hip exercises.
Materials and Methods	Participants with patellofemoral pain (n=218) were recruited into a two-arm parallel, multi-centre randomised superiority clinical trial conducted in Australia and Denmark (pre-registered: ACTRN12614000280628). Eligible participants were stratified into two subgroups based on their presenting midfoot width mobility and randomised to wear foot orthoses or four weeks of physiotherapist-supervised hip exercises (3 times/week). Primary outcome was a 7-point Likert global rating of change scale at 12 weeks, dichotomized as successful (much better or better) or not successful.
Results	No significant differences in success rates were found between subgroups stratified on their midfoot mobility and treatment (p=0.19). There was a 49% success rate with both treatments, with no significant difference between foot orthoses or hip exercises (p=0.67).
Conclusion	Midfoot width mobility does not predict a superior success rate with foot orthoses compared to hip exercises, with both treatments having comparable success rates. These findings inform shared-decision making and assist in determining patient preferences.

TITLE	Anterior pericapsular hip muscle action in gait; a comparison between Femoroacetabular impingement and healthy controls.
AUTHOR(S)	Mr Peter Lawrenson ¹ , Professor Paul Hodges ¹ , Professor Bill Vicenzino ¹ , Professor Kay Crossley ^{1,2} , Dr Adam Semciw ^{1,2}
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Introduction
Cam Femoroacetabular impingement syndrome (FAIS) is thought to be associated with anterior hip stability through disruption of passive structures (e.g. labrum). Where passive structures are compromised, pericapsular muscle activity in the anterior hip is hypothesised to supplement joint stability during gait. Anterior pericapsular muscle activity has not been investigated in Cam FAIS. The aim of this study was to compare anterior pericapsular activity in FAIS with asymptomatic controls during gait.

Materials and Methods
Thirteen football players (mean (SD) age 29 (7) years), with radiographically confirmed cam FAIS (alpha angle <60°) and a comparator population of thirteen physically active volunteers (26 (6) years), with no history of lower limb injury were recruited. Electromyographic activity of anterior pericapsular muscles (iliacus, iliocapsularis, gluteus minimus and rectus femoris) were measured across four walking trials. Burst activity was combined to create a grand ensemble for each group, and compared using non-parametric repeated measure statistics.

Results
Iliocapsularis ensemble demonstrated greater activity (%peak) during swing phase of the gait cycle (p<0.05) in FAIS. There was no significant difference in time to peak or duration of iliocapsularis burst activity between groups, suggesting intra-subject variation in iliocapsularis activity. The burst profile of iliacus, anterior gluteus minimus, and rectus femoris, showed no differences between groups.

Conclusion
The activity profile of iliocapsularis indicates intra-subject variability in FAIS, with no difference seen in other muscles tested. Further research is required to clarify these findings and to establish whether associations exist with variables such as symptom intensity, duration and stage of pathology.

TITLE	Can imaging determine the source of hip pain in ballet dancers and athletes?
AUTHOR(S)	Dr Susan Mayes ^{1,2} , Dr Peter Smith ³ , April-Rose Ferris ⁴ , Prof Jill Cook ²
AFFILIATIONS	1.The Australian Ballet, Australia 2. La Trobe Sport and Exercise Medicine Research Centre, Australia 3. MIA Radiology, Australia 4. Monash University, Australia.

Introduction: The relationship between hip pain and magnetic resonance imaging (MRI) findings is unclear. This study examined the association between imaging findings and pain in ballet dancers and athletes.

Materials and methods: 49 elite ballet dancers (22 men and 28 women) and 49 age and sex-matched non-dancing athletes underwent 3T hip MRI of both hips to detect cartilage defects, labral tear, LT tear and effusion-synovitis and completed the Copenhagen Hip and Groin Outcome Score (HAGOS). Hip pain was defined with a HAGOS pain score of ≤ 80. Body mass index (BMI) was calculated from participant weight and height.

Results: Effusion-synovitis (41%), cartilage defects (57%), labral tear (60%) and LT tear (38%) were detected on MRI in at least one hip. At least one of these pathologies was found in 84% of participants. The frequency of isolated hip pathology was low (1-7%). Effusion-synovitis and LT tear often coexisted (p=0.004, ES=0.61); there was no association between effusion-synovitis and cartilage defects (p=0.12, ES=0.32) or labral tear (p=0.55, ES=0.12). Cartilage defects were related to labral tear (p=0.006), but not LT tear once adjusted for age, sex, BMI and group. Hip pain was related to hip effusion-synovitis (p<0.001, ES= 0.78), but not cartilage defects (p=0.28, ES=0.22), labral tear (p=0.8, ES=0.05), or LT tear (p=0.28, ES=0.22).

Conclusion: Determining the source of hip pain is difficult as different hip pathologies coexist in the hips of ballet dancers and athletes. Effusion-synovitis was the only pathology related to hip pain and may be an important target in therapeutic management.

TITLE	Running biomechanics and performance in male and female elite orienteering athletes
AUTHOR(S)	Corina Nüesch ^{1,2} , Kimberly Byrnes ¹ , Annegret Mündermann ^{1,2} , Peter Zuest ³ , André Leumann ¹
AFFILIATIONS	1: Clinic for Orthopaedics and Traumatology, University Hospital Basel, Switzerland; 2: Department of Biomedical Engineering, University of Basel, Switzerland; 3: Medical Team, Swiss Orienteering

Introduction
Orienteering is a highly demanding sport where athletes not only require excellent aerobic performance but also the ability to run fast on different terrains and slopes while navigating with compass and map through the unmarked course. The aim of this study was to determine the role of biomechanics on running and Orienteering performance.

Material and Methods
Running biomechanics were assessed in 26 Swiss Orienteering national team members (12 female; age, 25.1±3.8years; body mass index, 20.3±1.3kg/m²) during treadmill running at increasing running speeds and with different treadmill inclinations using an inertial sensor system (RehaGait®; Hasomed, Germany). Relationships between running performance (5km-time and orienteering competition results) and biomechanics were analyzed using stepwise linear regression models.

Results
Sagittal range of motion of the knee and hip, ankle plantarflexion velocity during push-off, cadence and stride length increased with increasing running speed. At 16.2 km/h, women had a higher cadence and peak plantarflexion velocity than men (186±8steps/min and 1148±250°/s vs. 174±6steps/min and 900±66°/s, respectively; P<0.05). For all athletes, aerobic fitness explained 96% of 5km-time (within each sex: 69-82%). Adding stride length into the model resulted in 98% explained variance. None of the parameters explained variation in Orienteering sprint time.

Conclusion
Differences in orienteering performance between women and men are only explained partially by differences in aerobic performance in elite athletes. It is difficult to objectify the influence of running biomechanics on aerobic performance in such a homogenous, high level group of athletes. Of all measured parameters, stride length might have some influence.

