

FRI. 24.04.26

Prevention and education strategies to support athletes.

FROM 8:00 A.M | OLYMPIC MUSEUM OF LAUSANNE, QUAI D'OUCHY 1, LAUSANNE, SWITZERLAND



In partnership with

Conference Program



**PREVENTION
AND EDUCATION
STRATEGIES TO
SUPPORT ATHLETES**

07H30 | Doors Open

Opening Remarks

08H10 | Didier Hannouche (HUG)
08H15 | Jane Thornton (IOC)

Welcome Address
Protecting and promoting the health of the athlete –
the IOC approach

Session 1 - Prevention / Education in Different Groups of Athletes

moderated by Pascal Édouard & Camille Tooth

08H30 | Jean-François Kaux (ULiège/CHU Liège)
08H50 | Margo Mountjoy (McMaster University)
09H10 | Gaël Guilhem (INSEP)
09H30 | Discussion

Overuse injuries in young athletes: Between performance
pressure and long-term health preservation

“Shrink it and pink it” doesn’t work!: Injury prevention
in female athletes – the IOC Consensus Statement

Individualized injury prevention for elite athletes:
Looking back at both sides of the olympic medal

Keynote

moderated by Jean-François Kaux

09H45 | Tim Meyer (Saarland University)

The art of research in prevention: Methodological
challenges when investigating how to prevent cardiac
events vs. how to prevent injuries

10H25 | **Coffee Break**

Session 2 - The Challenge of Implementation - an International Federation’s Perspective

moderated by Torbjørn Soligard & Philippe Tscholl

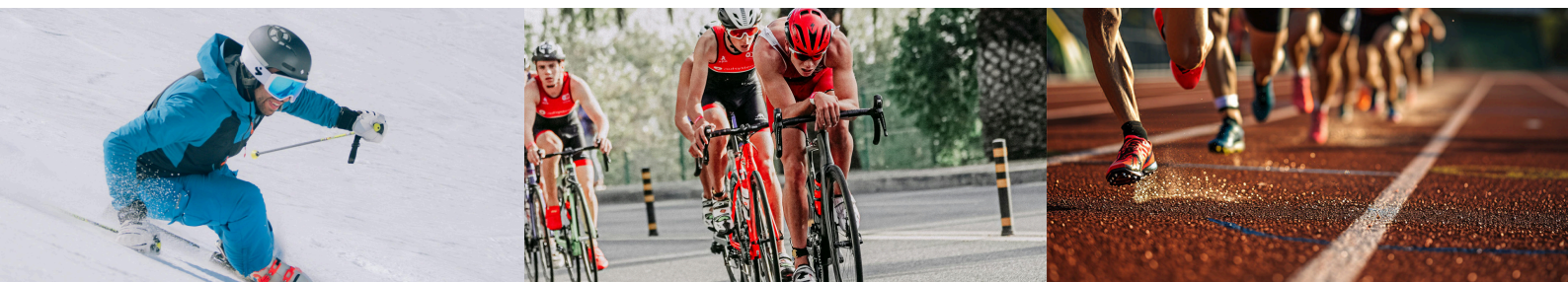
10H55 | Jörg Spörri (Balgrist University Hospital)
11H15 | Hanspeter Betschart (Swiss Olympics)
11H35 | Silvia Giagio & Paolo Adami (World Athletics)
11H55 | Discussion

Risk management in competitive alpine skiing -
Every piece of the puzzle counts

Prevention is performance - How Swiss Olympic protects
athletes around the Olympic Games

World Athletic’s approach: Integrating pelvic
floor health into athlete prevention

12H10 | **Lunch and Poster Walk**



Conference Program



PREVENTION AND
EDUCATION
STRATEGIES TO
SUPPORT ATHLETES

Session 3 - Promoting Prevention and Education

moderated by Gabrielle Ostiguy & Alexis Ruffault

13H30 | Katy Seil (LIROMS)

13H50 | Camille Tooth (ReFORM)

14H10 | Phillippe Tscholl (HUG)

14H30 | Discussion

Between likes and invisible Injuries: Mental health in athletes in the digital era

Education and prevention in low-resources countries - Lessons learned from the S-MOVE project
Easy tools in daily practice

14H45 | **Abstracts presentations**
moderated by Phillippe Tscholl & Camille Tooth

The best 3 abstracts

15H00 | **Coffee Break**

15H30 | **Award Ceremony**

Keynote

moderated by Gaël Guilhem

15H35 | Pascal Edouard (Université Jean Monnet)

Sports injury prevention: My lessons learnt throughout my experiences as clinician and research

Session 4 - Education / Prevention through technologies

moderated by Marc-Antoine Démaret & Jennifer Fayad

16H15 | Laurent Navarro (École nationale supérieure des Mines de Saint-Étienne)

Prevention through technologies

16H35 | Yosra Mekki (University of Oxford)

Education through AI

16H55 | Paolo Panichelli (FIA)

