

SOCCER FIT-FACTS

SEPTEMBER 30, 2009

MAINTAIN YOUR FITNESS ON THE FIELD THIS FALL

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The months of September and October present soccer coaches at various different levels of the game with a similar problem — how to help their players remain fit, and at the same time prevent any injuries from occurring. This type of training is termed “maintenance training” and is extremely important for helping athletes to continually perform at their best.

Maintenance training traditionally consist of 1-2 workouts per week, usually with a high intensity of training (to maintain speed, strength and endurance at the levels needed for optimal performance) and a low total volume of training (to prevent injuries and over-training).

Having had the privilege to work with coaches ranging from U10 club to university Varsity levels, I have found that although all coaches are interested in maintenance training, finding enough time in a busy autumn practice/game schedule, as well as choosing the right exercises and training sessions, are commonly shared concerns. Furthermore, while all aspects of soccer players’ physical fitness are important to maintain, the two primary areas of concern seem to be

aerobic endurance, and muscular strength, so it is those areas that will be discussed in more detail here.

An efficient and effective way to maintain aerobic endurance is to use high intensity aerobic interval training (or “HIT” training) on the field, during regular practice time. HIT training involves using short (5-60 second) bouts of high intensity activity, with slightly longer (20-120 second) rest periods. This type of training can be a very convenient way to help players maintain their soccer-specific endurance and speed. Recent studies have shown that as little as 5 minutes of properly structured high intensity interval training per week can have similar effects on the endurance levels of athletes as traditional endurance training regimens lasting 30-60 minutes (Gibala et. Al, 2008). Furthermore, the intermittent nature of high-intensity activities in soccer fits in well with the main principle of HIT training, and thus coaches can use soccer drills or small-sided games to develop their own high intensity intervals, ensuring that all training is soccer-specific and directly related to the game.

Maintaining muscular strength throughout the season is another common concern among

coaches and players at all levels. A quick and time-saving method of maintaining muscular strength is to use body weight circuit training on the field, also during regular practice time. Using the body’s own weight as resistance ensures that strength maintenance training is functional and soccer-specific. In addition, performing exercises consecutively (in a circuit) without resting allows for maintenance of muscular endurance as well as strength, and plays a vital role in preventing injuries.

On the next page is a sample soccer-specific high-intensity interval training (HIT) small-sided game, as well as an example of a soccer-specific body weight strength circuit, both of which can be incorporated in a team’s regular practice schedule to facilitate maintenance of endurance and strength. For optimal results, include the HIT game one day per week, immediately following warm-up, and the strength circuit 2 days per week, at the end of practice.

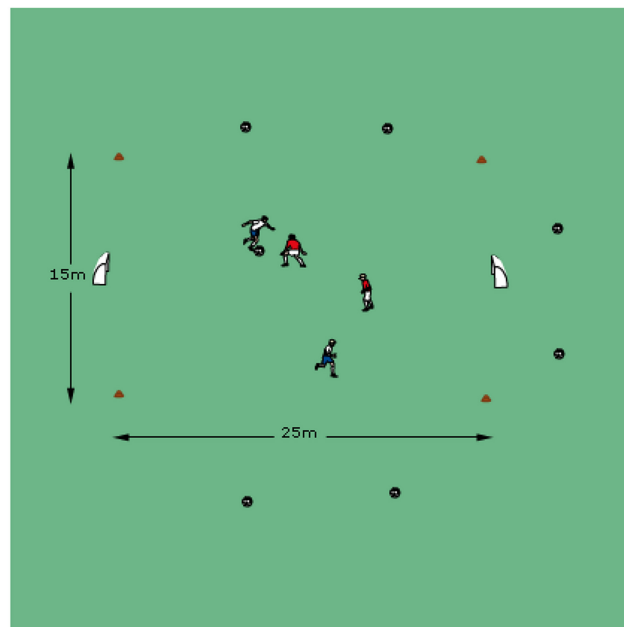
LEARN ABOUT IN THIS ISSUE:

- **HIT Training**
- **Body Weight Strength Training**
- **Soccer-Specific Fitness Testing**

ON-FIELD MAINTENANCE TRAINING

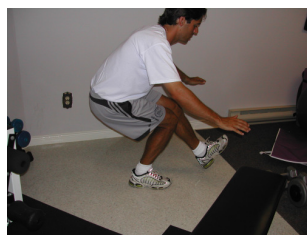
High Intensity Interval Training in Soccer: SmallSided Game:

