# 17. MONITORING TRAINING

## O-099  Monitoring training loads in top-level professional rugby league

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**OBJECTIVE** There is limited research that describes periodisation models for football. Recent studies have shown the session-RPE method (Foster et al., 2001) to be a valid tool for quantifying training load (TL) (Foster et al., 2001; Impellizzerri et al , 2004). There have been no studies that have described the training loads undertaken by top level professional rugby league players. The objective of this study was to measure and describe the training periodisation of a top level rugby league club during a season.

**METHODS** Thirty eight professional players from the same club reported RPE (CR-10) within 30 minutes of finishing each training session. The TL, monotony and strain were determined using previously described methods (Foster et al., 2001). Data was collected for each session during the distinct training phases of the season. ANOVA was used to determine any changes in TL during each of the training phases.

**RESULTS** There were significant differences in the mean weekly TL and strain between the various phases of the season. The mean weekly TL's and strain were greater in the preparation than the competition phases (P<0.01). The match loads during the competition phase did not significantly change. Table 1 shows periodisation of TL's for the various training activities during the training phases.

**Table 1.** Training loads for the various training activities during the different phases of the season.

| | General | Specific | Match Practice | Competition |
|---|---|---|---|---|
| Conditioning | 1452 (214[#†‡]) | 1036 (354*[†‡]) | 699 (188*) | 380 (342[*#]) |
| Strength | 519 (263) | 815 (302[†‡]) | 494 (127[#]) | 379 (136[#]) |
| Skills | 453 (101[#†]) | 790 (192*) | 698 (120*) | 613 (209) |
| Other | 201 (161[#]) | 489 (89[*‡]) | 348 (172[‡]) | 150 (89[#†]) |
| Match | | | 371 (70) | 479 (110) |

\* Sig. diff. to General; [#] Sig. diff. to Specific; [†]Sig. diff. to Match Practice; [‡] Sig. diff. to Competition

**DISCUSSION** In this study TL's were greater than those reported for semi-professional rugby league (Coutts et al., 2003) but less than high level endurance athletes (Foster et al., 1997). The present data showed that TL's were reduced during the competition phase to promote recovery between each match. These results show a periodised training structure in top level rugby league and support the use of session-RPE for monitoring TL's in football.

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Foster et al. (1997) *Running injuries*.W.B. Saunders: 173-188.

**KEY WORDS** Periodisation, training load, rugby league, session-RPE

## O-100  Physical loading, stress and recovery in a youth soccer tournament

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**OBJECTIVE** Different variations in the heart rate beat provide important information which can be used for monitoring physiological loading and stress-recovery process. Heart rate and rate variability (HRV) have been used to asses training effect indirectly by using EPOC prediction method (Rusko et al. 2003). HRV indices are field-capable variables to reflect stress-recovery processes (Hynynen et al. 2006). The purpose of the research was to study physical loading of young international level Finnish soccer players (n=10, age 16.9 + 0.2 yrs) in training and match conditions and stress-recovery state between training and match days during a competitive soccer tournament based on the heart rate variability measurements.

**METHODS** $MaxVO_2$, MaxHR, AerT and AnT were determined (Nummela, 2004). Players used Suunto t6 wristop computers in training sessions and 3 matches collecting RR-interval data during 6 days for EPOC and for nocturnal RRI-data collection. ACN system modulation was analyzed with HRV indices by using Firstbeat PRO software (Kettunen & Saalasti 2002). The players self-rated their perceived exertion and recovery.

**RESULTS** Mean $MaxVO_2$ was 53.5 ml/kg/min, MaxHR 198 bpm, AerT 38.0 ml/kg/min and AnT 46.3 ml/kg/min. EPOC values were in light and heavy training sessions18 and 72 ml/kg ($p<0.001$), respectively. EPOC values in matches were 213, 150 and 136 ml/kg ($p<0.01$). Average NHR after each match were 53, 50 and 51 bpm (ns). NHRV stress index was 0.061, 0.053 and 0.064 (ns), and recovery index 98, 103 and 98 (ns).

**DISCUSSION** The results indicated that maximal oxygen uptake had significant relationship to the perceived exertion in training sessions and matches and the loading of the whole tournament. According to the HRV stress and recovery indices the stress level was at highest after the first and last match. In conclusion, the HRV measurements analysed by the Firstbeat PRO software can be applied to soccer.

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**KEY WORDS** Soccer, physical loading, stress, recovery.

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## O-101 Physical features of American football players in post and pre-season period

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**OBJECTIVE** American football is a sport that demands high body contact at all levels of the game. Therefore an American football player needs a variety of physical components which are muscular strength, endurance and power. The purpose of this study was to compare the physical condition, in terms the muscular strength, endurance and power, of American football players in post and pre-season period.

**METHODS** There were eleven American football players in this study. Their mean age, height, mass, and BMD were 21.6 (2.3) years, 1.81 (0.01) m, 89.4 (16.6) kg, 1.303 (0.2) $gr/cm^2$, respectively. Leg strength data were recorded with the isokinetic dynamometer. Lateral trunk flexions, core and back endurances, and vertical jumps were used to analyze the efficiency of the off season period activity of players.

**RESULTS** Current study findings (Table 1) demonstrated that there were only significant differences between post and pre-season period in lateral trunk flexion and vertical jump performances ($p<0.05$). In addition, the leg strength measures did not show any statistically significant differences between two periods ($p<0.05$),

**Table 1.** Comparison of physical conditioning parameters of American football players in post and pre-season (SE) period.

| | Extension @60º/s. (%) | | Flexion @60º/s (%) | | Trunk Ext. (cm) | Lateral trunk flex. (cm) | | Endurance (sec) | | VJ (cm) | FJ (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Means (SD) | | | | | Means (SD) | | Means (SD) | | Means (SD) | |
| | D | N | D | N | | R | L | Core | Back | | |
| *Pre-SE* | 258.4 | 259.6 | 132.9 | 123.6 | 19.4 | 25.9 | 26.3 * | 222.9 | 157.9 | .28 * | .42 * |
| | (46.3) | (47.2) | (26.1) | (20.9) | (4.5) | (3.6) | (6.0) | (54.1) | (62.3) | (.02) | (.05) |
| *Post-SE* | 247.1 | 243.6 | 128.2 | 123.5 | 17.5 | 23.5 | 22.8 | 240 | 122.9 | .20 | .38 |
| | (43.6) | (43.7) | (23.5) | (23.7) | (2.1) | (4.1) | (3.9) | (0.0) | (54.1) | (.07) | (.05) |

* $p<0.05$

**DISCUSSION** Findings supported that there should be well-designed off season training program to compensate the physiological demands of the beginning of the season.

**KEY WORDS** American football, physical condition, muscular strength.