Fast Break

Publication for team medical personnel

June 2022

WELCOME to FAST BREAK!

Welcome to FIBA's quarterly publication. Our goal is to introduce our FIBA Sport Medicine and Sport Science community to newsworthy research topics. We welcome your questions or comments and thank you for your ongoing commitment to FIBA.

MESSAGE FROM THE FIBA MEDICAL COMMISSION

FIBA have been managing to keep its' international competitions going since August 2020. There have been a few individual COVID infections and a couple of outbreaks in teams but, considering the extensive competition involving hundreds of games in 6 continents and thousands of participants, this is a remarkable outcome. What have we learned from this experience?

Firstly, the risk of infection from a basketball competition is low if good preventative measures are followed. This is reassuring.

Secondly, from a FIBA competition perspective, the main infection risk has been in gatherings of groups of individuals and teams. Obviously, we need to remember that there are other important sources of COVID infection for teams such as transport, meetings and social gatherings. Therefore, ultimately the responsibility for managing the infection risk must rest with individuals and teams. In the past, FIBA has provided a platform of strong biosecurity through a series of protocols to protect participants in its' event. Now FIBA is shifting the COVID prevention strategy to a greater reliance on teams, team members and team physicians – provided there are no new emerging Variants of Concern (VOC) that force us to reconsider!

Thirdly, from the way VOCs are still emerging, this pandemic has a fair way to go!

This means the role of the team physician will now include:

- Keeping up to date with the current knowledge regarding COVID
- Educating team members so they have a strong grasp of health risks and appropriate mitigation strategies

- Making team members aware that everyone plays a role in protecting the team
- Overseeing COVID related health problems as they occur in the context of a high performance environment
- Advising federations and teams on testing and vaccination strategies and
- Assisting individuals who have anxiety and resistance to adopting important COVID controls

The FIBA Medical Commission is here to assist team physicians in these important functions. To facilitate this FIBA have mandated that teams should have a team physician with them for all their competitions, at home and away.

Stay well!

Dr Peter Harcourt

Chair, FIBA Medical Commission

MESSAGE FROM THE EDITOR

I suspect that for many of us, our clinical practices are skewed towards care for the able-bodied athlete. Mine certainly is, but not by intention or design. Research[1] has shown that although athletes with a disability have similar injury rates as able-bodied athletes, their use of the 'sport medicine team' differs, frequently defaulting to the rehabilitation model due to familiarity with this manner of care. Despite my involvement with elite basketball for many years I was unaware that wheelchair basketball (WCBB) was an independent federation in collaboration with FIBA.

WCBB was one of the 8 sports that debuted at the first Paralympic Games in 1960. The adaptive game uses the same court dimensions and basket height, and essentially the same FIBA rules as the standing-up game. There is no double-dribble in WCBB but travelling occurs if one carries the ball for more than two pushes of the chair. WCBB is a fast paced, engaging sport that has become one of the premiere Paralympic sports.

In this edition of the Fast Break, I 'chat about' the changes to WCBB classification and the implications that this will have on the adaptive game and competition across the world. I am keen to know your thoughts on this matter and to start a global conversation about issues important to the care of athletes that play basketball, whether that is on two legs or in a chair. I encourage everyone reading this to contribute to the Fast Break publication. If you have an idea, picture or comment you would like to share, please reach out.

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[1] https://doi.org/10.7939/r3-zbw5-8w33

SELECTED PUBLICATIONS OF INTEREST

Not All About the Effort? A Comparison of Playing Intensities During Winning and Losing Game Quarters in Basketball.

International journal of sports physiology & performance. 16(9):1378-1381, 2021

Authors
Fox JL; Green J; Scanlan AT

Abstract
PURPOSE: To compare peak and average intensities encountered during winning and losing game quarters in basketball players.
METHODS: Eight semiprofessional male basketball players (age = 23.1 [3.8]y) were monitored during all games (N = 18) over 1 competitive season. The average intensities attained in each quarter were determined using microsensors and heart-rate monitors to derive relative values (per minute) for the following variables: PlayerLoad, frequency of high-intensity and total accelerations, decelerations, changes of direction, jumps, and total inertial movement analysis events combined, as well as modified summated-heart-rate-zones workload. The peak intensities reached in each quarter were determined using microsensors and reported as PlayerLoad per minute over 15-second, 30-second, 1-minute, 2-minute, 3-minute, 4-minute, and 5-minute sample durations. Linear mixed models and effect sizes were used to compare intensity variables between winning and losing game quarters.
RESULTS: Nonsignificant (P > .05), unclear-small differences were evident between winning and losing game quarters in all variables.
CONCLUSIONS: During winning and losing game quarters, peak and average intensities were similar. Consequently, factors other than the intensity of effort applied during games may underpin team success in individual game quarters and therefore warrant further investigation.

Simplifying External Load Data in NCAA Division-I Men's Basketball Competitions: A Principal Component Analysis.

Frontiers in Sports & Active Living. 4:795897, 2022

Authors
Stone JD; Merrigan JJ; Ramadan J; Brown RS; Cheng GT; Hornsby WG; Smith H; Galster SM; Hagen JA.