Computer-aided engineering for vehicle safety in motorsport

17H15 | Discussion

Closing remarks

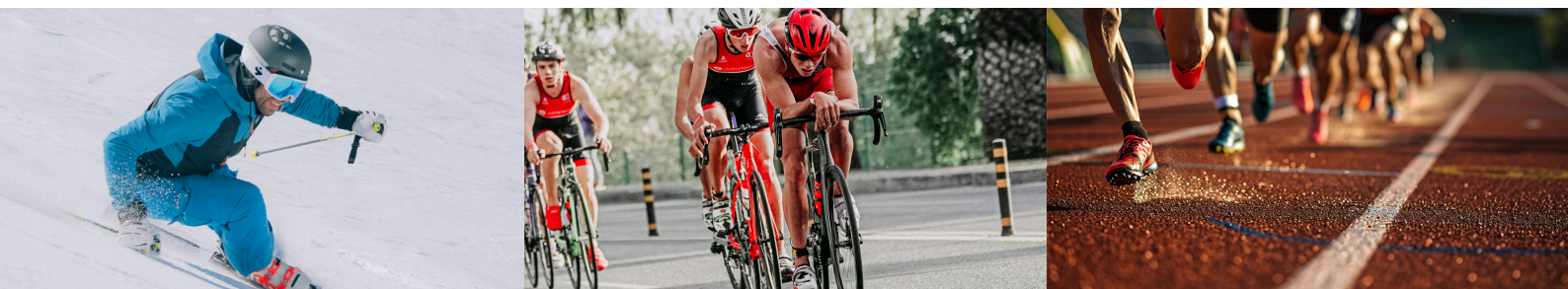
17H30 | Didier Hannouche (HUG)



Hôpitaux
Universitaires
Genève



In partnership with



FIXATION CHARACTERISTICS AND PUPIL DIAMETER IN INDIVIDUALS WITH CHRONIC ANKLE INSTABILITY COMPARED TO HEALTHY CONTROLS DURING A COGNITIVE-BALANCE DUAL-TASK: A CROSS-SECTIONAL STUDY

Alexandre Maricot^{1,2}

¹*Faculty of Physical Education and Physiotherapy, Human Physiology and Sports Physiotherapy Research Group, Vrije Universiteit Brussel, Brussels, Belgium.*

²*Luxembourg Institute of Research in orthopedics, Sports Medicine and Science (LIROMS), Luxembourg, Luxembourg*

Objective: To determine whether chronic ankle instability (CAI) alters visual behaviour when performing a balance task concurrently with a visual-cognitive task.

Methods: A cross-sectional study design was used to assess visual behaviour, balance and cognitive performance under dual-task conditions. Sample size was a priori determined to be 37 with an effect size of $f^2 = 0.5325$ ($\alpha=0.05$, power=0.90). Twenty patients with CAI and 20 healthy controls (CON) were included according to the international ankle consortium guidelines. They were instructed to respond as fast and accurately as possible to the visual-cognitive task without losing balance. Visual behaviour was quantified via fixation parameters and average pupil diameter, recorded continuously over the five-minute Color-word Stroop task performed on the self-reported most affected leg. Balance was evaluated using centre of pressure (CoP) measures: CoP area, path length and velocity, alongside cognitive performance indices: visuomotor response time and accuracy.

Results: No significant differences were revealed by the Kruskal-Wallis test in fixation parameters (adjusted p-value = 0.457-1.000, $\eta^2 = 0.0002$ -0.014), balance performance (adjusted p-value = 0.672-0.822, $\eta^2 = 0.001$ -0.015), or cognitive outcomes (adjusted p-value = 0.626-0.874, $\eta^2 = 0.0006$ -0.026) between groups. However, a significant difference in pupil diameter was found before the Benjamini-Hochberg correction (CAI: 4.8 (± 0.6), CON: 5.2 (± 0.3), $p = 0.042$, adjusted p-value = 0.167, $\eta^2 = 0.107$).

Conclusion: Individuals with CAI show no significant differences in visual behaviour compared to healthy controls. Effect sizes were negligible to small across all outcomes, except pupil diameter, which showed a medium effect warranting further investigation.

EYE TRACKING AND CONCUSSION: IMPACT OF SAMPLING FREQUENCY ON THE RELIABILITY AND ACCURACY OF KEY OCULOMOTOR OUTCOMES

M-A. Démaret^{1,2}

¹*Hôpitaux Universitaires de Genève, Genève, Switzerland*

²*ReFORM IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Liège, Belgique*

Objectives: Eye-tracking is increasingly used to detect oculomotor dysfunction after sport-related concussion, yet the impact of sampling frequency on measurement validity remains poorly defined. This study aims to quantify how reductions in sampling frequency affect accuracy and reliability of key oculomotor metrics, using 1000 Hz acquisition as reference standard. A secondary objective is to determine minimal sampling frequency that preserves metrological quality for diagnostic, monitoring, and field-based sport applications.

Methods: Eye movements were recorded from 50 healthy senior rugby players using a high-fidelity eye tracker (EyeLink 1000 Plus) sampling at 1000 Hz under controlled laboratory conditions. Participants completed two tasks: a rapid number-reading saccadic task adapted from the King-Devick test and a smooth pursuit task involving tracking of a predictable moving target. Downsampled datasets were generated from the original recordings to simulate common acquisition frequencies (500, 240, 120, 60, and 30 Hz). Outcome measures relevant to concussion assessment included saccadic latency, saccadic accuracy, smooth pursuit velocity gain, and disconjugacy indices. Within-subject comparisons were performed between each frequency condition and the 1000 Hz reference. Reliability and agreement analyses will include intraclass correlation coefficients and frequency-dependent comparisons.

Results: All acquisitions have been completed. Downsampling procedures and computation of oculomotor metrics are currently in progress. Preliminary analyses are expected in March, with full results available by May.

Conclusion: This study will clarify frequency-related measurement bias and identify acquisition thresholds compatible with reliable oculomotor assessment. Findings are expected to guide deployment of eye-tracking technologies for concussion evaluation and monitoring in real-world sport settings.