TITLE	Fast to Slow Muscle Fiber Shift and Parallel Hybrid Fiber Alterations in Exercising Seniors
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Background: Human skeletal muscle is composed of slow (type I), fast (IIa and IIx), and hybrid fibers. The latter co-express different myosin heavy chains (MHC), and seem to be more prominent in aging muscle. Their role is debated; hybrid fibers were reported either in a transitional state or as fixed individual entities. This study examined the fate of hybrid fibers with an endurance exercise intervention in an elderly sedentary population.

Methods: Twenty-two sedentary healthy elderly men and women underwent a 16-week supervised endurance exercise intervention. Eighteen endurance-trained age- and gender-matched volunteers served as controls. Fiber type distribution was determined by immunohistochemistry on vastus lateralis muscle biopsies pre- and post-intervention.

Results: At baseline, a type II dominant fiber profile was observed compared to the control group, with more type IIa (P=0.0301) and IIx fibers (P=0.0328). There was no significant difference between groups in hybrid fibers I-IIa (P=0.6719) and IIa-IIx (P=0.0998) representing together almost 5% of total muscle fibers. Intervention triggered qualitative dynamics towards an increase in type I, and decrease in type II fibers, paralleled by an increase in I-IIa hybrids (P=0.0301).

Conclusions: The present study is, to our knowledge, the first to examine hybrid muscle fiber type adaptations to endurance exercise in the elderly. Hybrid fiber proportions did not differ between chronic sedentary and chronic endurance-trained states. Exercise intervention increased type I-IIa hybrid fibers along with shift dynamics in other fiber types suggesting the contribution of hybrid fibers to a fast to slow fiber type transition, eventually serving as intermediate reservoir from one monomorphic MHC expressing fiber type to another. This finding favors the transitional theory regarding hybrid muscle fibers and exercise, crucial to understanding reversible mechanisms of sarcopenia and development of prevention measures.

TITLE	Altered lumbo-pelvic control in patients with longstanding hip and groin pain compared to healthy controls
AUTHOR(S)	Anders Pålsson ¹ , Ioannis Kostogiannis ^{1,2} , Eva Ageberg ¹
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Introduction: Exercises involving lumbo-pelvic control are often included in the exercise-based treatment for patients with longstanding hip and groin pain (LHGP). However, it is unknown whether patients with LHGP have altered lumbo-pelvic control. Therefore, the aim of this study was to evaluate lumbo-pelvic control in patients with LHGP in comparison to healthy matched controls.

Material and methods: 87 patients (50% women, age 18-55) with LHGP (>3 months) and 28 healthy controls, matched for gender, age and activity level, were recruited. Lumbo-pelvic control was assessed with the double-leg lowering test (DLTT) in a supine position and a newly developed test, the standing active single leg raise (SASLR) test. During the DLTT, the hip extension angle (°) when the pelvis reached 10° anterior tilt (sagittal plane) was recorded. The mean value of three attempts served as outcome, and a high value is thought to be associated with better lumbo-pelvic control. During the (SASLR), the range of medial to lateral (frontal plane) and anterior to posterior (sagittal plane) pelvic tilt was measured by a tilt sensor attached to the sacrum. The mean range of three repetitions served as outcome, and a lower range is assumed to be associated with better lumbo-pelvic control. The independent sample t-test was used for between-group comparisons.

Results: The patients showed worse lumbo-pelvic control (patients minus controls) in DLTT (mean difference -11.1° (95%CI, -17.2; -5.1) p<0.001) and in SASLR in frontal plane (mean difference 0.9° (95%CI, 0.03; 1.7) p=0.041), but not in SASLR sagittal plane (mean difference 0.7° (95%CI, -0.6; 1.9) p=0.288) compared with controls.

Conclusions: The altered lumbo-pelvic control observed in patients with LHGP compared with healthy controls, suggests that exercises of lumbo-pelvic kinematics in both the sagittal and frontal plane should be included in the treatment for this patient group.

TITLE	Return to sport and hip function after hip arthroscopy for femoroacetabular impingement
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AFFILIATIONS	Physiotherapist ASP (Geneva), Physiotherapist of Servette-Chênois LNA football féminin

Introduction: Femoroacetabular impingement (FAI) is the most frequent hip pathology in young athletes. Hip arthroscopy is a treatment of choice and offers good results. The goal of this study is to evaluate athletic population's return to sport (RTS) and hip function after arthroscopic hip surgery for FAI with Patient-reported outcome (PRO) score.

Methods: Athletic patients who underwent hip arthroscopy for FAI were selected retrospectively. Three auto-administered questionnaires were sent by email post-operatively: Hip And Groin Outcome Score (HAGOS), Hip Outcome Score-Sports scale (HOS-SS) and one return to sport's questionnaire.

Results: Fifteen athletic patients were included in the study. The average return-to-sports rate was 58.3%, whose 25% at the same pre-injury level. The patients returned to sport with an average of 8.1 months. The scores average were: HAGOS: 69.2 ± 16.8 (IC 95%: 59.9-78.6), HOS: 74.1 ± 22.9 (IC 95%: 61.4-86.8). 83.3% of the population expressed postoperatively pain but lower. All patients have adapted their sport practice. Post-surgery satisfaction was evaluated at 75%.

Discussion: Multiple risk factors have an impact on the RTS rate: duration of preoperative pain, time of sports stop, psycho-social factors, population characteristics. The postoperative results are positive and hip arthroscopy is recommended to an athletic population.

Conclusion: Despite the low RTS rate found in this study, the RTS results are very positive after hip arthroscopy surgery. It might be necessary to quickly diagnose and take care of the patients to improve postoperative results.

TITLE	Hip- and groin symptoms in young male soccer players and its relation with cam morphology: a prospective study with 5-year follow-up
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Introduction: Cam morphology can possibly result in hip- and/or groin symptoms and limited hip range of motion. Conflicting evidence is available, including only one prospective study¹. The aim is to investigate the association between the presence, severity, and duration of cam morphology and hip symptoms and function.

Materials and Methods: Academy male soccer players (n=49) participated in this prospective 5-year follow-up study (age range 17-24 years). Standardized anteroposterior pelvis and frog-leg lateral radiographs were obtained at baseline¹, 2.5-year² and 5-year follow-up. The femoral head-neck junction was quantified by:
1. Visual score, classified as: (1) normal, (2) flattening, (3) prominence
2. Alpha angle

Cam morphology was defined as having a flattening or prominence or by an alpha angle ≥60°, severe cam morphology as a prominence or alpha angle ≥78°. Hip and Groin Outcome Score (HAGOS) questionnaire (6 domains) results were divided in 3 groups, lowest (22 domains in lowest Inter Quartile Range [IQR]), highest (22 domains in highest IQR) and middle group (remainders). Hip range of motion was measured. Cam morphology duration was defined as 'short' (present at 2.5 or 5-year) or 'long' (already present at baseline).