Abstract
The primary purpose was to simplify external load data obtained during Division-I (DI) basketball competitions via principal component analysis (PCA). A secondary purpose was to determine if the PCA results were sensitive to load demands of different positional groups (POS). Data comprised 229 observations obtained from 10 men's basketball athletes participating in NCAA DI competitions. Each athlete donned an inertial measurement unit that was affixed to the same location on their shorts prior to competition. The PCA revealed two factors that possessed eigenvalues >1.0 and explained 81.42% of the total variance. The first factor comprised total decelerations (totDEC, 0.94), average speed (avgSPD, 0.90), total accelerations (totACC, 0.85), total mechanical load (totMECH, 0.84), and total jump load (totJUMP, 0.78). Maximum speed (maxSPD, 0.94) was the lone contributor to the second factor. Based on the PCA, external load variables were included in a multinomial logistic regression that predicted POS (Overall model, $p < 0.0001$; AUCcenters = 0.93, AUCguards = 0.88, AUCforwards = 0.80), but only maxSPD, totDEC, totJUMP, and totMECH were significant contributors to the model's success ($p < 0.0001$

for each). Even with the high significance, the model still had some issues differentiating between guards and forwards, as in-game demands often overlap between the two positions. Nevertheless, the PCA was effective at simplifying a large external load dataset collected on NCAA DI men's basketball athletes. These data revealed that maxSPD, totDEC, totJUMP, and totMECH were the most sensitive to positional differences during competitions. To best characterize competition demands, such variables may be used to individualize training and recovery regimens most effectively.

Electrical and Structural Adaption of Athlete's Heart and the Impact on Training and Recovery Management in Professional Basketball Players: A Retrospective Observational Study.

Frontiers in Physiology. 13:739753, 2022.

Authors
Zimmermann P; Moser O; Edelmann F; Schoffl V; Eckstein ML; Braun M

Abstract
Introduction: We analyzed data of 27 professional basketball players to prove cardiac remodeling referring echocardiographic parameters, cardiopulmonary exercise testing (CPET), and 12-lead electrocardiogram (ECG) analyses. The aim of our study was to present different characteristics in the athletes, on the one hand signs of a high vagal tone in the 12-lead ECG as criteria of early repolarization (ER), furthermore echocardiographic remodeling parameters and finally the performance in CPET. Therefore, we divided the cohort into a group with signs of ER pattern in the 12-lead ECG and without these criteria and presented the differences in detail.

Materials and Methods: This was a single-center, retrospective study performed in 27 professional basketball players (age: 26.5 +/- 7.5 years, male: 27, height: 197.2 +/- 12 cm, weight: 100 +/- 17 kg, BMI: 25.7 +/- 3.4 kg/m2). All participants underwent a sports medicine checkup, ECG analysis, transthoracic echocardiographic examination, and a CPET on a cycle ergometer between 2015 and 2019 during their pre-season preparation time. All individuals were healthy people without cardiological advance anamnesis. After assessment, two groups were built based on electrocardiographic criteria of ER pattern and a group without these criteria and compared against each other for parameters of echocardiographic assessment, CPET, and 12-lead ECG analysis. Data were analyzed with Minitab statistic program (Minitab Inc., State College, PA, United States) and Graph Pad Prism 8.2.1 (279; Graph Pad Software, San Diego, CA, United States) using ANOVA testing with post-hoc testing and unpaired t-testing ($p <= 0.05$). Retrospectively additional information was collected referring to the management of training sessions, recovery time, and nutrition by interviewing the athletic training staff in order to understand the principles for individual athlete's training management and physiological and cardiopulmonary interactions.

Results: Comparing professional basketball players with ER pattern to those with no ER pattern, significant differences were found for CPET, echocardiographic, and ECG analysis ($p < 0.05$). Absolute and relativized peak oxygen uptake (VO2 peak; ER 4120 +/- 750 ml/min (39 +/- 5.4 ml/kg/min) vs. non-ER 3556 +/- 393 ml/min (37.2 +/- 5.3 ml/kg/min), $p = 0.018$) and maximum workload during CPET (ER 310 +/- 51.5 Watt (2.94 +/- 0.35 W/kg) vs. non-ER 271 +/- 32 Watt (2.85 +/- 0.49 W/kg), $p = 0.026$) was higher in athletes with an ER pattern. Furthermore, ER pattern athletes showed a higher enddiastolic left ventricular diameter (LVedd; ER 58.3 +/- 7.9 mm vs. non-ER 53.6 +/- 3.6 mm, $p = 0.048$) and a significantly enlarged left atrial (LA) endsystolic

diameter (ER 23.33 +/- 2.71 mm vs. non-ER 20.47 +/- 2.29 mm, p = 0.006) as well as a significantly enlarged right atrial (RA) endsystolic diameter (ER 23.42 +/- 2.15 mm vs. non-ER 20.93 +/- 3.28 mm, p = 0.033). Significant differences between the two compared groups could be revealed for left ventricular mass Index (LVMI gr/m2; LVMI ER 113 gr/m2 +/- 17.5 vs. LVMI non-ER 91.3 gr/m2 +/- 15.1, p = 0.002), but no significant differences for the relative wall thickness were found (RWT; RWT ER 0.49 +/- 0.11 vs. RWT non-ER 0.38 +/- 0.06, p = 0.614).