OVERCOMING THE LIMITS OF KINEMATIC ANALYSIS: RUNNING COORDINATION AFTER ACL RECONSTRUCTION IN YOUNG PATIENTS

J. Fayad¹, A. Tamang¹, C. Wojtylka¹, T. Neto¹, R. Seil^{1,2}

¹Luxembourg institute for Research in Orthopedics, Sports Medicine and Science (LIROMS)

²Centre Hospitalier du Luxembourg, Division of Neurosciences and Musculoskeletal Diseases, Luxembourg

Objectives: Return-to-sport (RTS) assessments following anterior cruciate ligament reconstruction (ACLR) often show limited inter-limb differences during running 9–12 months post-surgery. In comparison, limb asymmetries persist in jumping tasks even after patients meet RTS criteria. Joint coordination analysis may provide additional insight into neuromuscular adaptations not captured by traditional kinematic measures. This study investigated interlimb coordination during running at RTS after ACLR using a vector coding approach to determine whether coordination analysis detects alterations that may explain persistent jump asymmetries.

Methods: ACLR patients undergoing RTS evaluations performed treadmill running at a self-selected speed. Running kinematics were collected using a motion capture system (Qualisys AB, Sweden). Lower limb joint angles were calculated in the sagittal and frontal planes. Mid-stance joint angles were compared between operated and contralateral limbs. Proximal–distal joint couplings (hip–knee and knee–ankle) were constructed in both planes. A modified vector coding technique generated angle–angle plots and coupling angles across the stance phase.

Results: Forty-five ACLR patients (30 males, 15 females; age 17.7 ± 2.3 years) were included. Kinematic analysis revealed reduced sagittal plane knee and ankle range of motion on the operated side. Coordination analysis identified significant interlimb differences in the hip sagittal–knee frontal and knee sagittal–ankle frontal coupling angles.

Conclusion: Although kinematic metrics were limited to reduced sagittal plane motion, coordination analysis revealed persistent changes in joint coupling patterns at RTS. These findings suggest that adaptations persist in the operated limb, indicating altered movement organization beyond isolated joint range of motion.

LOAD MANAGEMENT IN VOLLEYBALL ACADEMY IN SWITZERLAND: THE KNOWLEDGE AND PRACTICE OF ATHLETES AND COACHES: A QUALITATIVE APPROACH

L. Fischer^{1,2}, S. Williams¹, P. Tscholl², S. Bekker¹

¹*Department for Health, University of Bath, United Kingdom*

²*Department of Orthopaedic Surgery and Traumatology, Swiss Olympic Medical Center, Geneva University Hospitals, Geneva, Switzerland*

Objectives: Youth athlete development models and consensus recommend load management to prevent injury. However, its application remains challenging due to internal factors (e.g. growth and maturation) and external factors (e.g. playing on multiple teams and school obligations). This study aimed to understand athletes' and coaches' perspectives on the application of load management in a volleyball academy.

Methods: A qualitative approach was used. Five focus groups were conducted with 24 athletes and two coaches. Data were audio-recorded, transcribed, and analyzed with the Framework method.

Results: Five themes were identified: (1) communication, (2) load monitoring, (3) load management, (4) barriers, and (5) facilitators. Communication is the primary tool for load monitoring and management, enabling individualized training load modification in team sports, but it is influenced by the coach-athlete relationship, resulting in high variability among athletes. Load management is done quantitatively through periodization and the calendar (one day off per week) and qualitatively through communication. Barriers arise at the individual, financial, and structural levels, such as the mismatch between clubs' performance focus and the academy's athlete development focus, which creates load management challenges. Facilitators include athletes' social support from family and friends and the coaches' ability to manage load on an individual basis.

Conclusion: Communication is essential for monitoring and managing load. Clear explanations of athletes' and coaches' roles, rights, and duties could foster mutual respect, creating a trustworthy relationship that improves communication. To this end, the involvement of higher-level stakeholders is necessary to support coaches in creating a safe environment for youth athlete development.

IMPACT OF MENISCAL RAMP LESIONS ON POSTOPERATIVE FUNCTIONAL OUTCOMES FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

M. Gauthier^{1,2}, P. M. Tscholl^{1,2}

¹*Department of Orthopedics and Traumatology, University Hospital of Geneva, Rue Gabrielle-Perret-Gentil 4, 1205 Geneva, Switzerland*

²*Réseau francophone olympique de la recherche en médecine du sport (ReFORM), IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Geneva, Switzerland*

Objectives: Meniscal ramp lesions have been linked to increased knee instability, potentially leading to poorer postoperative outcomes. This study aims to evaluate the impact of ramp lesions on postoperative functional outcomes following anterior cruciate ligament (ACL) reconstruction.

Methods: Patients undergoing ACL reconstruction with quadriceps tendon (QT) or hamstring tendon (HT) autografts between 2015 and 2020 were retrospectively reviewed. At 9 months postoperatively, outcomes were evaluated using ACL-RSI scores, stability tests, muscle strength, and jump tests. Patients were grouped by the presence (group A, n=69) or absence (group B, n=187) of ramp lesions. Groups were compared based on the side-to-side difference in GNRB (Δ GNRB), as well as limb symmetry index (LSI) in concentric quadriceps (60°/s, cQ) and concentric/excentric hamstring strength (60°/s cH, 90°/s eH), and jump performance.

Results: 256 patients (180 men, 76 women) were included in this study, with a mean age of 27 years. Graft types were similar between Group A (70% QT, 30% HT) and Group B (77% QT, 23% HT). There were no significant differences between groups in postoperative ACL-RSI scores (61 vs 65), Δ GNRB (0.4mm vs 0.4mm), cQ (76% vs 79%), cH (93% vs 94%), eH (85% vs 89%), 3-single leg (91% vs 86%) or side hop test (92% vs 91%).

Conclusion: The presence of ramp lesions did not significantly influence postoperative functional stability, muscle strength, or psychological readiness for return to sports in this cohort. These findings suggest that when adequately treated during ACL reconstruction, ramp lesions may not impair early functional recovery.