Results: Cam morphology presence based on visual score or alpha angle were not associated with the lowest vs the highest HAGOS group (P=.057/P=.057). Cam morphology based on visual score was associated with limited flexion (P=.001), based on alpha angle with limited flexion and internal rotation (P=.032/P=.005). Severe cam (prominence) was associated with limited flexion and internal rotation (P=.049/P=.033), while an alpha angle ≥78° was associated with limited flexion (P=.049). A long cam morphology duration was not associated with symptoms.

Conclusion: Presence, severity and duration of cam morphology were not significantly associated with symptoms, but cam morphology presence and severity were associated with limited flexion and internal rotation.

Character count (with spaces): 1999 / 2000

References:
1. Khanna V, Caragianis A, Dipirmio G, Rakhra K, Beaulieu PE. Incidence of hip pain in a prospective cohort of asymptomatic volunteers: is the cam deformity a risk factor for hip pain? Am J Sports Med. 2014;42(4):793-797.
2. Agricola R, Bessems JH, Ginai AZ, et al. The development of Cam-type deformity in adolescent and young male soccer players. Am J Sports Med. 2012;40(5):1099-1106.
3. Agricola R, Heijboer MP, Ginai AZ, et al. A cam deformity is gradually acquired during skeletal maturation in adolescent and young male soccer players: a prospective study with minimum 2-year follow-up. Am J Sports Med. 2014;42(4):798-806.

TITLE	Criteria for clearance to return to sport following primary anterior cruciate ligament reconstruction: a scoping review
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Introduction: Determining readiness to return to sport (RTS) after anterior cruciate ligament (ACL) reconstruction is a critical decision for sports medicine professionals to improve performance and reduce reinjury risk after RTS.

Materials & Methods: MEDLINE, Embase, CINAHL, and SPORTDiscus electronic databases were utilized. Data were categorized into seven domains: time, strength, hop testing, clinical examination, patient reported outcomes (PROs), subjective reports, and performance-based criteria.

Results: 209 studies were included. Time was used in 178 studies (85%).¹ Time was the only criterion used to clear athletes to RTS in 88 studies (42%). Various modes of strength testing were reported in 86 studies (41%). Thirteen different hop tests were used in 31 studies (15%). Reporting of which specific limb symmetry indices were utilized was variable for both strength and hop testing. Clinical examination was used in 54 studies (26%); including ligamentous stability (17%) and range of motion (14%). PROs were used in 8 studies (4%); while subjective report of pain, knee stability, and readiness to RTS, were used in 17 studies (8%). Performance-based criteria were used in 41 studies (20%); including agility (2%) and proprioception (3%). In studies utilizing more than one RTS criteria: 23% used two criteria, 21% used three criteria, and 9% used four criteria or more. There has been a 32% increase in number of studies reporting RTS criteria since last review on this topic.
¹[all percentages reported reflect a portion of total studies (209)]

Conclusions: Time was the most common criterion used to clear athletes to RTS following primary ACL reconstruction; 4 out of every 5 studies used a time criterion, 2 out of every 5 studies reported a strength criterion. Only 1 in 5 studies used a physical performance-based criterion, and fewer than 1 in 10 studies used an athlete-report criterion. The multifactorial aspects of RTS are not considered when clearing athletes to RTS.

TITLE	Accuracy of Clinical and Imaging Tests for the Diagnosis of Hip Dysplasia and Instability: A Systematic Review
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Introduction: Evidence concerning the accurate clinical or imaging methods to diagnose hip instability or hip dysplasia is currently scarce. There is a need to summarize the diagnostic accuracy of clinical and imaging tests for the diagnosis of hip dysplasia and instability.

Materials Methods: A computer-assisted literature search of MEDLINE, CINAHL, and EMBASE databases using keywords related to diagnostic accuracy of the hip joint was conducted on March 6th, 2018. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses of Diagnostic Test Accuracy Studies (PRISMA-DTA) guidelines was used for the search and reporting phases of the study. Quality assessment of bias and applicability was conducted using the Quality of Diagnostic Accuracy Studies-2 tool (QUADAS 2). Diagnostic accuracy, including sensitivities (SN), specificities (SP), likelihood ratios (+LR and -LR) and 95% confidence intervals (CI) were summarized.

Results: Out of 3109 citations, seven articles were included. Two studies reported on five clinical tests for hip instability and five studies reported on five radiographic measures for hip dysplasia. Only one study reached high methodological quality. The Prone instability test moderately improved positive posttest probability by 38% to diagnose hip instability. The Shenton line moderately to highly improved posttest probability by 41% to 60% to diagnose hip dysplasia.

Conclusion: This systematic review summarizes the diagnostic accuracy of various clinical tests and radiographic measures for hip instability and hip dysplasia. Further high-quality studies are necessary to examine the diagnostic accuracy of the clinical examination and radiography to assist in ruling in or ruling out the diagnosis of hip dysplasia and instability. Consensus is required to standardize definition of these diagnoses and their reference standard.

TITLE	The Temporal Pattern of Recovery in Eccentric Hamstring Strength Post-Soccer Specific Fatigue.
AUTHOR(S)	Dr David Rhodes, Dr Matt Greig
AFFILIATIONS	University of Central Lancashire, Edge Hill University

Background/Aim: Eccentric hamstring strength is an aetiological risk factor for soccer injury. The temporal pattern of recovery post-exercise is critical in injury management.

Methods: 18 male professional soccer players completed baseline assessments of eccentric hamstring strength at isokinetic speeds of 60, 150 and 300°·s⁻¹. Post SAFT[®] measures were repeated immediately, +24hrs, +48hrs and +72hrs. Main effects for recovery time and testing speed in average torque (AvT), peak torque (PT) and the corresponding angle (θ) were supplemented by regression modelling to describe the temporal pattern of recovery.

Results: A main effect for isokinetic testing speed was observed in PT and AvT. A main effect for recovery time highlighted greater strength pre-exercise, with a quadratic pattern to temporal recovery highlighting minima achieved at between 40-48 hrs.

Conclusion: Strength parameters are not fully recovered until 96 hrs post soccer specific fatigue, with implications for training design and injury management, particularly within fixture-congested periods.

TITLE	Effects of delivering a written physical activity prescription during a specific consultation of physical activity counselling realized by a sports and exercise physician: a pilot study
AUTHOR(S)	Dr. Mathieu Saubade ¹ MD, Jessica Dreyfus ² Msc student, Dr. Christos Karatzios ^{1,3} MD, Cyril Besson ¹ Msc, Prof. Charles Benaim ¹ MD-PhD, Prof. Vincent Gremeaux ¹ MD-PhD
AFFILIATIONS	¹ Swiss olympic medical center, Division of physical and rehabilitation medicine, Lausanne University Hospital - CHUV; ² Institute of sports sciences, University of Lausanne; ³ Division of physical and rehabilitation medicine, Lausanne University Hospital - CHUV, Lausanne, Switzerland.

INTRODUCTION: Prescription of physical activity (PA) is highly recommended as a non-pharmacological powerful prevention intervention in primary care. Sport and exercise medicine (SEM) physicians are trained to gain specific skills for this task.

