AUTOMATIC, COMPLEX ANALYSIS OF TOP EUROPEAN SOCCER GAMES: RELATION TO LAB PERFORMANCE DIAGNOSTICS

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For many years there are well developed research tools and many results with respect to the testing of human performance in the lab, also for soccer players (Bangsbo et al., 2006; Krustrup et al., 2006). The precise analysis of the performance in the game, however, was very limited for a long time due to the effort that was associated with game analysis normally carried out by observers sitting next to the field documenting the various actions of the players. The available software was dependent on the visual control of the observer. As actions and interactions in soccer, compared for example to tennis, are complex, it was difficult to bridge the gap between results of performance diagnostics in the lab and performance on the soccer field.

Not long ago new technologies (AMSICO PRO) became available with which it is possible to identify, scan and track each player on the field for the whole game based on 2D-kinematics. Thus all actions and every movement can be assessed quantitatively. For an individual analysis of a player this is a remarkable advance as now relationships between physiological lab-and field parameters can be investigated. Due to the above mentioned complexity of the game and the huge amount of digital data that is now available (e.g. running distances, accelerations, running velocity, shots, passes), traditional statistical procedures are no longer sufficient.

In current research therefore the following strategy was mapped out. 1) Adjusting statistical tools for the analysis of complex data and systems (homogenisation, profiling, scale variation, local and global pattern detection); 2) Application to data of top European soccer teams (English Premiership, German Bundesliga; 3) Analysis of individual performance parameters on field and relation to lab diagnostics of German Bundesliga players.

According to item 2 various field kinematic parameters between different European soccer clubs were studied. 37 players of a German Bundesliga club participated in the study according to the aims under item 3. The following methods used were: differential strength diagnostics of all soccer-relevant muscle groups, incremental treadmill test, spiroergometry and estimation of lactate transportation capacity (whole blood, plasma, erythrocytes), visual acuity, 3D-anthropometry, sprint test.

The results show a great variability of kinematic performance parameters on the soccer field during the game. By means of pattern detection methods it was possible to identify critical, dynamic time-distance scales in the course of the game that were associated with scoring. The results of lab performance diagnostics underline the necessity of soccer specific strength training with special reference to reactive agonist-antagonist relation. Moreover the analysis of aerobic and anaerobic capacity in relation to the performance parameters on the field shows great potential for an optimization of individual endurance training.

References

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