DYNAMIC KNEE ALIGNMENT DURING GAIT: A NEW STANDARDISED ASSESSMENT PROTOCOL

E. Giraudeau¹, J. Fayad¹, A. Tamang¹, C. Wojtylka¹, R. Seil^{1,2}

¹Luxembourg institute for Research in Orthopedics, Sports Medicine and Science (LIROMS)

²Centre Hospitalier du Luxembourg, Division of Neurosciences and Musculoskeletal Diseases, Luxembourg

Introduction: ACL injuries are becoming increasingly common among young people, leading to major surgeries such as knee replacement. Knee osteotomy is an alternative approach that reduces the load in the knee improving knee alignment. Frontal knee alignment is defined by 3 main angles: mechanical Hip Knee Ankle angle (mHKA), Medial Proximal Tibial Angle (MPTA) and Lateral Distal Femoral Angle (LDFA). Currently, only static long-leg radiographs are used to determine these angles. We hypothesize that frontal knee alignment changes during gait and may provide more information about surgical correction needed.

Methods: To assess frontal knee alignment, a protocol consisting of gait analysis using 11 marker-based cameras (100Hz, Qualisys, Sweden) and 2 force plates (1000Hz, Arsalis, Belgium) was developed. Joint centers, defined in Visual 3D (HAS-MOTION, Canada), and an IOR lower limb marker set with additional markers on the tibial condyles, enable mHKA, MPTA, LDFA computations. This protocol will be tested on 10 patients undergoing knee osteotomy. Patients' radiographs are used for comparison with static trials.

Results: Three patients have been recruited so far, showing changes in mHKA, MPTA and LDFA during the stance phase. LDFA values depend on the varus/valgus of the patient, whereas mHKA and MPTA present more consistency in angles changes. Preliminary comparisons between static radiographs and gait trials depict a consistent difference only for LDFA.

Discussion / Conclusion: These preliminary results show that mHKA, MPTA and LDFA are computable dynamically. Joint line convergence angle will be used to improve marker placement accuracy through comparison to static radiographs.

THE 'VICIOUS CIRCLE' OF INJURIES: A MARKOV CHAIN ANALYSIS OF 177 ATHLETICS ATHLETES FOLLOWED OVER 20 WEEKS USING DAILY INJURY DATA COLLECTION

S. Iatropoulos¹, P-E. Dandrieux¹, K. Hollander², L. Navarro³, P. Edouard^{1,4}

¹Université Jean Monnet Saint-Etienne, Lyon 1, Université Savoie Mont-Blanc, Laboratoire Interuniversitaire de Biologie de la Motricité, F-42023, Saint-Etienne, FRANCE.

²Institute of Interdisciplinary Exercise Science and Sports Medicine, MSH Medical School Hamburg, Hamburg, Germany

³Centre CIS, F-42023, Mines Saint-Etienne, Univ Lyon, Univ Jean Monnet, Laboratoire Interuniversitaire de Biologie de la Motricité, Saint-Etienne, France

⁴Department of Clinical and Exercise Physiology, Sports Medicine Unit, University Hospital of Saint-Etienne, Faculty of Medicine, Saint-Etienne, France

Objectives: To explore (1) the risk of injury according to the number of previous injuries, and (2) the risk of the athletes' health status to worsen relative to its current impact on athletics participation.

Methods: Athletics athletes (n=177) allocated to the control group of a randomised controlled trial (I-ReductAI - Clinicaltrial.gov: NCT06805162), without altering their usual practice, provided daily injury (i.e., any self-reported musculoskeletal complaint) data through online questionnaires, during 20 weeks. Using Markov chains to model the state transitions from one day to the following, we determined the probabilities of (1) sustaining an injury with partial or full participation restriction (ICPR) depending on the number of previous such injuries, and (2) transitioning between the four health states (i.e., healthy, injury with full, partial, or no participation) on a day-to-day basis. Comparisons between any two probabilities were based on their risk ratio and its 95% confidence interval [95%CI] derived from bootstrapping.

Results: We analyzed 10375 athlete-days. The risks of a 2nd and 3rd ICPR were 4.5 [1.4 - 19.4] and 6.2 [1.3 - 92.4] times higher than the previous ICPR's risk (i.e., 1st and 2nd), respectively. Compared with being healthy, experiencing an injury with full participation at a given day had significantly higher risk of transitioning to an injury with partial (ratio = 9.6 [6.1 - 15.3]) or no (ratio = 6.4 [3.4 - 12.7]) participation the following day.

Conclusion: These results support the concept of the 'vicious circle' of injuries in a day-to-day basis.

EFFICACY OF INTRA-ARTICULAR INJECTION IN FEMOROACETABULAR IMPINGEMENT IS ASSOCIATED WITH PREOPERATIVE CLINICAL SCORES BUT NOT WITH IMAGING SEVERITY

N. Kerkour¹, H. Bouredoucen², D. Hannouche^{1,3}, M. Gauthier^{1,3}

¹*Department of Orthopedics and Traumatology, Geneva University Hospital, Rue Gabrielle-Perret-Gentil 4, 1205 Geneva, Switzerland*

²*Division of Radiology, Department of Imaging and Medical Informatics, Geneva University Hospital, Rue Gabrielle-Perret-Gentil 4, 1205 Geneva, Switzerland*

³*Réseau francophone olympique de la recherche en médecine du sport (ReFORM), IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Geneva, Switzerland*

Objectives: Femoroacetabular impingement (FAI) causes hip pain in young adults. Cam-type is defined by an increased alpha angle, while pincer involves acetabular overcoverage assessed by LCE angle or retroversion. Intra-articular hip injections are used for diagnostic and therapeutic purposes. This study evaluated whether the efficacy and duration of preoperative cortisone injections correlate with preoperative clinical severity and imaging findings.