MATERIALS AND METHODS: Data of patients who benefited from a consultation targeting PA counselling at the Swiss Olympic Medical Center of the University hospital of Lausanne between march 2016 and may 2018 were collected. All data from the initial consultation (IC) and the last consultation documented (LC) were compared retrospectively by the Wilcoxon signed-rank test.

RESULTS: This pilot study included 60 patients (age = 45.8 ± 13.6 years; 66.7% of women; 88.33% with BMI > 25 kg/m²; number of consultation = 3.23 ± 1.45; follow up period = 242.17 ± 159.27 days). The mean total scores of the International Physical Activity Questionnaire (short form version) at IC and LC for patients who received a written PA prescription (PAP) (56.67% were 1939.7 ± 2068.8 MET-minutes/week and 4854.1 ± 3165.3 MET-minutes/week, respectively (p=0.00017); and 4107 ± 3004.2 MET-minutes/week and 5115.5 ± 2921.2 MET-minutes/week (p=0.124397) for patients who didn't receive any PAP (43.33%), respectively. No difference was found concerning the effects on PA among patients who were addressed to a specialist in adapted PA, or those who received a physiotherapy prescription, at IC and LC. Among patients whose IPAQ category was low at IC, 36.4 % and 50 % raised to a moderate and high IPAQ category at LC, respectively, and 75 % of patients whose IPAQ category was moderate at IC raised to a high IPAQ category at LC.

CONCLUSION: This study highlights the importance of delivering a written PA prescription, and demonstrates interesting effects of a consultation of PA counselling realized by a SEM physician. Further studies are needed to improve our knowledge on efficient tools to promote PA.

TITLE	Does the sensory organization test discriminate between athletes and non-athletes?
AUTHOR(S)	Fausto Romano^{1,2}, Giovanni Bertolini^{1,2}, Alessandra Ventura², Karin Mani², Dominik Straumann¹, Mario Bizzini², Nina Feddermann-Demont^{1,2}
AFFILIATIONS	¹ Department of Neurology, University Hospital Zurich and University of Zurich, Zurich Switzerland ² Swiss Concussion Center, Schulthess Clinic, Zurich, Switzerland

Introduction
Evidence in literature indicates that sports activities may contribute to enhanced postural stability in athletes. It has been suggested that practice of highly skilled movements, that involve sensory systems for postural control, leads to improvements in balance.

Performing the Sensory Organization Test (SOT), a standard test for evaluating sensory interactions in balance control, we aim at investigate: (1) if athletes have a more stable standing posture than non-athletes (2) if different postural strategies are used across different sports (3) if the SOT can detect subtle balance changes.

Material and Methods
120 athletes (70 Hockey, 20 Football, 30 Handball players) and 20 non-athletes were recruited. The SOT was performed using computerized dynamic posturography system (EquiTest) to assess subjects' ability to use visual, proprioceptive and vestibular cues to maintain postural stability in upright stance. Specifically, 20 features were computed from COM and COP signals as measures of postural steadiness.

Results
Standard COM-based features provided by the EquiTest did not show any significant difference between athletes and non-athletes, although they are commonly used to identify balance problem in elderly and vestibular patients. More surprising, no significant differences between non-athletes and athletes and between the different sports were detected using our CoP-based feature set.

Conclusion
Our negative findings suggest two possible explanations: (1) Considering that the discriminatory ability of a test depends on task complexity, SOT is not enough challenging to differentiate between athletes and non-athletes (2) the specific modalities of postural regulation developed with sports are not always transferable to upright stance situations, as such abilities can be specific to a particular task.

TITLE	"Pas à Pas": an innovative and collaborative project to project to promote physical activity
AUTHOR(S)	Dr. Mathieu Saubade ¹ MD, Marie Zollinger ² Msc, Yan Ueltschi ³ Msc, Marion Falbranz ⁴ Msc., Stephanie Locicero ⁵ PhD, Raphael Bize ⁶ MD, MPH, Sanda Samitca ⁷ PhD, Fabio Peduzzi ⁸ , Alexia Fournier ⁹ PhD, Dr. David Nanchen ¹⁰ MD, MSc.
AFFILIATIONS	¹ Department of ambulatory care and community medicine, Policlinique Médicale Universitaire; ² Swiss Olympic Medical Center, Physical and rehabilitation medicine division, University Hospital of Lausanne - CHUV; ³ Promotion Santé Vaud, Canton de Vaud; ⁴ University Institute of Social and Preventive Medicine, University of Lausanne, Lausanne, Switzerland

INTRODUCTION: "Pas à Pas" ("step by step") is a pilot project initiated in 2015 by the Canton de Vaud (french-speaking part of Switzerland) to support physically underactive people towards a behaviour change. "Pas à Pas" allows GPs to refer the PA evaluation, counselling and follow up to specialists in adapted physical activities (APA) through a specific prescription. APA sessions are free and consist in supervised, individualized and motivational primary prevention approach. They create a link between health professionals in contact with sedentary publics and PA offers organized in the regions. Consultant medical experts (internal medicine, public health, exercise and sport medicine) help the successful completion of the project.

MATERIALS AND METHODS: A « Plan, Do, Check, Act » method allowed to improve the PA referral scheme during the first year of the project. Data collected by the specialists in APA have been analysed. Moreover, an external formative evaluation through focus groups and literature review has been realized.

RESULTS: Between the 15.09.2015 and the 16.09.2017, 50 physicians referred 198 patients to the 3 specialists in APA of the project, with a total of 153 patients evaluated. Many interesting strengths and some limitations are highlighted. This project helps the local population to be more active with interesting motivational effects, in accordance with medical literature. Different recommendations have been established for the implementation of the project.

CONCLUSION: "Pas à Pas" is an innovative project permitting GPs to delegate PA counselling and follow up of their patients to specialists in APA, with well-appreciated results. This project proposes a practical solution to promote PA, especially in people with noncommunicable diseases and could represent an interesting model to broadcast within Switzerland and others countries.

TITLE	Effects of a specific consultation of physical activity counselling realized by a sports and exercise physician: a pilot study
AUTHOR(S)	Dr. Mathieu Saubade ¹ MD, Jessica Dreyfus ² Msc student, Dr. Christos Karatzios ^{1,3} MD, Cyril Besson ¹ Msc, Prof. Charles Benaim ¹ MD-PhD, Prof. Vincent Gremeaux ¹ MD-PhD
AFFILIATIONS	¹ Swiss olympic medical center, Division of physical and rehabilitation medicine, Lausanne University Hospital - CHUV; ² Institute of Sports Sciences and physical education; ³ Division of physical and rehabilitation medicine, Lausanne University Hospital - CHUV, Lausanne, Switzerland.

INTRODUCTION: Physical activity (PA) counselling is increasingly encouraged and sports and exercise medicine (SEM) physicians have a key role to play. Data about the effects of a specific consultation in PA counselling realized by a SEM physician remain scarce.