Conclusion: Professional basketball players with criteria of ER pattern showed different results in CPET and cardiac remodeling as athletes with no ER pattern. These findings should encourage the athletic training staff to emphasize the quality of an individual training schedule for each athlete based on the cardiopulmonary pre-season sport medicine checkup.
Nevertheless, echocardiographic findings, ER pattern, and performance in CPET have to be interpreted referring the sport-specific and athlete's ethnical background.

Impact of hip abductor and adductor strength on dynamic balance and ankle biomechanics in young elite female basketball players.

Scientific Reports. 12(1):3491, 2022 Mar 03.

Authors
Dominguez-Navarro F; Benitez-Martinez JC; Ricart-Luna B; Cotoli-Suarez P; Blasco-Igual JM; Casana-Granell J

Abstract
This study aimed to evaluate, in an isolated and relative manner, hip abductor (ABD) and adductor (AD) strength and to study the extent to which these factors are related to balance and ankle dorsiflexion mobility in young elite female basketball players. Sixty trainee-level elite female basketball players (13-18 years old), who voluntarily agreed to participate in the study, were divided into three subgroups based on competition age divisions (U14, U16, U18). Isometric hip ABD and AD strength in each leg was evaluated using the ForceFrame Strength Testing System, also calculating the strength ratio and imbalance between legs. Y Balance Test (YBT) and ankle dorsiflexion mobility were also assessed. ANOVA was used for between-group differences analysis. Likewise, the impact of hip strength on balance and ankle mobility was analyzed using Pearson's correlation coefficient. A linear regression model for dependent variables was created with all variables that exhibited significant correlations. A between-group comparison analysis for the three competition age subgroups (U14, U16, U18) revealed non-significant differences (p > 0.005) for the hip strength variables except for hip ABD strength. The correlation study showed low-moderate effect sizes for hip ABD (in both the contralateral and homolateral limb) and AD strength (only the homolateral limb) with YBT and ankle dorsiflexion. However, when performing a regression model, only right hip ABD significantly predicted right limb YBT scores (beta = 0.592, p = 0.048). The present study indicated that, although both hip ABD and AD strength correlate with balance and ankle mobility with low-moderate effect sizes, only hip ABD strength was found to significantly predict YBT scores. Therefore, the potential role of hip ABD strength in particular, but also hip AD strength, for monitoring and enhancing balance and ankle mobility outcomes, should be taken into consideration when designing and implementing preventive strategies for lower-limb injuries.

Balancing Injury Risk and Power Development by Weighted Jump Squat Through Controlling Eccentric Loading.

Journal of Strength & Conditioning Research. 35(11):2999-3005, 2021 Nov 01

Authors
Songsupap T; Newton RU; Lawsirirat C

ABSTRACT: Weighted jump squat (WJS) training is highly effective for increasing neuromuscular power but entails higher injury risk than traditional resistance training because of the impact of landing. Braking mechanisms can be used to control the landing impact; however, the optimal eccentric loading condition that balances injury risks and power output is still unclear.
The purpose of this study was to assess different eccentric braking conditions. Twenty-two male varsity basketball players aged 20.8 +/- 1.1 years and a 1 repetition maximum (1RM) of back squat-to-body mass ratio of 2.0 +/- 0.2 participated in the study. The subjects performed 2 sets of WJS of 6 repetitions with additional 30% of 1RM load under 4 randomly assigned conditions: (a) traditional load, no braking (B0), (b) 25% braking load reduction during landing (B25), (c) 50% braking load reduction during landing (B50), and (d) 100% braking load reduction during landing with release at touchdown (B100R). A repeated measures analysis of variance was used to determine differences of dependent variables: peak power output, peak force, peak velocity, and impulse. B100R resulted in statistically lower eccentric peak force and impulse for the first 50 milliseconds than the other 3 conditions ($p < 0.05$), but the largest concentric peak power. Furthermore, B0 resulted in statistically lower concentric peak power and peak velocity than the other 3 conditions ($p < 0.05$). We suggest that B100R was a more favorable loading condition that balanced injury risk and power production in WJS.

Is the King-Devick Test a Reliable Tool in Wheelchair Athletes? A Preliminary Prospective Study in Wheelchair Basketball

Clinical Journal of Sport Medicine. 32(2):e134-e138, 2022 Mar 01

Authors
Richard J; Lin YS; Wernet L; Kasitinon D; Royston A; Bristow K; Garner D; Argo LR

Abstract
OBJECTIVE: (1) To determine the reliability of the King-Devick (KD) test among wheelchair basketball athletes across a season and (2) to compare the KD test time changes among those with and without a clinically suspected concussion.
DESIGN: Prospective, observational study.
SETTING: Division 3 college athletics department.
PARTICIPANTS: Twenty-nine intercollegiate wheelchair basketball athletes.
INTERVENTIONS: Athletes were prospectively monitored for concussions throughout the 2018 to 2019 season. King-Devick testing was completed preseason, midseason, postseason, and after clinically suspected concussions.
MAIN OUTCOME MEASURES: Two-way random effects intraclass correlation coefficient (ICC) was calculated. Friedman's test and pairwise comparison with Bonferroni correction were used to compare for change over time. Mean KD times and changes were compared between athletes with and without suspected concussion.
RESULTS: The KD test demonstrated good test-retest reliability (ICC = 0.826). Among participants without a concussion, there was a significant decrease in the mean KD test time from preseason to midseason (-3.3 seconds; P = 0.0167) and preseason to postseason (-3.3 seconds;