Methods: This retrospective study included symptomatic FAI patients treated with hip arthroscopy or open surgery (2023-2026) who had preoperative radiographs and CT, cortisone hip injection, and completed clinical scores. LCE and acetabular retroversion were assessed on radiographs, alpha angles on CT. Injection efficacy was classified as complete or partial, and injection duration as >1 month or ≤1 month. Preoperative assessment included Tegner Activity Scale (TAS), iHOT-33, HOS-ADL, HOS-SS, and HAGOS.

Results: Thirty patients (mean age 30) were included: 14 cam-type and 16 mixed-type. Mean alpha angle was 66°, mean LCE 32°, and 40% had acetabular retroversion. Injection efficacy was complete in 24 patients and partial in 6 patients; 13 reported relief >1 month. No associations were found between groups regarding sex, age, BMI, and preoperative duration of symptoms. Patients with partial injection efficacy had lower HOS-SS (32 vs 54). No associations were found with other scores. Injection duration was not associated with demographic variables and clinical score. No associations were found between radiological parameters and injection efficacy and duration.

Conclusion: Greater sport-related functional impairment was associated with poorer injection. Injection efficacy and duration were independent of demographic and imaging severity factors.

THE TIMING OF RISK: TEMPORAL DISSOCIATION BETWEEN PEAK BIPLANAR KNEE MOMENTS AND ACL STRAIN IN PROFESSIONAL FOOTBALLERS

T. Mann¹, S. Bagheri¹, M. Baniasad¹, V. Seifi², M. Bouri¹

¹*Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland*

²*FIFA Medical Center of Excellence, Tehran, Iran*

Introduction: Non-contact anterior cruciate ligament (ACL) injuries in professional football predominantly occur during specific situational patterns, including pressing, tackling, and pivoting. These patterns fundamentally consist of high-intensity change-of-direction (COD) maneuvers that require the athlete to rapidly transition their center of mass while the pivot limb is subjected to complex, multiplanar loading. While external multiplanar loads specifically the combination of knee abduction and rotation moments are established risk indicators [1], recent evidence suggests that internal ACL strain is an equally critical factor. However, the temporal relationship between external loading and internal ligament strain remains poorly understood. This study investigated whether peak multiplanar knee moments align temporally with peak ACL strain during a reactive COD task.

Method: Twenty-five male professional soccer players (19 ± 1.5 years; 172.4 ± 32.0 cm; 72.8 ± 7.3 kg) performed a landing maneuver followed by an immediate change of direction. Kinematic data were captured using a 10-camera Vicon system (100 Hz), while kinetic data were recorded via two Kistler force plates (1000 Hz). A minimum of three trials per direction (left/right) were collected. Musculoskeletal modeling was performed in OpenSim v4.5 using a modified Gait2392 model augmented with additional knee degrees of freedom (rotation and abduction/adduction) and a passive ACL element [3]. The knee rotation, abduction and flexion moments were computed as well as ACL's length throughout the landing phase, from initial contact until the foot off of the pivoted limb. All the analysis was performed for the pivot leg, which is often the leg opposite the direction of movement. Knee abduction and rotation moments were calculated throughout the stance phase; the vector norm of these two components was defined as the biplanar transverse knee moment. Simultaneously, ACL strain was measured as the percentage of ligament elongation relative to its static standing length. The temporal offset was then calculated to determine the 'timing gap' between these two events: the point of maximum ligament stretch (peak strain) and the point of maximum external twisting force (peak moment). If these two happen at the same time, they can create a high risk profile meaning that the max force is applied at the moment that ACL is elongated maximally.

Results: Analysis of 50 limbs revealed a consistent temporal dissociation between external loading and internal ligament deformation (Fig 2). Specifically, maximum ACL strain consistently occurred significantly later than the peak biplanar transverse knee moment, with a mean delay of 214 ± 143

ms. This indicates that peak ACL elongation is not driven by the initial kinetic impact, but rather reached during the late-stance stabilization phase.

Conclusion: The clinical significance of these findings lies in the "timing gap" between maximum ligament stretch and maximum external twisting force. If these events synchronize, they create a "perfect storm" risk profile, where the highest force is applied precisely when the ACL is maximally elongated and most vulnerable. For clinical practice and Return-to-Play assessment, that would be better not look at maximum loading alone. Injury risk assessment must evaluate whether peak loads are applied to an elongated vs. a relaxed ACL. A high load applied to a relaxed ligament may be less hazardous than a moderate load applied to a maximally elongated one.

References:

[1] Donelon TA et al. Biomechanical determinants of knee joint loads associated with increased anterior cruciate ligament loading during cutting. *Sports Med* 2020; 6(53).

[2] Chaudhari AMW et al. ACL-injured subjects have smaller ACLs than matched controls. *Am J Sports Med* 2009; 37(7).

[3] Kar J. et al A musculoskeletal modeling approach for estimating anterior cruciate ligament. *Ann Biomed Eng* 2013; 41(2).

A CULTURAL PERSPECTIVE ON SPORT-RELATED CONCUSSION: RECOVERY DURATIONS DIFFER BETWEEN FRENCH-SPEAKING CANADIAN AND EUROPEAN ATHLETES

G. Martens^{1,2}

¹*Réseau Francophone Olympique de la Recherche en Médecine du Sport (ReFORM), IOC Research Centre for Injury Prevention and Protection of Athlete Health, Liège, Belgium*

²*NeuroRecovery Lab, GIGA-Consciousness, University of Liège, Liège, Belgium*

Objectives: To investigate symptom resolution and return-to-sport (RTS) timelines across geographical regions and demographic subgroups within a large international cohort of French-speaking athletes.

