**Greater efficacy for countermovement jump height than flight time: contraction ratio measures for signalling match-induced neuromuscular fatigue in English Premier League Academy Football Players.**

Introduction

Neuromuscular fatigue (NMF) is a natural consequence of football match play that can compromise physical performance potential and increase injury susceptibility (Bittencourt et al, 2016). Measures derived from the countermovement jump (CMJ) relating to performance (i.e., jump height; JH) and movement strategy (i.e., flight time: contraction ratio; FT:CT) are commonly used in practice to monitor the neuromuscular status of players around games. However, there is a paucity of research available to examine their conceptual efficacy (i.e., sensitivity to match play and time-course of restoration thereafter) for this purpose in under 18 English Premier League (EPL) academy football players. Consequently, we examined the sensitivity and time-course of restoration of CMJ JH (flight time; JHFT) and FT:CT measures following U-18 EPL academy football match play.

Methodology

Eighteen players (age = 17.0 ± 0.7; height = 1.82 ± 0.07 m; body mass = 73.5 ± 76 kg) from a single category 1 EPL U-18 academy team participated in this investigation. Players performed a standardised warm up and three maximal CMJs at five time points around 8 competitive league home games: one day before (MD-1), 30 mins pre-match (MD-PRE), 30 mins post-match (MD-POST) and two (MD+2) and three (MD+3) days post-match. Jumps were performed on dual force plates (ForceDecks FD4000, Vald Performance, Brisbane, AU), sampling at 1000 Hz. Force-time curves were analysed using proprietary software (ForceDecks Version 2.0.8000, Vald Performance, Brisbane, AU). A PERMANOVA and post-hoc univariate analyses of variance were used to examine match-induced changes to CMJ measures. Data collection followed institutional ethics committee approval and the obtainment of informed player and parent / guardian consent.

Results

CMJ JHFT reduced between MD-1 and MD-POST (d = 0.33, small, p = .031), remained compromised at MD+2 (d = 0.35, small, p = .023) and had returned to MD-1 levels by MD+3. CMJ FT:CT reduced between MD-1 and MD-POST (d = 0.22, small, p = .142) and had retuned to MD-1 levels by MD+2.

Discussion / Conclusion

The CMJ performance (JHFT) measure was more sensitive to match play than the CMJ movement strategy (FT:CT) measure in U-18 EPL academy football players. CMJ JHFT showed a small, significant reduction between MD-1 and MD+3, whereas FT:CT showed a small, non-significant reduction between MD-1 and MD+2. This contrasts the result of Cormack et al (2008), who reported equivocal match-induced changes to JHFT but substantial reductions to FT:CT over similar time-points around Australian Rules Football (AFL) match play. Our finding is likely explained by the compromising effect of match-induced muscle damage on maximal neuromuscular performance, limiting CMJ performance. Though previous research reports that NMF can manifest as a change to CMJ movement strategy measures independently of changes to JH (Gathercole et al, 2015), our finding supports the use of CMJ JH measures for signalling match induced NMF in U-18 academy football players.