P = 0.0167). No change was seen from mid-to-post season. Six athletes had 7 suspected concussions. Each demonstrated an increase in the KD test time, with a mean increase from 44.3 +/- 9.5 seconds to 53.7 +/- 12.8 seconds. King-Devick test times returned to or below baseline by postseason.
CONCLUSIONS: The KD test shows good reliability among wheelchair basketball athletes without a concussion. A learning effect is demonstrated initially but plateaus on subsequent testing. Unlike athletes without a concussion, players with a clinically suspected concussion showed an increase in the KD test time.

Comparing the effect of a simulated defender and dual-task on lower limb coordination and variability during a side-cut in basketball players with and without anterior cruciate ligament injury.

Journal of Biomechanics. 133:110965, 2022 Mar.

Authors
Heidarnia E; Letafatkar A; Khaleghi-Tazji M; Grooms DR

Abstract
Anterior Cruciate Ligament (ACL) injuries commonly occur when attention is simultaneously on the environment (other players, objects) and maintaining neuromuscular control. Therefore, our purpose was to investigate lower-extremity coordination following ACLR during a run-to-cut with ecological validity to sport competition. Sixteen male basketball players with ACLR (20.8 +/- 3.42 years, time since surgery: 9.5 +/- 2.4 months) were contrasted with 16 healthy male control basketball players (21.3 +/- 3.17 years) during a run-to-cut maneuver under two conditions: 1) standard, run and initiate a ~40degree side-cut and 2) simulated sport, run-to-cut with the presence of a defender and engaged in a dual-task to intercept a ball. Lower limb kinematics were used to calculate continuous relative phase metrics for evaluation of coordination pattern and variability. Independent t-test and effect size were used to evaluate the difference between the two groups and across condition via change score.
The simulated sports cutting maneuver coordination patterns were significantly different between groups for hip-ankle, hip-knee, knee-knee, and knee-ankle coupling ($p < .05$). Only hip-knee coupling had a significant condition change score ($p = .01$) with ACLR increasing (51.8 +/- 79.1%) and healthy controls (-16.04 +/- 64.1%) decreasing hip flexion-extension and keen abduction-adduction coupling. There was no significant difference in normal cut coordination between groups. The addition of simulated sport visual attention and dual task motor planning during the run-to-cut might elicit different lower limb movement patterns in ACLR athletes compared to the healthy counterparts, potentially contributing to the elevated reinjury risk in those with ACLR history when returning to sport.

Correlations Between Medicine Ball Throw With Wheelchair Mobility and Isokinetic Tests in Basketball Para-Athletes.

Journal of Sport Rehabilitation. 31(1):125-129, 2022 01 01

Authors
Ribeiro Neto F; Loturco I; Henrique Lopes G; Rodrigues Dorneles J; Irineu Gorla J; Gomes Costa RR

Abstract
CONTEXT: A detailed analysis of wheelchair basketball skills in beginner wheelchair basketball players (WBP) can provide practitioners with important indications regarding the selection and prospective development of potential sports talents. A comprehensive WBP evaluation can be very time consuming, mainly during the initial phases of the training processes, which could be a barrier in clinical and practical settings.
Moreover, the large number and the turnover of beginner WBP attending rehabilitation centers make the applicability of field and strength tests unfeasible.
OBJECTIVE: To verify the relationships between the medicine ball throw (MBT) and wheelchair basketball mobility performance field tests and the shoulder and trunk peak torque in male and female beginner WBP.
DESIGN: Cross-sectional study.
SETTING: Rehabilitation Hospital Network, Paralympic Program.
PARTICIPANTS: Thirty-seven female and male beginner WBP.
MAIN OUTCOMES MEASURES: Participants performed wheelchair basketball field tests (speed, agility, strength, and power tests) and the maximum strength test in the isokinetic dynamometer. The outcomes were correlated with the MBT results.
RESULTS: The MBT presented significantly very high and perfect correlations with all wheelchair basketball field tests assessed (5-m sprint, 20-m sprint, and zig-zag agility test with and without a ball), and peak torque (R2 ranging from .810 to .995; P <= .05) for male and female athletes.
CONCLUSIONS: The MBT, a simple and feasible test, can be used for estimating and determining the wheelchair mobility performance of female and male beginner WBP. It is suggested to measure the distance of a 5-kg medicine ball thrown by athletes during training and testing routines to follow the players' progression.

Weekly Fluctuations in Salivary Hormone Responses and Their Relationships With Load and Well-Being in Semiprofessional, Male Basketball Players During a Congested In-Season Phase.

International journal of sports physiology & performance. 17(2):263-269, 2022 02 01.