Methods: An anonymous online survey circulated among the ReFORM IOC Research Centre partner athletes collected sociodemographic variables and concussion history. Self-reported duration of SRC symptoms and time to RTS were contrasted by geographic origin (Canada vs. Europe) and a multivariate logistic regression was applied to evaluate the combined influence of origin, sex, age group (minor vs. adult), level of play (amateur vs. professional), and SRC risk category (low/moderate/high) on prolonged recovery.

Results: 998 athletes completed the survey (Canada = 635; Europe = 363), among which 409 indicated at least one SRC history. Canadian athletes reported significantly longer symptom durations than European ones (median 30 days; interquartile range [IQR] 14–91 versus 7 days; IQR 2–21; Wilcoxon $p < 0.001$). Likewise, RTS durations were extended in the Canadian cohort (28 days; IQR 14–61 versus 10 days; IQR 7–21; $p < 0.001$). The multivariate analysis demonstrated both Canadian origin and female sex were independently associated with greater odds of prolonged symptom duration (>14 days) and delayed RTS (>20 days). Age category, professional status, and SRC risk did not significantly predict extended durations.

Conclusion: In this international sample of French-speaking athletes, SRC recovery timelines differed markedly by geography and sex, with European athletes and males reporting shorter symptom and RTS durations. Implementation of injury prevention strategies should account for context-specific characterization of injuries, including recovery patterns.

COMPARISON OF POSTURAL CONTROL AND ANKLE RANGE OF MOTION BETWEEN PARTICIPANTS WITH AND WITHOUT HISTORY OF LOWER-LIMB INJURY

N. Nenad^{1,2}, J. Stevan^{1,3}, D. Vujičić¹, K. Žiga^{4,5}

¹*College of Health Sciences, Academy of Applied Studies Belgrade, Serbia*

²*University of Belgrade, Institute for Medical Research, Belgrade, Serbia*

³*University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia*

⁴*Faculty of Health Sciences, University of Primorska, Slovenia*

⁵*Ludwig Boltzmann Institute for Rehabilitation Research, Vienna, Austria*

Objectives: To examine the relationship between ankle dorsiflexion range of motion (RoM) and postural sway in individuals with prior lower limb injury, compare balance performance between injured and uninjured limbs as well as between injured and uninjured participant groups.

Methods: 25 participants (age 22.84 ± 4.5) were recruited where 14 were with a history of unilateral leg injury and 11 without history of injury. They underwent assessment of ankle dorsiflexion RoM using the knee-to-wall test. Postural sway was measured during 20-second single-leg stance with eyes closed using an IMU sensor placed on the sacrum which measures angular displacement as proxy for postural sway. Time-domain and frequency-domain variables were derived.

Results: Ankle RoM on the injured side showed no significant correlations with any postural sway variable (all $p \geq 0.054$). Within-participant comparisons revealed significantly greater mean sway position in the anterior-posterior (Y) direction on the injured leg compared to the uninjured side ($p = 0.003$). Between-group comparisons showed that injured participants had significantly greater mean sway position in the mediolateral (X) direction than uninjured controls ($p = 0.016$).

Conclusion: No differences were found in the association between ankle dorsiflexion RoM and postural sway after leg injury, and the majority of postural sway parameters were not affected by injury history. However, injury history was associated with anterior sway shift on the injured leg compared to uninjured leg, and medial sway shift versus uninjured individuals. These findings suggest that some sensorimotor adaptations may persist pre- or post-injury and support targeted preventive balance interventions.

CYCLOPS SYNDROME AFTER ACL RECONSTRUCTION: CELLULAR DRIVERS AND THERAPEUTIC TARGETS

I. Nikolic¹, P. Tscholl², L. Clerc², M. Gauthier², L. Morici¹, C. Lamy³, O. Jordan¹, G. Borchard¹

¹*Institute of Pharmaceutical Sciences of Western Switzerland, University of Geneva, Geneva, Switzerland*

²*Department of Orthopaedic Surgery and Musculoskeletal Trauma, University Hospital of Geneva, Geneva, Switzerland*

³*Department of Anatomy, Faculty of Medicine, University of Geneva, Geneva, Switzerland*

Fibrosis is a consequence of dysregulated tissue repair driven by persistent inflammation, sustained fibroblast activation, and excessive extracellular matrix (ECM) deposition. In the knee joint, fibrosis manifests as arthrofibrosis, a complication frequently observed after knee surgery.

In this project, we explore Cyclops syndrome, a mechanistically underexplored complication after ACL reconstruction, affecting approximately 10% of patients. It is characterized by the formation of a fibrotic nodule (Cyclops lesion) anterior to the graft, which limits knee extension, causes pain/swelling, requiring revision surgery as the only treatment option. Despite its clinical relevance, the underlying biological mechanisms remain poorly understood.

We hypothesize that Cyclops syndrome arises from a failure to resolve postoperative inflammation, leading to the emergence of functionally reprogrammed pro-fibrotic cell populations within a hypoxic and mechanically stressed microenvironment, locking the tissue in a state of unresolved fibrosis.

The aim of this study was to investigate the cellular and histological composition of Cyclops lesions, to identify key molecular biomarkers and potential druggable targets.

Analyses were performed on patient biopsies. Cyclops lesions appeared as highly vascularized fibroproliferative structures with a disorganized, porous architecture. Two main cell populations were identified: CD206⁺ macrophages and activated fibroblasts (FAP⁺). Cells were further cultured to form 3D spheroids to mimic the *in vivo* environment. Selected inhibitors of ECM cross-linking enzymes showed good safety profiles and promising trends in reducing IL-6 production, a key pro-inflammatory and pro-fibrotic marker.

