motion (ACROM) were used for a functional assessment of cervical condition.

Results: The one-year prevalence of neck pain was 42.9%. Multivariate analysis revealed that pilots instructor have right side rotation limited (-9.4° vs. non instructors, F_{1.36} = 8.6 with p < 0.01). The use of head-mounted system (HMS) did not affect ACROM and muscular functionality. There were significant differences between Neck Pain Group (NPG) and healthy group of pilots concerning some ACROM (p < 0.05) and some MEP (p < 0.05). In NPG the levels of perceived pain showed significant correlation with past flight experience parameters (p < 0.05) and the years of flight career (p < 0.05). The amount of core stability activities, ball games, and weight lift exercise, negatively correlated with the level of perceived pain (p < 0.05).

Conclusion: ACROM and MEP were worst in NPG. The past flying experience on high-performance aircraft such as the F16 was highly related to neck pain. The negative correlation of some physical activities may suggest to further investigate their role in preventing the neck pain in EFA pilots.

Reference

57 PO O
Posture and emotions. On the move to find the balance
N. De Col1, C. Galbusera2, M. Quarantelli2

1Studio De Col Nicoletta di Ginnastica posturale e Fitness; 2Department of Human Science and Quality of Life Enhancement, Università Telematica di Roma “San Raffaele”

Aim: Posture is a person’s physical attitude, instantly visible, observable and objective, resulting from the continuous search for balance and constant adjustments performed by the body, depending on several aspects (emotional, biomechanical).

Method: The study was based on a sample of 78 people. They all had a posture examination and all had to undertake two different questionnaires, one about their emotional state referred to a timeframe of a few days (PANAS scale) and another one considering their general approach to life (25 statements).

Results: There are links among Lowen’s five posture types and people’s attitude towards life. The subjects’ favorite statements differ according to their posture type (Rigid, Masochistic, Schizoid, Psychopathic, Oral) while their emotional state of a few days does not seem to be aligned with their posture. Only a few items (determined, active, ashamed) are related with posture, but only as signs of a general attitude towards life rather than a temporary emotional condition.

Conclusions: This might proves that emotions related only to a few days cannot change a person’s posture, as the body adapts to longer emotional states. The human being not only moves his body, but also thoughts and emotions get moved. An athlete is a person who has to deal with emotions and thoughts during a competition, a child to be educated in school is a growing person, adults under rehabilitation have memories that create feelings. When a subject is only considered “athlete” or “patient”, there is a risk of losing many useful information that could help that person improve himself.

References

SATURDAY POSTER SESSION
TRAINING, PERFORMANCE AND EVALUATION METHODS

58 TP1 P
Predictors of training load in professional soccer players
P. Rongoni, M. Gervasi, D. Sisti, M. Rocchi, A. R. Calavalle

Department of Biomolecular Sciences, University of Urbino, Italy

Aim: This study was aimed at examining the influence of playing time changes on the psychophysical variables, comparing session Rating of Perceived Exertion (sRPE), training load and Game Time (GT) data, in elite soccer players.

Methods: A sample of nineteen professional soccer players of the Italian Premier League was tested during 10 months (T, pre-season and in-season period). The considered variables were: sRPE; Game Time (GT), registered in all the competitions; percentage body fat (%BF) and Body Cell Mass Index (BCMI), tested at the beginning of every months; Immunoglobulin A (IgA), Testosterone (T) and Cortisol (C) collected in four times. ANOVA repeated measures were performed on sRPE followed by non Linear Regression; Multiple linear Regression was performed in order to quantify predictability of physiological parameters on sRPE. Correlation among parameters measured was also performed.

Results: We found that: fat mass and body mass cellular index had not correlation with sRPE and GT, BCMI, sRPE, Testosterone and Cortisol correlated with the T (p = 0.001) but only for single subjects; Immunoglobulin data revealed to be useful indicators for the training load, highlighting the athletes immune system status. The session rating of perceived exertion correlates with game time with r = 0.56 (end of the season r = 0.89). Especially in the last 3 months of the season, game time load represented 79 % of influence on sRPE data.

Conclusions: Our findings showed that the fat mass and the body cell mass index were not predictors of the training load. On the other side the session rating of perceived exertion data were clearly influenced by the game time and not from the training load. Our results suggest that psychological stress factors had to be considered in elite soccer players, especially at the end of the season, to preserve athletes health and to optimize the performance.

59 TP1 P
Relationship between Wingate test and vertical jump in young female volleyball players
A. Cataldo1, D. Cerasola2, M. Traina1

1Sport and Exercise Sciences “DISMOT” Research Unit, University of Palermo; 2Department of Movement, Human and Health Sciences, “Foro Italico” University, Rome, Italy

Aims: Maximum vertical jump is an important component in performing spike and block skill in volleyball and is a reflection of explosive muscle strength (Bosco et al. 1983). The Wingate test (WT) is used to evaluate anaerobic performance by measuring muscle power during short-term, high-intensity exercise (Bar-Or 1987). The
aim of this study was twofold: to investigate the possible relationship between power performance on the Wingate test (WT) and explosive leg strength performed during a vertical counter-movement jump test (CMI) and whether anaerobic power assessed could identify players with the best performance.

**Methods:** 14 young female volleyball players, age 16–26 years, were grouped by performance (those with a CMI >75th that was >38 cm were grouped as high-performance group while those with a CMI ≤38 cm were classified as low-performance). Wingate Test was completed, and peak power (PP), average power (AP), time-to-peak power (tPP), and power drop (PD) were collected for each athlete.