Authors
Kamarauskas P; Lukonaitiene I; Scanlan AT; Ferioli D; Paulauskas H; Conte D

Abstract
PURPOSE: To assess weekly fluctuations in hormonal responses and their relationships with load and well-being during a congested in-season phase in basketball players.
METHODS: Ten semiprofessional, male basketball players were monitored during 4 congested in-season phase weeks consisting of 3 weekly matches.
Salivary hormone variables (testosterone [T], cortisol [C], and T:C ratio) were measured weekly, and external load (PlayerLoad TM and PlayerLoad per minute), internal load session rating of perceived exertion, percentage of maximum heart rate (HR), summated HR zones, and well-being were assessed for each training session and match.
RESULTS: Significant (P < .05) moderate to large decreases in T were found in the third and fourth weeks compared with the first week. Nonsignificant moderate to large decreases in C were apparent in the last 2 weeks compared with previous weeks. Summated HR zones and perceived sleep significantly (P < .05) decreased in the fourth week compared with the first week; whereas, percentage of maximum HR significantly (P < .05) decreased in the fourth week compared with the second week. No significant relationships were found between weekly changes in hormonal responses and weekly changes in load and overall wellness.

CONCLUSIONS: A congested schedule during the in-season negatively impacted the hormonal responses of players, suggesting that T and C measurements may be useful to detect fluctuations in hormone balance in such scenarios. The nonsignificant relationships between weekly changes in hormonal responses and changes in load and well-being indicate that other factors might induce hormonal changes across congested periods in basketball players.

Mental Fatigue Over 2 Elite Netball Seasons: A Case for Mental Fatigue to be Included in Athlete Self-Report Measures.

International journal of sports physiology & performance. 17(2):160-169, 2022 02 01.

Authors
Russell S; Jenkins DG; Halson SL; Juliff LE; Connick MJ; Kelly VG

Abstract
PURPOSE: Mental fatigue is emerging as an important consideration for elite sporting performance, yet it is rarely monitored. The present study assessed changes in mental fatigue in professional team-sport athletes across 2 seasons and examined the relationship between mental fatigue and other athlete self-report measures of well-being.
METHODS: Elite netballers contracted to all teams competing in Australia's premier professional netball competition during the 2018 and 2019 seasons (N = 154) participated. Using 5-point Likert scales, mental fatigue, fatigue (physical), tiredness, sleep quality, stress, mood, and motivation were assessed daily across 2 seasons composed of 14 round and finals series.
RESULTS: The ratings of mental fatigue significantly changed during both seasons. In 2018, lower ratings of mental fatigue were reported in round 1 versus 3, 4, 6, 8, and 14; round 7 versus 6; and round 6 versus 10 ($P < .05$). In 2019, lower ratings of mental fatigue were identified for round 1 versus 3, 9, 10 to 14, and semifinal; round 2 versus 10 to 13; and 5 versus 10 to 12 ($P < .05$). Ordinal regression revealed significant differences between mental fatigue and physical fatigue ($P < .001$), tiredness ($P < .001$), stress ($P < .001$), mood ($P < .001$), and motivation ($P < .05$).
CONCLUSIONS: The present study found mental fatigue to significantly fluctuate across a season in elite netballers. Moreover, perceived mental fatigue differed from physical fatigue, tiredness, stress, mood, and motivation. The data impress the need for mental fatigue to be included as an independent measure of athlete well-being. Monitoring of mental fatigue can allow practitioners to implement strategies to manage its influence on performance.

Sleep affects the motor memory of basketball shooting skills in young amateurs.

Journal of Sports Medicine & Physical Fitness. 61(2):188-198, 2021 Feb.

Authors
Miyaguchi S; Inukai Y; Hashimoto I; Otsuru N; Onishi H

Abstract
Sleep has long been shown as important for memory processing and retention, and has recently been implicated in motor memory consolidation.
However, it is not known whether sports skills, including basketball shooting skills, are also affected by sleep in young, healthy individuals. Therefore, we investigated whether sleep before and after basketball shooting skill training affected the acquisition and retention of shooting skills. This study included 19 healthy male subjects who participated in a basketball shooting skill training session (100 shots) and a retention test performed 2 days later (30 shots). The learning

and retention indices were calculated using performance scores that evaluated each subject's shooting skills. A wearable activity tracker was used to measure sleep parameters for 4 consecutive days, 2 days before and 2 days after training. We discovered the relationship between sleep duration before and after training and retention of shooting skills (sleep duration before training; $p = 0.044$, $r = 0.467$, sleep duration after training; $p = 0.006$, $r = 0.606$). The retention index for the subgroup with long sleep duration before and after training was significantly higher than that for the subgroup with short sleep duration before and after training, respectively ($p = 0.021$ for both). There was no significant relationship between learning index and each sleep parameter. Our results demonstrated that sleep duration before and after training was related to retention of shooting skills following basketball shooting skills training.

High-Pressure Game Conditions Affect Quiet Eye Depending on the Player's Expertise: Evidence from the Basketball Three-Point Shot.

Brain Sciences. 12(2), 2022 Feb 18.