MATERIALS AND METHODS: Data of patients who underwent to a consultation specialized in PA counselling developed by the Swiss Olympic Medical Center of the University hospital of Lausanne between march 2016 and may 2018 were collected. All data from the initial consultation (IC) and the last consultation documented (LC) were compared retrospectively by the Wilcoxon signed-rank test.

RESULTS: This pilot study included 60 patients (age = 45.8 ± 13.6 years; 66.7% of women; 88.33% with BMI > 25 kg/m²; number of consultation = 3.23 ± 1.45; follow up period = 242.17 ± 159.27 days). The mean total scores of the International Physical Activity Questionnaire (short form version) completed by each patient at IC and LC were respectively 2878.9 ± 2718.6 MET-minutes/week and 4967.4 ± 3039.2 MET-minutes/week (p=0.00013). The mean waist circumference at IC and LC were respectively 105.1 ± 20.5 cm and 102.4 ± 20.6 cm (p=0.02064). Mean weight, BMI, waist-hip ratio, systolic/diastolic blood pressure and heart rate showed no significant differences between IC and LC.

CONCLUSION: A specific consultation of PA counselling realized by a SEM physician appears to be efficient with significant increase of PA over a period of more than 6 months. A prospective study is necessary to confirm these results and seek for potential further clinical improvements.

TITLE	The efficacy of physiotherapy interventions for FAIS: A systematic review of the literature.
AUTHOR(S)	Dr Joanne Kemp ¹ , Mark Scholes ¹ , Dr Andrea Mosler ¹ , Dr Harvi Hart ¹ , Dr Mario Bizzini ² , Dr Steven Chang ³ , Professor Kay Crossley ⁴
AFFILIATIONS	¹ La Trobe University, Bundoora, Australia ² Schulthess Klinik, Zurich, Switzerland

Introduction
The purpose of this systematic review was to report the efficacy of physiotherapy interventions in improving pain and function in young and middle-aged adults with hip pain, including those with FAIS.

Materials and Methods
This systematic review was conducted according to the PRISMA guidelines. A comprehensive search strategy on June 15, 2018, identified studies that investigated patients aged 18 to 50 years who undertook physiotherapy interventions, and reported outcomes relating to pain, function and/or quality of life. The Cochrane Risk of Bias Tool was used to rate methodological quality. Effect sizes were calculated where sufficient data were present.

Results
1720 papers were retrieved from the search. After exclusion criteria were applied, 13 studies were included for analysis. All included studies demonstrated a high risk of performance and detection bias. There were no full-scale placebo-controlled RCTs of physiotherapy.

When compared to control interventions in both non-operative and post-operative patient groups, effect sizes ranged from moderate effect sizes favouring the control (-0.57[-0.94 to -0.20]); to large effect sizes (0.80[0.60 to 1.00]) favouring the physiotherapy intervention. For within-group change pre- to post-physiotherapy intervention, effect sizes ranged from small, non-significant effects (0.06[-0.34 to 0.20]) to large positive effect sizes favouring the physiotherapy intervention (2.19[1.94 to 2.44]). Physiotherapy interventions that were of at least 3 months duration demonstrated the largest positive within-group change (0.57[0.38 to 0.76] to 4.39[3.81 to 4.98]).

Conclusion
Physiotherapy interventions may improve pain and function in patients with FAIS for up to 2 years. However, further full-scale high quality RCT studies are required.

TITLE	Clinical and Radiological Effects of Platelet-rich Plasma on Interstitial Supraspinatus Lesion: A Prospective, Randomized, Double-blind, Placebo-controlled Trial
AUTHOR(S)	A.J. Schwitzgebel ^{a,b} , J. Tirefort ^a , F.C. Kolo ^a , A. Nowak ^b , A. Kourhani ^c , V. Gremeaux ^b , A. Lädermann ^{a,d,e}
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Introduction
Symptomatic interstitial superior rotator cuff tear management remains challenging, as conservative management is rarely fully effective, and surgical management requires a long recovery period. Our aim is to assess effectiveness of ultra-sound guided platelet-rich plasma infiltrations (PRP) on the supraspinatus interstitial tear healing.

Methods
We conducted a randomized, double-blind, controlled trial involving 80 patients suffering from a symptomatic isolated supraspinatus tendon interstitial tear. Patients received two intratendinous injections separated by 1 month, of either PRP (n=41) or saline solution (n=39). The primary outcome was tear size evolution, measured on magnetic-resonance arthrogram performed at baseline and at month 7.

Results
Pre-operative patient demographics and baseline characteristics did not differ between the two groups. At 7 months, there were no significant differences between the PRP and control groups in terms of decrease in lesion size (0.3±23.6 mm² vs 8.1±84.6 mm²; p=0.18), reduction of pain on Visual Analogic Scale (VAS) (2.3±3.0 vs 2±3.0; p=0.59), improvement of Single Assessment Numerical Evaluation (SANE) score (16.7±20 vs 14.2±29.0; p=0.65), Constant score (8.6±13.0 vs 10.6±19.0; p=0.60), or American Shoulder and Elbow Surgeons (ASES) score (19.5±20.0 vs 21.9±28.0; p=0.67). Adverse effects (frozen shoulders and extension of lesion to bursal or articular surface) were more frequent in the PRP group (22/41) compared to the control group (10/39). At final follow-up, 7 patients (17%) in the PRP group had surgical repair of the rotator cuff compared to only 2 patients (5%) in the control group.

Conclusions
PRP was not superior to saline injection regarding supraspinatus interstitial tear healing and clinical outcomes improvement. We observed a clinical and radiological improvement on the merged PRP and placebo groups between months 0 and 7. More side effects were observed on the PRP group.

TITLE	OSTEOARTHRITIS OF THE KNEE – A MASSIVE CONCERN IN FORMER ELITE FEMALE FOOTBALL PLAYERS.
AUTHOR(S)	Philippe M. TSCHOLL ¹ , Sana BOUDABBOUS ² , Astrid JUNGE ³ , Annika PRIEN ^{3,4} .
AFFILIATIONS	¹ Department of Orthopaedics and Traumatology, University Hospital of Geneva, Geneva, Switzerland ² Department of Musculoskeletal Radiology, University Hospital of Geneva, Geneva, Switzerland ³ Medical School Hamburg, Hamburg Germany ⁴ Department of Public and Occupational Health, Amsterdam Collaboration on Health and Safety in Sports, VU University Medical Center, Amsterdam, Netherlands.

INTRODUCTION: osteoarthritis of the knee is a frequent complain in former elite male football players as early as 10-15 years after their professional career. No comparative data exist in former female football players and its influence on quality of life.

METHODS: forty-nine former female professional football players, with a mean career length of 10±5 years, having ended their football activity 9.5±4 years previously, agreed on participating in this cross-sectional research study. A semi-structured interview was performed to collect information on football-related knee injuries during their career. Current complains were assessed using KOOS. A standardized MRI was performed on both knees to assess meniscus and cartilage injuries.