**Results:** Athletes with the best performance were lighter, had lower BMI and fat mass respect to low-performance group. Average power indexed was significantly higher in high-performance respect to low-performance group. By ROC analysis, fat mass was able to perfectly indexed was significantly higher in high-performance respect to low-performance group. Among anaerobic power parameters, average power >6.99 had the highest accuracy (AUC 0.79, Sensitivity 100%, Specificity 75%).

**Conclusions:** Anthropometric characteristics, especially fat mass, are critical to determine performance in female volleyball players. Anaerobic power, as assessed by average power at Wingate test, is higher in best performance athletes and is significantly associated to vertical counter movement jump test.

**References**

100%). Among anaerobic power parameters, average power >6.99 were grouped as high-performance group while those with a CMJ <75%.

100%). Among anaerobic power parameters, average power >6.99 had the highest accuracy (AUC 0.79, Sensitivity 100%, Specificity 75%).

**Conclusions:** Anthropometric characteristics, especially fat mass, are critical to determine performance in female volleyball players. Anaerobic power, as assessed by average power at Wingate test, is higher in best performance athletes and is significantly associated to vertical counter movement jump test.

**References**

### 60 TP1 P
**Morpho-functional asymmetries and risk of injury in right-handed basketball players: an acute study**

R. D’Alba1, M. Gollin2,3

1Motor and Sport Science Graduate, SUISM, University of Turin; 2Department of Clinical and Biological Science, University of Turin; 3Adapted trained and performance Laboratory, SUISM, University of Turin

**Aim:** Different sports have specific movements, which can involve specific kinetic modifications. Therefore, these adaptations, if protracted, may lead to muscle and joint damage (Eston and Byrne 2004; Peterson and Renstrom 2002). The purpose of the present research is to investigate morpho-functional asymmetries of lower limbs connected with risk of injury in right-handed basketball players.

**Methods:** 12 right-handed regional level basketball players were recruited (age 21 ± 4 years, height 182 ± 9 cm, weight 76 ± 14 kg, 13 ± 3 years of competitive experience). The following variables were studied: length of lower limbs with a flexometer, hamstring flexibility with a digital goniometer (iPhone 4S, GetMyRom version 1.0.3, USA), bipedal dynamic balance using a Libra platform (Easy Tech, Borgo San Lorenzo, Firenze), maximal isometric quadriceps strength with dynamometric platforms (Giobus Italy, Codognè, Terviso), gait cycle in different running speeds (7, 8, 9, 10 km/h) using Optogait (Microgate Italy, Bolzano).

**Results:** Data show (Wilcoxon test) these following significant variations:
- isometric quadriceps strength (P < 0.01,
- 18%: Left 230 kg, Right 191 kg);
- bipedal dynamic balance of lower limbs (total area P < 0.05,
- 31%: left 89°/sec, right 118°/sec; outer area P < 0.01, +47%:
- left 7°/s, Right 15°/s; outer time P < 0.05, +37%: left 3.95 s,
- right 5.45 s; time of re-entry P < 0.01, +37%: left 0.74 s, right 1.16 s).

**Conclusions:** A proprioceptive preventive training program should be implemented in order to balance the lower limbs of right-handed basketball players and to avoid possible injury.

**References**

### 61 TP1 P
**Relationships between technical/tactical indicators and performance in youth female volleyball**

L. Gubellini1, V. Balzani1, F. Mermi1,2

1School of Pharmacy, Biotechnology and Sport Sciences, University of Bologna, Bologna, Italy; 2Department of Biomedical and Neuromotor Sciences, University of Bologna, Bologna, Italy

**Aim:** There is a wide debate on which technical and tactical factors are the most relevant for performance in volleyball (Inkinen et al. 2013; Zirrhoglu 2013; Ugrinowitsch et al. 2014). This study aimed to assess the relationships between selected technical/tactical indicators and performance indicators (sets and points won) in youth female volleyball.

**Methods:** Twenty-six female players belonging either to a high-level (H) team (n = 13, age 15.1 ± 0.3 years, volleyball practice 5.9 ± 1.7 years) or to an amateur (A) team (n = 13, age 15.1 ± 0.3, volleyball practice 5.3 ± 1.7 years) were involved. 15 and 11 games were analysed, respectively for teams H and A, using the software Click and Scout. Examined parameters included the point rate, the reception and the attack indices (proportion of receptions and attacks over total points), and indices of positive/negative attacking, receiving, and serving performance. Correlations and cluster analysis were used for data analysis.

**Results:** The point rate was lower in H vs. A, probably due to higher quality opponents. The reception index was in the range 0.4–0.5 for H, whereas it showed overall lower values for A. The attack index ranged from 0.7 to 0.9 for H, with slightly lower values for A. A trend of positive attacks to increase across the season was observed in H, while this index remained almost constant in A. The cluster analysis revealed two clusters of variables: positive indices, correlated to a successful outcome (r = 0.17, 0.77, and 0.81 for reception, serve, and attack, respectively); negative indices, negatively correlated to a successful outcome (r = −0.08, −0.51, and −0.61 for serve, reception, and attack, respectively).

**Conclusions:** The present findings demonstrate that an effective attack is a key factor for performance in youth female volleyball. Moreover, already at this age, the impact of technical/tactical aspects on performance is affected by the competitive level of the team and opponents.

**References**
Ugrinowitsch H, Lage GM, Santos-Naves SPD, Dutra LN, Carvalho MFS, Ugrinowitsch AAC, Benda RN (2014) Transition I efficiency