Authors
Giancamilli F; Galli F; Chirico A; Fegatelli D; Mallia L; Palombi T; Lucidi F

Abstract
Research on attention in sport using eye-tracking methodology has highlighted that the highest levels of expertise and performance are characterized by a specific gaze behavior consisting of a perception-action variable named quiet eye. The present study aimed to understand the role of quiet eye during the three-point shot, especially in game conditions in which even a single point may determine victory or defeat. Twenty-one basketball players (twelve competitive elites and nine semi-elites) with a high-shooting style performed three-point shots in four game scenarios different from each other for the time available (time pressure) and the relevance of the score (performance pressure). The results showed that competitive elites performed a longer quiet eye online duration and a shorter QE preprogramming duration than semi-elites, especially in the highest-pressure condition. On the one hand, these results suggest that quiet eye during three-point shots could fulfill an online control function. On the other hand, the findings stressed the importance of implementing experimental conditions that can resemble as closely as possible actual sport situations. Finally, we suggest that sport professionals interested in administering to athletes a quiet eye training protocol in order to improve three-point shot performance consider the shooting style of the players.

Does Fair Coach Behavior Predict the Quality of Athlete Leadership Among Belgian Volleyball and Basketball Players: The Vital Role of Team Identification and Task Cohesion.

Frontiers in Psychology. 12:645764, 2021.

Authors
De Backer M; Van Puyenbroeck S; Fransen K; Reynders B; Boen F; Malisse F; Vande Broek G

Abstract
A vast stream of empirical work has revealed that coach and athlete leadership are important determinants of sport teams' functioning and performance. Although coaches have a direct impact on individual and team outcomes, they should also strive to stimulate athletes to take up leadership roles in a qualitative manner. Yet, the relation between coach leadership behavior and the extent of high-quality athlete leadership within teams remains underexposed. Based on

organizational justice theory and the social identity approach, the present research tested whether perceived justice of the coach positively predicts the quality of athlete leadership. Furthermore, we examined the role of group dynamic processes (i.e., team identification and task cohesion) within this relation.
Belgian volleyball (N = 161) and basketball players (N = 78) were asked to rate the justice of their coach, their team identification, the task cohesion, and the athlete leadership quality in the team. Structural equation modeling indicated that coaches' perceived justice positively predicted the quality of athletes' leadership, and that this relation was established through three intermediate steps (i.e., from team identification to task cohesion, to athlete leadership quality). These results suggest that fair coach behavior does not only bridge the gap between leadership and followership, it also has the potential to improve the quality of athletes' leadership within sport teams. More specifically, findings suggest that coaches' perceived justice cultivates a shared social identity characterized by high levels of players' identification with their team, which in turn increased their perceptions of the team's task cohesion. Finally, this increased task cohesion encouraged the athlete leaders to demonstrate high-quality leadership.

Influence of Strength Programs on the Injury Rate and Team Performance of a Professional Basketball Team: A Six-Season Follow-Up Study.

Frontiers in Psychology. 12:796098, 2021.

Authors
Caparros T; Pena J; Baiget E; Borras-Boix X; Calleja-Gonzalez J; Rodas G

Abstract
This study aims to determine possible associations between strength parameters, injury rates, and performance outcomes over six seasons in professional basketball settings. Thirty-six male professional basketball players [mean +/- standard deviation (SD): age, 30.5 +/- 4.7 years; height, 199.5 +/- 9.5 cm; body mass, 97.9 +/- 12.9 kg; BMI 24.6 +/- 2.5 kg/m2] participated in this retrospective observational study, conducted from the 2008-09 to the 2013-14 season. According to their epidemiological records, each player followed an individual plan designed within different strength training programs: Functional (n = 16), Eccentric (n = 8), or Resistance (n = 12). Seven hundred and fourteen valid records were obtained from 170 individual strength tests during 31 sessions. Tests performed were leg press, squat, and jerk. Parameters recorded were force, power, velocity, peak velocity, and time to peak velocity for strength; time loss injury and muscle injury for injury rate; and games won, games lost, and championships for performance outcomes. All the strength variables and injuries are independent of the strength programs ($p < 0.01$). The correlation analysis showed very significant relationships between muscular injuries and time to peak velocity ($r = 0.94$; $p < 0.01$), significant relationships between force and games lost ($r = 0.85$; $p < 0.05$), and muscular injuries with games lost ($r = -0.81$; $p < 0.05$) per season. Mean values per season described a possible association of force, time to peak velocity, and muscular injuries with performance outcomes ($R 2 = 0.96$; $p < 0.05$). In this specific context, strength variables and injury rate data show no association with a single type of strength training program in this cohort of high-performance basketball players.

Drop jumps improve repeated sprint ability performance in professional basketball players.

Biology of Sport. 39(1):59-66, 2022 Jan.

Authors
Zagatto AM; Dutra YM; Claus G; Malta ES; de Poli RAB; Brisola GMP; Boullosa D

Abstract
To verify the acute effect of drop jumps (DJ) on two repeated sprint ability tests (RSA), interspersed with a rest period simulating a basketball game break. Twelve first division basketball players (age: 24.8 +/- 6.9 years; body mass: 97.0 +/- 9.2 kg; height: 2.0 +/- 0.1 m) performed, in a randomized crossover design, two RSA tests separated by 5 min after DJ or control conditions. The DJ condition comprised 5 DJs performed 4 min prior to the first RSA test, whereas 3 DJ were completed 30 s prior to a second RSA test. Surface electromyography was recorded from the lower body for root mean square (RMS) analyses during sprinting.
Three countermovement jump (CMJ) tests were performed after warming up and immediately after the second RSA test. DJ improved RSA performance with a faster best time in the first RSA test ($p = 0.035$), and a shorter total time and mean time ($p = 0.030$) for the second RSA test. No significant differences were found in RMS between protocols. CMJ decreased in both conditions after the RSA tests ($p < 0.05$). This study revealed a post-DJ RSA potentiation in professional male basketball players. This simple and effective approach could be implemented at the end of the warm-up and before the end of game breaks to improve player preparedness to compete.