RESULTS: 60 % of all knees were injured at least once and nearly every second knee underwent surgery (n=47). Anterior cruciate ligament (ACL) surgery was performed in 37% of the players, and in 25% of the players bilaterally. 45% of the players were asymptomatic in terms of KOOS score, and 22% of the knee, no femorotibial cartilage lesion ≥3 according to Outerbridge was found. ACL surgery was associated with lateral meniscal extrusion (p=0.01). Partial meniscectomy before their twenties doubled the risk of cartilage lesions than when ACL surgery was performed. KOOS score was not affected by ACL surgery, but significantly by partial meniscectomy at follow-up.

CONCLUSION: the incidence of osteoarthritis to the knee is at least as high in former female as male football players. Especially early partial meniscectomy (more than ACL surgery) leads to early onset of symptomatic knee osteoarthritis.

TITLE	DETERMINING FACTORS FOR SPORTS PARTICIPATION 2 TO 3.5 YEARS AFTER ANTERIOR CRUCIATE LIGAMENT –RECONSTRUCTION
AUTHOR(S)	Philippe M. TSCHOLL ¹ , Suzanne GARD ¹ , Phaeton ANGELLOZ-PESSEY ² , Maximilian SCHINDLER ¹ , Lara ALLET ³ .
AFFILIATIONS	¹ Department of Orthopaedics and Traumatology, University Hospital of Geneva, Geneva, Switzerland ² Medical School, University of Geneva, Switzerland ³ Department of Community Medicine, University Hospitals and University of Geneva, Geneva, Switzerland

INTRODUCTION: Return to sports after anterior cruciate ligament reconstruction (ACL-R) shows satisfactory results, whereas two to three years postoperatively, sports activity levels are decreasing. The aim of the study was to assess sports activity levels at a minimum of 2 years after ACL-R and investigate on persisting complains in patients returning to their initial sport (RTP) or that changed their sports activity (RTP).

METHODS: All patients that underwent primary/isolated ACL-R between October 2013 and June 2015 with isometric strength testing 6 to 9 months postoperatively, were eligible for this study. They were contacted by phone and answered a structured questionnaire upon their current sports activity and persisting complaints.

RESULTS: Fifty-six of 73 of the contacted patients were willing to participate (18 female, 30±8 years) with a medium follow-up of 3 years (range: 1.9 to 3.7). RTS was found 75% (N = 42) and RTP in 23%. One patient did not return to any sporting activity, 21% of the RTS were symptom-free, whereas 33% felt some sort of apprehension, pain (20%) or muscular weakness (10%). The most frequent reason to RTP was apprehension (38%), loss of motivation (31%) and pain (8%). The isometric strength testing could not predict either RTS/RTP.

CONCLUSION: Apprehension and post-operative pain are frequent, and equally found in patients with RTS or RTP at 3 years after surgery. Early strength test results alone at 6 to 9 months seem not to be of any benefit to predict RTP or RTS.

TITLE	MRI Assessment of ligaments and cartilage in the pediatric and adolescent elbow.
AUTHOR(S)	Patrick Vavken, MD (1); Carlo Camathias, MD (2)
AFFILIATIONS	(1) Alphaclinic Zurich, Kraftstrasse 29, 8044 Zurich (2) Department of Orthopaedics, University Childrens Hospital Basel, Basel

Introduction:
Elbow injuries in young athletes are a concern in sportsmedicine due to increasing incidence and difficult imaging. The purpose of this study was to define "normal values" for elbow MRI findings in pediatric/adolescent patients.

Methods:
65 studies from patients aged 11 ± 4 years were analyzed. Testing for collateral ligaments and cartilage (including pseudodefects), stratified by physical status. All assessments were done in independent duplicate.

Results:
9 MRIs (13%) did not allow assessment because of poor quality/artefacts. In skeletally mature patients, the radial and ulnar collateral ligament were clearly discernable in 94% and 77%, measuring 1.5 ± 0.6 mm and 1.9 ± 0.6, compared to 55% and 59% in the immature patients with a mean thickness of 1.1 ± 0.6 and 1.4 ± 0.6 mm (significant difference for both discernability and size (p<0.05)). 42% of all patients with closed physes had a posterior pseudodefekt in the capitulum, compared to 17% in the skeletally immature patients (p=0.08).

Conclusions:
10% of elbow MRIs in this pediatric population could not be assessed reliably. In skeletally immature patients, i.e. those most likely to suffer from OCD or little league elbow, assessment of the collateral ligaments is limited. Thus management of elbow instability should put appropriate weight on proper clinical assessment. Pseudodefects, which are seen in 85% of asymptomatic adult patients, are encountered in 42% of adolescents but only 17% of immature patients. Thus any irregularity in the cartilage of the pediatric elbow patient should be further assessed with the utmost diligence.

TITLE	Arthroscopic stabilization for posterolateral elbow instability
AUTHOR(S)	Patrick Vavken, MD
AFFILIATIONS	Alphaclinic Zurich, Kraftstrasse 29, 8044 Zurich

Introduction:
Posterolateral Rotational Instability (PLRI) is an important problem in sportsmedicine, especially since it is frequently misinterpreted as lateral epicondylitis/tenniselbow. Treatment consists of ligament reconstruction with a tendon graft, requiring open surgery and graft harvest with all associated risks and potential complications. The objective of this study was to prospectively follow 10 patients undergoing arthroscopic elbow stabilization with suture-anchors instead of classic reconstruction.

Methods:
10 patients with clinical signs and MR-findings of PLRI were included in this study after having given informed consent. Elbow arthroscopy was performed and PLRI-II-III confirmed. The elbow was stabilized by reattaching the lateral ulnar collateral ligament and extensor tendons with suture anchors. Endpoints were VAS pain (0-10), ROM, the Mayo Elbow Performance Score (MEPS) and the Andrews Carson Score (ACS).

Results:
The mean age was 44 years (95%CI 35-53), 60% male. 4 patients had a history of trauma, all others had been treated for lateral epicondylitis with an average of 2.2 (95%CI 1-4) corticosteroid injections and physiotherapy. There were statistically significant and clinically relevant improvements in all endpoints with a reduction in pain by 5.4 pts (95%CI 4.6-6.3) and improvement in MEPS by 37.2 pts (95%CI 28-47) and ACS by 59 pts (95%CI 50-68). There was no significant reduction in extension (-1°, 95%CI -2.9-3.8) or flexion (-1.7°, 95%CI -0.8-4.0). There were no complications, one patient did report occasional tenderness to touch over the knots.

Conclusions:
Arthroscopic stabilization provided a statistically significant and clinically relevant improvement in this prospective cohort of patients with "II-III PLRI".