Future studies will focus on single-cell phenotyping, while integrating patient clinical data to provide further insights into the risk factors.

CONCUSSION MANAGEMENT IN MOTOR SPORT DRIVERS: KNOWLEDGE, PRACTICES, AND TRAINING NEEDS OF FRENCH GENERAL PRACTITIONERS

G. Novert¹, M-A. Démaret^{2,3}

¹*Université Bourgogne Europe*

²*Hôpitaux Universitaires de Genève, Genève, Switzerland*

³*ReFORM IOC Research Centre for Prevention of Injury and Protection of Athlete Health, Liège, Belgique*

Objectives: To assess the knowledge, attitudes, clinical practices, and perceived training needs of French general practitioners (GPs) involved in the management of concussion in motor sport drivers, and to examine whether sports medicine training influences knowledge level and return-to-drive decision-making.

Methods: A national cross-sectional observational study was conducted using an anonymous online questionnaire distributed to GPs involved in issuing medical certificates for Fédération Française du Sport Automobile license holders. The 25-item survey, adapted from the Rosenbaum Concussion Knowledge and Attitudes Survey and international consensus recommendations, explored concussion knowledge, attitudes, clinical management, and return-to-drive decisions. Statistical comparisons were performed according to sports medicine training status and decision-making autonomy.

Results: Seventy-seven physicians completed the survey. Most had no formal sports medicine training (63.6%), and 76.6% reported low to moderate confidence in managing concussion in drivers. Overall knowledge was satisfactory, with over 90% recognizing recurrence risk and the need for medical clearance before return to competition. However, uncertainty remained regarding recovery duration and age-related vulnerability. Physicians with sports medicine training demonstrated significantly higher global knowledge scores than those without training. Higher knowledge levels were also associated with independently assuming return-to-drive decisions, whereas physicians who delegated decisions to specialists had significantly lower knowledge scores. More than 80% expressed a need for motor sport-specific guidelines.

Conclusion: Despite generally adequate knowledge, gaps remain in concussion recovery assessment and return-to-drive decision-making. Concussion-specific guidelines and targeted education may improve decision consistency and reduce the risk of premature return to driving.

CHALLENGES OF INJURY RISK REDUCTION STRATEGY IMPLEMENTATION IN BELGIAN'S PROFESSIONAL MALE FOOTBALL TEAM: A QUALITATIVE ANALYSIS

M. Socheleau^{1,2}, F. Delvaux^{1,2}, Y. Depluvrez³, O. Materne⁴, A. Aguilaniu²

¹*University Hospital of Liège, Belgium*

²*Department of Physical Activity and Rehabilitation Sciences, University of Liège, Belgium*

³*Sport Science Department, Royal Standard Club Liège*

⁴*Sports Medicine Department, K.A.S. Eupen Football Club*

Objectives: This qualitative study aimed to identify barriers and facilitators influencing the implementation of injury risk reduction strategies within a Belgian professional male football club.

Methods: A qualitative analysis using grounded theory methodology was conducted. Eight semi-structured interviews were carried out with key stakeholders from a Belgian professional football male first team: four professional staff (a physiotherapist, a strength and conditioning coach, an assistant coach, and a goalkeeper coach) and four outfield players. Interviews were audio-recorded, transcribed verbatim, and analyzed inductively using Atlas.ti software. Codes were iteratively generated and grouped into higher-order conceptual categories through constant comparison between two researchers.

Results: Four major conceptual categories emerged: i) prevention organization reflects a complex balance between performance demands, workload management, and logistical constraints; ii) individualized screening and data integration are central to injury risk profiling and daily decision-making, requiring accurate clinical interpretation, iii) players' perceptions and prior injury experiences shape their engagement in preventive strategies, varying according to personal injury history and beliefs, iv) interdisciplinary communication and collaboration play a pivotal role despite structural and organisational challenges.

Conclusion: The implementation of injury risk reduction strategies in professional male football is a multifactorial, context-dependent process. Greater success relies on an integrated approach combining individualized programming, appropriate data use, active player engagement, and strengthened interdisciplinary communication. These findings provide contextualised field-based strategies to optimise injury risk reduction and highlight the importance of clear communication pathway between staff and players.

MENSTRUAL CYCLE-RELATED SYMPTOMS AND DISORDERS AND THEIR IMPACT ON PHYSICAL, PSYCHOSOCIAL AND ENVIRONMENTAL DETERMINANTS OF EXERCISE PERFORMANCE: A SCOPING REVIEW

A. Stitelmann^{1,2}, MSc, PT; A-V. Bruyneel², PhD, PT; C. Enea³, PhD; N. Boisseau⁴, PhD.

¹*Department of Orthopedic Surgery and Traumatology of the Musculoskeletal System, Geneva University Hospitals, Geneva, Switzerland*

²*Geneva School of Health Sciences, HES-SO University of Applied Sciences and Arts, Western Switzerland, Geneva, Switzerland*

³*Laboratory MOVE (UR20296), Faculty of Sport Sciences, University of Poitiers, Poitiers, France*

⁴*Laboratoire des adaptations métaboliques à l'exercice en conditions physiologiques et pathologiques (AME2P), Aubière Cedex, France*

Background: Menstrual cycle (MC)-related symptoms and disorders are common in female athletes, but their effects on exercise performance remain insufficiently characterised. Growing evidence highlights that physical, psychosocial, and environmental determinants should be seen as interrelated performance-influencing domains.