Contemporary Principles for Postoperative Rehabilitation and Return to Sport for Athletes Undergoing Anterior Cruciate Ligament Reconstruction.

Arthroscopy, Sports Medicine, and Rehabilitation. 4(1):e103-e113, 2022 Jan.

Authors
Badawy CR; Jan K; Beck EC; Fleet N; Taylor J; Ford K; Waterman BR

Abstract
Despite advancements in our understanding of anterior cruciate ligament (ACL) injury prevention and nonsurgical management, ACL reconstruction continues to occur at an alarming rate. Among athletic patients, individuals participating in basketball, soccer, and football have the highest incidence of ACL injury, often requiring surgical intervention. To ensure the optimal treatment strategy for return to sport and prevention of secondary graft re-tear, it is important to tailor to the specific demands of the injured athlete and apply evidence-based best practices and rehabilitation principles. The purpose of this review is to provide readers with a brief background regarding ACL injuries, a focused review of clinical outcome studies after ACL reconstruction, and an updated framework with expert-guided recommendations for postoperative rehabilitation and return to sporting activity. Currently, there is no gold standard for rehabilitation after ACL reconstruction, highlighting the need for robust studies evaluating the best modalities for athlete rehabilitation, as well as determining the efficacy of new tools for improving therapy including blood flow restriction therapy and neuromuscular electrical stimulation. Based on clinical experience, a renewed focus on objective, criteria-based milestones may maximize the ability of return to preinjury levels of athletic function.

LET'S CHAT ABOUT…

Let us know what is on your mind, what you want to chat about in the next issue of the FAST BREAK. Email to mwesner@ualberta.ca.

In this issue of Fast Break, Marni Wesner chats about wheel chair basketball classification.

Classification is the process of ordering units into smaller groups based on common, observable properties. Paralympic athletes are classified based on impairment. This helps ensure the winner is the best athlete, not the athlete with the least impairment. In November 2007, the International Paralympic Committee (IPC) Classification Code was approved. This provided a comprehensive guideline and procedure to conduct classification in sports governed by the IPC and mandated the development of evidence-based classification systems. "The purpose of the system is to promote participation in sport by people with disabilities by minimising the impact of impairment on the outcome of competition"[2]. The IPC is committed to the development of select classification systems, not performance systems, to ensure that athletes who enhance their performance due to training will not be moved to a class with an athlete with less impairment.

Success in Paralympic sport is significantly impacted by classification, and subjectivity in classification within the sports can significantly impact validity of the classification. Functional classification focuses on sport specific skills and the impact of impairment(s) on the development and performance of sport specific skills. Classification systems vary greatly among sports and are sport specific; the sport is supposed to determine what is eligible for classification.
In 2015, the IPC revised the classification code and significantly changed the rules for who is now eligible to compete. No longer is there a minimum impairment criteria, now there are only 10 criteria that enable an athlete to compete: impaired muscle power, impaired passive range of movement, limb deficiency, leg length difference, short stature, hypertonia, ataxia, athetosis, and vision or intellectual impairment. This change is forcing many national federations to revisit their wheelchair basketball team classification as many athletes who have competed in wheelchair basketball are now 'not disabled enough' to continue to compete.
Previously if a person was unable to play basketball standing up, one could compete in wheelchair basketball. The IPC-enforced change to classification has removed wheelchair basketball's ability to determine eligibility for their players, and effectively created an environment where the athletes now have to meet certain criteria on disability. This raises questions of where does able-bodied sport end and adaptive sport begin? What level of impairment limits participation and what degree of impairment fosters disability? What will happen to all the athletes who no longer have a forum to compete because they are not 'disabled enough' to compete in the new IPC-classification system?

I'd love to hear your thoughts on this issue. If you care to comment, I will publish this as a conversation in the next edition of the Fast Break.

[2] IPC Classification Handbook

FROM THIS HISTORY BOOKS

The Other Dream Team: After the collapse of the Soviet Union, the 1992 Lithuanian basketball team did not have the resources to make it to the Olympics in Barcelona. However, the band The Grateful Dead stepped up and funded the team, including band-inspired warm up jerseys. The Lithuanian team defeated the Russians to win the bronze medal.

SHARE YOUR PHOTOS

Please send us your funny, interesting, or remarkable basketball pictures that we can share with the medical and sport science basketball community.

Photo caption: Dr. Andrew Pipe and the host medical team at the Tokyo 2020 Olympic Games.

THE STUDENT'S CORNER

This space is intended for sport science and medical students, residents, and fellows to contribute to our knowledge and conversation.

Please encourage your students to contribute to the Fast Break on a topic of their choosing related to basketball injury, rehabilitation or sport science.

