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Physical and Physiological Testing of Soccer Players: Why, What and How should we Measure?

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| Monitoring soccer players is important for evaluating individual and collective team behavior during training sessions and games, in addition to informing recovery strategies and load management. Modern micro-technology allows assessment of physical, technical and tactical performance parameters in “real-world” conditions. However, physical testing performed either in laboratories or on the pitch is required for individual training prescription, and to develop performance benchmarks for playing standards and playing positions. Anaerobic actions precede the majority of goals, and a large number of linear or repeated sprint tests with or without direction changes have been used in order to assess soccer players’ ability to create or close a gap. The Yo-Yo tests evaluate the players’ ability to repeatedly perform intense exercise. These tests have substantial correlations with high-intensity running distance covered in matches and are considered more valid than measures of maximal aerobic power. Commonly used change-of-direction tests do not mimic on-field movements, and the usefulness of repeated-sprint tests can be questioned, owing to the near-perfect relationship between best and average sprint times. In this presentation we outline minimum standards, percentiles, methodological concerns and future recommendations which hopefully can serve as bottom line information for soccer practitioners. KEYWORDS: endurance, fatigue, football, reliability, sprint, validity, Yo-yo.  [Reprint pdf](TH.pdf) · [Reprint docx](TH.docx) · [Slideshow pptx](SoccerTests.pptx) |

Soccer is the world`s most popular sport: approximately 265 million players and 5 million referees and officials are actively involved, or 4% of the world population, according to FIFA, the International Federation of Association Football. The game is intermittent in nature and involves multiple motor skills, such as running, dribbling, kicking, jumping and tackling. Performance depends upon a variety of individual skills and their interaction and integration among different players within the team. Technical and tactical skills are considered to be predominant factors. For example, pass completion, frequency of forward and total passes, balls received and average touches per possession are higher among successful teams compared to less successful teams ([Bradley et al., 2013](#_ENREF_1); [Dellal et al., 2011](#_ENREF_4); [Rampinini et al., 2019](#_ENREF_8)). However, individual physical and physiological capabilities (both aerobic and anaerobic) must also reach a certain level for players to be successful ([Bradley et al., 2013](#_ENREF_1); [Haugen et al., 2013](#_ENREF_5); [Haugen et al., 2014](#_ENREF_6); [Krustrup et al., 2006](#_ENREF_7); [Tønnessen et al., 2013](#_ENREF_10)).

Teams from the best European leagues have tight game schedules, long seasons and relatively short pre-season periods, limiting the possibilities for long-term physical conditioning planning ([Carling et al., 2015](#_ENREF_2)). As long as each player does his/her “job” satisfactorily on the field, all other physical and physiological considerations are secondary ([Delgado-Bordonau and Mendez-Villanueva, 2012](#_ENREF_3)). In such settings, the main focus is to recover and prepare for the next game. Underperforming players may be replaced by other players in the short term, while they risk being sold to other clubs in the longer term. In contrast, academies and reserve teams prepare for future careers by developing soccer-specific motor skills and physiological capacity to an elite level. Key skills are developed to a high level, while other capabilities merely need to meet a minimum requirement ([Bradley et al., 2013](#_ENREF_1); [Reilly et al., 2000](#_ENREF_9); [Tønnessen et al., 2013](#_ENREF_10)).

Many physical tests have been implemented in clubs and academies over the years to evaluate physical performance in soccer players. This long list includes linear sprinting, agility, repeated sprint ability, VO2max, and Yo-Yo intermittent tests. However, in the last decade semi-automatic computerized player tracking technologies and global positioning systems (GPS) with integrated accelerometers have been extensively implemented in the best European soccer leagues for match analysis. This technology allows assessment of physical, technical and tactical performance parameters during training sessions and games. The advantage with such technology is obvious, as a large range of performance data can be assessed quickly and accurately in real-world conditions. The introduction of this technology has initiated a debate among professional practitioners and scientists regarding the value and usefulness of traditional off-field testing. Are soccer-related fitness tests still necessary? Is it reasonable to assume that future soccer laboratories will consist of micro-technology and purpose-built software only, replacing timing gates, force platforms and metabolic gas analyzers? Our goal with this presentation is to identify pros and cons with today’s available physical performance assessment tools and present reasonable arguments regarding what information is needed to prescribe training and thereby enhance soccer performance.

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