Objective: The objective of this scoping review was to synthesise the current evidence on the influence of MC-related symptoms and disorders on exercise performance within a biopsychosocial and environmental framework. Its aims were to (1) examine the physical determinants of subjective and objective performance outcomes, (2) explore psychosocial and environmental moderators, (3) identify variations across sport types and athlete levels, and (4) appraise methodological approaches and limitations.

Methods: Thirty-one studies (from 2003 to January 2025) meeting the Population - Concept - Context criteria (non-hormonal contraceptive users - analysis of MC-related symptoms/disorders and physical, psychosocial, or environmental determinants of exercise performance - any sport type or activity level) were identified.

Results: MC-related symptoms and disorders were consistently linked to perceived performance impairment, although the evidence on the objective outcomes was heterogeneous. The methodological quality of the included studies was generally low, thus limiting comparability. Psychosocial (i.e. stigma) and environmental (i.e., sanitary facilities) factors amplify the MC effect on performance, but these factors remain underexplored.

Conclusion: The available data suggest that MC symptom burden could be a major determinant of perceived exercise performance impairment. Future research should adopt an integrative design that combines physical, psychosocial and environmental perspectives and standardised symptom assessments in order to advance evidence-based, context-sensitive approaches in female sport.

DOES JUMP HEIGHT SYMMETRY REFLECT RTS READINESS? BIOMECHANICAL COMPENSATIONS DURING SINGLE-LEG VERTICAL JUMP IN YOUNG ACLR PATIENTS

A. Tamang¹, J. Fayad¹, C. Wojtylka¹, T. Neto¹, C. Mouton², R. Seil^{1,2}

¹Luxembourg Institute of Research in Orthopedics, Sports Medicine and Science (LIROMS),
Luxembourg

²Centre Hospitalier du Luxembourg, Division of Neurosciences and Musculoskeletal Diseases,
Luxembourg

Introduction: Return-to-sport (RTS) testing after anterior cruciate ligament reconstructions (ACLR) is often based on the Limb Symmetry Index (LSI). However, performance-based LSI measures may overestimate recovery, as they do not account for the biomechanical strategies used to achieve symmetry. As such, vertical jump performance depends not only on the knee but also on the force production and absorption. This study aims to investigate how variations in the LSI influence force production during single-leg countermovement jumps (SL-CMJ) and to identify the biomechanical deficits associated with these variations.

Methods: Kinematic and kinetic data of the lower limbs during SL-CMJ was recorded of patients 8-12 months after ACLR. Comparisons were conducted within-group (operated vs. contralateral limbs) and between-groups (operated) categorized by jump height LSI: Group 1 (LSI < 90%) and Group 2 (LSI ≥ 90%) with a repeated measure ANOVA assessed the significant differences within and between groups.

Results: Forty patients were included (age = 17.4 years; 23 male), 24 with a jump height LSI < 90% (Group 1), and 16 with an LSI ≥ 90% (Group 2). Group 1 showed significantly reduced eccentric ground reaction force (GRF), concentric GRF, and hip extension moment during take-off. Within-group analysis showed greater asymmetries in Group 1 (i.e. hip, knee, and ankle), whereas Group 2 only exhibited asymmetries in ankle dorsiflexion, knee flexion and extension moments.

Conclusions: Our findings suggest that biomechanical deficits extend well beyond the knee function, as patients with jump height LSI < 90% showed reduced eccentric and concentric GRF and reduced hip extension moments.

IMPACT OF A REHABILITATION PROGRAM ON GAIT IN AN ATHLETIC PATIENT WITH SPASTIC DIPLEGIA: A CLINICAL CASE

C. Wojtylka¹, A. Tamang¹, J. Fayad¹, T. Neto¹, J. Azzolin², K. Überham³

¹*Luxembourg Institute of Research in Orthopedics, Sport Medicine and Science (LIROMS), Luxembourg*

²*Service Médecine Physique et de Rééducation, Centre Hospitalier de Luxembourg (CHL), Luxembourg*

³*Service Évaluation et Rééducation Fonctionnelles, Centre Hospitalier de Luxembourg, Luxembourg*

Introduction: Spastic Diplegia (SD) is a form of Cerebral Palsy (CP) characterised by predominantly motor impairment of the lower limbs with additional involvement of the trunk and upper limbs. However, the trunk plays a key role in postural control, contributing to stability and coordination during gait. Rehabilitation targeting the axial segments may improve postural and locomotor control in patient with CP. We hypothesised that a rehabilitation program (RP) focused on the axial segments would improve trunk control and consequently enhance gait kinematic and kinetic parameters.

Methods: A 24-year-old patient with right-predominant SD (GMFCS II) underwent a six-month rehabilitation program supervised by a physiotherapist, including strengthening, coordination and endurance exercises targeting the upper body. Three-dimensional gait analysis was performed before, midway through, and at the end of the programme. Gait kinematics were recorded using a markerless motion capture system (Qualisys AB, 100 Hz, Göteborg, Sweden) and kinetics were measured using two force platforms (Arsalis, 1000 Hz, Louvain-la-Neuve, Belgium).

Results: The results demonstrated improved spatiotemporal gait parameters, with increased walking speed and step length and reduced step width. Regarding kinematic and kinetic parameters, bilateral hip adduction increased during mid-stance, accompanied by reduced pelvic obliquity and lateral thoracic movements during stance. Mediolateral ground reaction force oscillations were also reduced during stance.

Conclusion: A Rehabilitation Program may improve postural control and intersegmental symmetry during gait. These findings suggest that patients with SD may benefit from axial-focused rehabilitation.

24.04.2026

6th ReFORM Symposium



Thank you to our sponsors:



Johnson & Johnson



aptissen >



NEUTROMEDICS AG



SEVIKA MEDICAL

stryker®