Ledderhose Disease/Plantar Fibromatosis

Dr. Kayla Gallo, Sport and Exercise Medicine Fellow
University of Ottawa, Canada

Case Study: A 35-year-old female basketball player presents to the office with a one year history of painful nodules located to the plantar aspect of her feet. They were initially quite small, however, over time have progressed in size to the point of causing significant pain with any weight bearing activities. She is otherwise healthy, takes no medications and does not smoke.

Ledderhose disease or plantar fibromatosis (PF) is an uncommon disease characterised by small slow-growing thickening of superficial fibromatoses of the plantar aponeurosis[1]. Similar processes of soft tissue fibromatosis are found elsewhere in the body, such as in Dupuytren and Peyronie diseases. In PF, the benign subcutaneous nodules typically occur on the medial or central plantar area of the feet[2]. Bilateral involvement is not uncommon, occurring in approximately 25% to 40% of patients[3]. The etiology is not well understood, and risk factor may include male sex, Caucasian race, diabetes mellitus, repeated trauma, long-term alcohol consumption, chronic liver disease, epilepsy, and family history[3,4].

The disease is thought to have three phases:

1. Proliferative phase: nodular fibroblastic proliferation
2. Active phase: induction of collagen synthesis and deposition
3. Resting phase: fibroblastic activity is reduced, and collagen maturation occurs[3, 4]

Diagnosis can be made clinically by palpating the nodules, and a thorough assessment of concurrent pathology contributing to the patient's symptomatology. If uncertainty remains, the diagnosis may be confirmed with ultrasound. On ultrasound, the normal plantar fascia shows a homogeneous striated hyperechoic appearance in the longitudinal axis[5]. With PF, ultrasound show lesions embedded on the plantar fascia with sharp juxtaposition between the less reflective fibroma and the much brighter plantar fascia surrounding it[5] (see Figure 1).

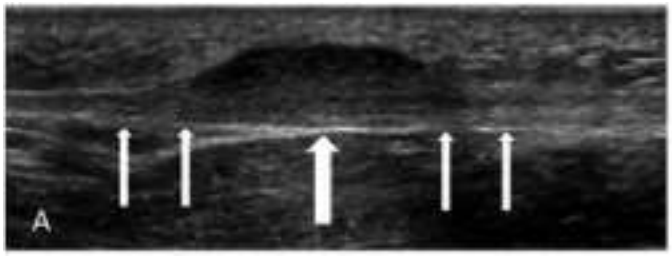

Figure One: Longitudinal US images show the typical appearance of plantar fibromatosis. A single echogenic lesion (thick arrow) shows contiguity with an intact plantar fascia (thin arrows)[5].

A lesion that is near an intact, nondistorted plantar fascia and with no intramuscular involvement help exclude a malignant etiology[5]. A "comb sign" defined as alternating linear bands of hypoechogenicity next to isoechogenicity relative to the plantar fascia may also been seen[5]. MRI, although rarely necessary, shows focal, oval-shaped areas of disorganization embedded in the plantar fascia[3].

Conservative treatment may include stretching, physiotherapy, footwear modifications, pads or orthotics. Shockwave therapy may potentially reduce pain and soften the fascia and nodules as early as 2 weeks after initiation of treatment[6]. Medical treatments include steroid injections, which can objectively shrink the size of the nodules by decreasing inflammation, contracture rates, and growth rates, thus resulting in smaller, less painful nodules. Previous studies have suggested a total of 3–5 injections administered approximately 4–6 weeks apart at a concentration of 15–30 mg per nodule[3]. The exact dosage for optimal results has yet to be determined and multiple injections carry the risk of tendon or fascial rupture. Another option is radiation therapy which is believed to reduce the proliferative activity of fibroblasts. Weekly doses of 3.0 Gy for 5 weeks followed by one additional session after 6 weeks, for a total of 30.0 Gy[7]. Other treatment options explored in a previous systematic review include verapamil, tamoxifen and collagenase. Verapamil's mechanism of inhibiting collagen production and increasing the activity of collagenase is thought to decrease the contractile function of fibroblasts and myofibroblast[3]. Dosing is based on evidence for Peyronie's disease with transdermal cream twice a day for 9 months, or one intralesional injection every other week[3]. Tamoxifen's antiestrogen properties have showed promise in in vivo studies with decreases in both contracture rates and proliferative activity of fibroblasts in Dupuytren's disease[8]. Similarly, collagenase another experimental therapy, has been shown to decrease contractions in other diseases of soft tissue fibromatosis, however, is yet to be proven in PF soft tissue fibromatosis[3]. As such, further studies are required to explore these later three therapies for this disease.

From a surgical perspective, treatments include local excision, wide excision, and complete fasciectomy, however these incur as high as 60% recurrence rates[3]. Recurrence is often a more aggressive lesion and previous studies have suggested combining surgery, specifically complete fasciectomy, with post-operative radiation to decrease this reoccurrence rate[9].

Case Outcome: Following comprehensive history and physical exam, a diagnosis of plantar fibromatosis was clinically confirmed. Options best supported by the evidence were discussed, and the patient chose to pursue infiltration of the five nodules with Depo-Medrol 40mg/ml mixed with lidocaine 1% without epinephrine. Follow up 6 weeks post-injection confirmed the nodules had shrunk and as a result the patient had significant relief of her pain.

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