TITLE	Arthroscopic shoulder stabilization in U18 athletes – complications and day-to-day shoulder function.
AUTHOR(S)	Patrick Vavken, MD
AFFILIATIONS	Alphaclinic Zurich, Kraftstrasse 29, 8044 Zurich

Introduction:
Young age and competitive sports, especially overhead, are known risk factors for shoulder instability. While surgical success rates are well published, less attention has been given to complications and day-to-day shoulder function

Methods:
Data on 150 shoulder stabilizations in U18 athletes with a minimum follow-up of 2 years were reviewed. Included endpoints were complications, readmissions for treatment, and surgical revisions within 2 years of the index procedure.

Results:
141 patients (105 male / 36 female) with a mean age of 15 ± 1 years were included for a total of 150 procedures. The mean follow-up was 50 ± 16 months. 2% the patient had to be re-admitted for pain management. 1% suffered from a transient neurologic dysfunction (ulnar neuropraxia, diffuse brachial plexus dysfunction, and axillary paresthesia). There were no perioperative infections of thrombotic events. 12% suffered from recurrent instability. 8% required a surgical revision within 2 years. 3% had recurrent instability that was not surgically revised. 34% required another round of PT or an injection at a mean of 1.4 after the initial surgery. There was no effect of age (p=0.705) or type of procedure (p=0.670) on the these findings.

Conclusion:
Complication and revision rates in U18 athletes undergoing arthroscopic shoulder stabilization are similar to those reported for adults. Interestingly, one third (I) required additional physical therapy in the second year after surgery, stressing the importance of a sound and ongoing training regimen postoperatively.

TITLE	Headache response to symptom-based constant and interval aerobic training in a concussed ice-hockey player with cardiovascular system dysautonomia. A case study.
AUTHOR(S)	Alessandra Ventura MSc¹, Mario Bizzini PhD, PT^{1,3}, Giovanni Bertolini PhD^{1,2}, Antonella Palla MD^{1,2,5}, Nina Feddermann MD^{1,2,4}
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Introduction: Headache is frequent after concussion substantially limiting successful return to sport (RTS). Among others, it can be caused by cardiovascular system dysautonomia (dCVS). RTS usually includes sub-symptom threshold constant intensity aerobic training (ssCIT). Interval training (osIT) including over-symptom threshold intervals has not been documented yet.

Aims: Investigation of ssCIT and osIT on headache in a concussed 22-years-old female ice-hockey player with dCVS signs.

Methods: ssCIT at 80% of peak heart rate (HR peak) determined at baseline following a cycle ergometer incremental test until symptom-threshold (increase of symptoms intensity ≥ 3 on a numeric rating scale 0-10). Protocol was performed during 2 months. Thereafter, protocol was switched to osIT for 1.5 months. Incremental test was assessed at baseline, after ssCIT and after ssCIT + osIT.

Results: Exercise duration and HR peak increased after ssCIT and ssCIT + osIT and headache intensity decreased of 67% and 100%, respectively.

Conclusions: Neither ssCIT nor ssCIT + osIT lead to headache-symptom exacerbation after training. Headache improved after ssCIT and resolved after ssCIT + osIT. osIT was well-tolerated with no side-effects. Further studies on a larger population of concussed athletes with dCVS have to establish whether osIT is superior compared to ssCIT in headache improvement and, thus, possibly contributing to faster RTS.

TITLE	Artificial Intelligence to Understand Concussion: Retrospective Cluster Analysis on Balance and Vestibular Diagnostic Database of Patients after Head Trauma
AUTHOR(S)	Rosa Visscher^{1,2}, Nina Feddermann-Demont^{2,3}, Fausto Romano^{2,3}, Dominik Straumann^{1,3}, and Giovanni Bertolini^{2,3}
AFFILIATIONS	¹ Institute for Biomechanics, ETH Zurich, Zurich, Switzerland ² Swiss Concussion Center, Schulthess Clinic, Zurich, Switzerland ³ Department of Neurology, University Hospital Zurich and University of Zurich, Zurich Switzerland

Introduction
 Concussion patients show alterations in clinical outcomes spreading over a variety of domains. We propose a bottom-up, machine-learning approach on objective vestibular and balance diagnostic data of patients after head trauma to provide insight into differences in patients' phenotypes independently of existing diagnosis (unsupervised-learning).

Material and Methods
 Diagnostic data from a battery of validated balance and vestibular assessments, epidemiological data and symptoms reported by patients were extracted from the database of the Swiss Concussion Center. Symptoms were not used for cluster analyses. Complex (Self-Organizing Map - SOM) and standard (k-means) clustering tools were used and formed clusters were compared.

Results
 96 patients (81.3% male, age (median [IQR]): 25.0[10.8]) expected to suffer from concussion or post-concussive syndrome (52[140] days between diagnostic testing and concussive episode) were included. Cluster evaluation indicated dividing the data into two groups. Only the SOM gave a stable clustering outcome, dividing the patients in group-1 (n=38) and group-2 (n=58). The larger significant difference was found in Caloric summary score for maximal-speed-of-the-slow-phase, where group-1 scored 30.7% lower than group-2 (27.6[18.2] vs 51.0[31.0]). Group-1 also scored significantly lower on Sensory-Organization-Test composite score (69.0[22.3] vs 79.0[10.5]) and higher on Visual-Acuity (-0.03[0.33] vs -0.14[0.12]) and Dynamic-Visual-Acuity (0.38[0.84] vs 0.20[0.20]). Group-1 tended to report headache, blurred vision and balance problems more frequently than group-2 (>10% difference).

Conclusion
 The SOM divided the data into one group with prominently vestibular disorder and another with no clear vestibular or balance problems, demonstrating that artificial intelligence could help improving the diagnostic process.

TITLE	Hip and groin problems in Swedish elite ice hockey: Seasonal prevalence, duration and relation to self-reported function in the beginning of the new season
AUTHOR(S)	Tobias Wörner, MSc (1); Kristian Thorborg, Ass. Prof. (2); Frida Eek, Ass. Prof. (1)
AFFILIATIONS	<ol style="list-style-type: none"> (1) Department of Health Sciences, Lund University, Sweden (2) Sports Orthopaedic Research Center - Copenhagen (SORC-C), Department of Orthopaedic Surgery, Copenhagen University Hospital, Amager-Hvidovre, Denmark

INTRODUCTION
 The prevalence of hip and groin problem in ice hockey is unknown and suspected to differ between playing positions. This study aimed to describe the seasonal prevalence of hip and groin problems in male ice hockey players, as well as its relation to self-reported hip and groin function in the beginning of the new season. Furthermore, potential differences between playing positions were explored.

MATERIAL AND METHODS
 Swedish male ice hockey players [Mean age (SD): 24 (5)], active on an elite-level of play (N=329) responded to an online survey, assessing history and duration of hip and groin problems in the previous season and current self-reported hip and groin function [Copenhagen Hip and Groin Outcome Score (HAGOS)].

RESULTS
 Prevalence of hip and groin problems during the previous season was reported by 48% of players (median duration 3 (IQR: 1-4) weeks). Prevalence of hip and groin problems leading to time-loss (median duration 3 (IQR: 1-4) weeks) was reported by 29.5%. Players with problems during the previous season had worse HAGOS-scores than players without such experience (p<0.001). Players with longest symptom duration (≥ 6 weeks) presented with worst HAGOS-scores (p \leq 0.026). No differences were found between playing positions.

CONCLUSION
 Regardless of playing position, hip and groin problems were very prevalent in male ice hockey, being experienced by half of all players and leading to time-loss for three in 10 players. Players with hip and groin problems during the previous season had significantly worse hip and groin function in the beginning of the new season.

TITLE	Seasonal prevalence of hip and groin problems in elite female ice hockey players and relation to self-reported function in the beginning of the new season
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INTRODUCTION
 The prevalence and severity of hip and groin problems in women's elite ice hockey is unknown. Aim of this study was therefore to describe seasonal prevalence and duration of hip and groin problems in women's elite ice hockey, as well as the relation to self-reported hip and groin function in the beginning of the new season.

MATERIAL AND METHODS
 Sixty-nine elite players [Mean age (SD): 22 (5)] from the Swedish Women Hockey League responded to an online survey, assessing history and duration of hip and groin problems in the previous season and current self-reported hip and groin function [Copenhagen Hip and Groin Outcome Score (HAGOS)].

RESULTS
 Prevalence of hip and groin problems during the previous season [median duration: 1.5 weeks (IQR: 1-2.25)] was reported by 60.9% (N=42) of all players. Prevalence of hip and groin problems leading to time-loss [median duration: 1.5 weeks (IQR: 1-2.25)] was reported by 21.6% (N=18) of players. Players with hip and groin problems during the previous season had worse HAGOS scores in the beginning of the new season compared to players without history of such problems (p \leq 0.01).

CONCLUSION
 Hip and groin problems are very prevalent in female elite ice hockey. Three in five players reported to have had hip and groin problems during the previous season. One in four players missed training and matches due to hip and groin problems. Players with hip and groin problems during the previous season had significantly worse hip and groin function in the beginning of the new season.

TITLE	Copenhagen five-second-squeeze testing in 333 male ice hockey players: how are hip and groin symptoms, strength and sporting function related?
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INTRODUCTION
 Aim of this study was to investigate correlations between five-second-squeeze test (5SST), self-reported hip and groin related sporting function and strength in ice hockey players. Furthermore, discriminative ability of the 5SST traffic light approach [Numeric pain rating scale (NRS): 0-2=green; 3-5=yellow; 6-10=red] regarding different levels of self-reported function and strength was investigated.

MATERIAL AND METHODS
 Professional and semi-professional male ice hockey players (n=333) performed the 5SST and responded to the sport-subscale of the Copenhagen Hip and Groin Outcome Score [HAGOS (Sport)]. Bilateral adduction and abduction strength was obtained by hand-held dynamometry. Correlation coefficients (rho), standardized effect sizes (ES) for differences in strength (Cohen's d) and self-reported function (r) were provided.

RESULTS
 The 5SST correlated significantly to self-reported function (rho = .319; p<0.01) and hip muscle strength (rho = -.157 to -.305; p \leq 0.01). HAGOS (Sport) differed significantly between all traffic light groups (ES= 0.23-0.33; p \leq 0.005). Players with NRS > 2 (yellow and red) had lower adductor (ES \geq .73; p < 0.001) and abductor strength (Yellow: ES = .29; p = 0.031; Red: ES: .52; p = 0.052) than players with green light.

CONCLUSION
 The 5SST correlated significantly with self-reported function and hip muscle strength in ice hockey players. The traffic light approach was able to discriminate regarding self-reported function. Players with yellow and red light had reduced adductor and abductor strength compared to players with green light (NRS \leq 2). Hence, regular 5SST-testing may allow early identification of these players likely benefiting from load management and hip muscle strengthening.

TITLE	Self-reported hip function and performance based measures in patients following hip arthroscopy compared to an asymptomatic control group – A cross sectional study
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INTRODUCTION
Little is known about the physical impairments that may be related to residual hip pain and impaired sport function in patients following hip arthroscopy (HA). This study aimed to compare subjective and objective hip function between HA-patients 6-10 months after surgery and a healthy control group. Furthermore, it was aimed to compare patients' objective function between the surgically treated hip and the contralateral hip.

MATERIAL AND METHODS
Thirty-five HA patients (Mean 8.1 months (SD=2.5) post-operatively) and 34 healthy participants matched on gender-, age-, and activity level were cross-sectionally compared regarding self-reported hip function [Copenhagen Hip and Groin Outcome Score (HAGOS)], hip range of motion [ROM (Flexion, internal-, external rotation)], isometric hip muscle strength (adduction, abduction, flexion, internal-, external rotation) and performance based measures (PBMs: Y-balance test (YBT), medial and lateral hop test, Illinois agility run test)].

RESULTS
HA-patients had significantly worse HAGOS scores ($p<0.001$) and less ROM (Mean diff= 4.2° - 9.5° ; p 's= <0.04) than controls. Besides reduced flexion strength [Mean diff: 0.18 nm/kg; $p=0.026$] and less posterior-medial YBT reach (Mean diff: 6.3 cm; $p=0.021$), no significant differences in strength or PBMs were found. No within group difference was found between surgically treated hips and contralateral hips.

CONCLUSION
HA-patients had significantly worse subjective hip-function than controls 6-10 months after surgery, but comparable objective hip function except for measures relating to hip-ROM and hip flexion strength. Results of this study suggest that patients remain to have impairments in hip-ROM as well as hip flexion strength 6-10 months after HA and following rehabilitation.

TITLE	Effects of a multifaceted treatment including running retraining with visual feedback on iliotibial band syndrome in runners: a double case report
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Introduction: Iliotibial Band Syndrome (ITBS) is a common running injury. Biomechanical alterations in running kinematics can be a cause. Treatment usually include hip abductors strengthening, manual therapy modalities and neuro-muscular coordination training. The goal of this study was to assess the effects of a multifaceted approach including running retraining sessions with visual feed-back.

Method: Two subjects with ITBS were assessed in terms of pain and running distance, abductors muscle strength, iliotibial band flexibility and biomechanical factors while running with a 2D video analysis in frontal plane. The treatment consisted in manual therapy, muscle strengthening and stretching exercises at home, neuro-muscular coordination exercises and running retraining with visual feed-back.

Results: The two subjects were able to run without pain in an increased distance. Biomechanical factors in running and tension in iliotibial band were also improved. Only one subject improved his hip abductors strength.

Discussion: Few studies assess the effects of a multifaceted approach or running retraining in ITBS treatment, with results similar to the current study. Other studies show modifications in running kinematics for subjects with ITBS compared to controls, especially in frontal plane, but also in transversal and sagittal planes. A 3D video analysis could be useful to assess more precisely the effects of a running retraining with visual feed-back.

Conclusion: Multifaceted approach including running retraining with visual feed-back has positive effects in pain, running distance, running kinematics and others secondary outcomes in two subjects with ITBS.