- players divided into teams of 2, playing on 25 x 15m fields with small goals, with balls placed around the perimeter of the playing area
- play 2 v 2, for 2 minutes, with coach playing a new ball in immediately after the ball is played outside the playing area
- Rules:
 - Both players from the team must be in their opponents' "half" of the field in order to score
 - If a goal is scored when one of the defending players has not come back into their own "half" the goal is worth two points
- rest periods are 1 minute, and teams switch opponents



Body Weight Strength Training Circuit

- When selecting exercises to put into a circuit for body weight training, it is important to look at the specific muscles that are used in soccer (glutes, hamstrings, quadriceps, adductors, abdominals, and core muscles)
 - Next, the specific types of muscular contractions (concentric, isometric, and eccentric) need to be considered
 - The following strength maintenance circuit can be done 3 times, without rest, at the end of practice, 2 days per week
1. **1 Leg Squat (x 10 each leg)** - stand on one leg, and bend at the knee and hip until knee reaches 90 degree angle, then push to straighten hip and knee
 2. **Bent Knee Crunch (x 30)** - keep knees at 90 degree angle, and raise shoulders off the floor
 3. **Heel Touches (x 20 each side)** - hold a crunch and bend side-ways at the waist, touch one heel then the other
 4. **Isometric V-Sit Hold (x 45 seconds)** - hold the torso and legs off the floor at 45 degree angles, keeping legs straight
 5. **Alternate Arm/Leg Extension (x 10 each arm/leg)** - lay on stomach, arms and legs extended, raise one arm with the opposite side leg, then repeat
 6. **Isometric Back Extension Hold (x 30 seconds)** - lay on stomach, touch ears and lift torso off the ground, and hold



One Leg Squat



Bent Knee Crunch



Heel Touches



Isometric V-Sit Hold



Alternate Arm/Leg Extension



Isometric Back Extension Hold

THE YO-YO INTERMITTENT RECOVERY TEST—A QUICK AND EFFECTIVE WAY TO TEST SPECIFIC ENDURANCE IN SOCCER

By Robert Rupf, MSc., BEng.

Aerobic endurance has been reported to be an important physical attribute for a successful soccer player. Research dating back from the 1970's indicates that soccer players on average can travel 10-12 km a game, with recent research indicating that upwards of 14 km can be covered during a match. However, considering that the average person walks at a speed of 6 km/hr for a total of 9 km over a 90 minute duration, it is easy to see that each player in a soccer game can perform up to 90% of the distance doing low intensity work. Therefore, the physical attribute that appears to separate elite players from sub-elite players might be the amount of high intensity work they can perform over a 90 minute game.

High intensity work in soccer consists of fast jogs and sprints. From a physiological perspective, athletes who are able to perform a lot of high intensity work have both a strong aerobic conditioning background, and a strong speed training background. Research from Denmark appears to support the importance of high intensity work. The authors of some research involving top Danish international players and Danish players in the top domestic league found that the international level players covered almost 20-30% more high intensity running in domestic league action, than their sub-elite counterparts. This was despite the fact that they had similar aerobic physiology. This study might suggest then that traditional aerobic testing, such as the Cooper test and the beep test, may not be a suitable test for soccer players for two reasons. First, it may not provide the correct physiological advice on how to track the physical development of a soccer player, and second, the tests may not properly identify the differences between different levels of play. One test, however, is continuously being proven to identify the development of high intensity running in soccer players. This test is called the Yo Yo Intermittent Recovery Test.

The Yo Yo Test was created to assess a player's ability to handle high intensity running. It consists of a player performing two consecutive moderate or high intensity 20m runs, followed by a 10s rest. This pattern continues with increasing speed until the athlete is not able to keep up with the pace set by the test. To set up the test, you will need to establish three lines. The first line, the start line is set up at the edge of the 18 yard box. The second line called the turn line is set 20m (approximately 22 yards) away from the start line towards the centre circle. The third line called the recovery line is set 5 m (approximately 5.5 yards) away from the start line towards the goal line (Figure 1). To administer the test, the athlete starts at the start line and runs to the turn line when they hear the beep. The athlete must arrive at the turn line by the beep and return to the start line by the next beep. Failure to reach the start line by this second beep means the athlete is given a warning. Two consecutive warnings will terminate the test for the athlete. If the athlete reaches the start line in time, he or she then has 10 s to walk to the recovery line and return to the start line before the cycle commences again. Once the test is completed, the tester should record the level that the athlete achieved.

There are two speed levels that the tester should consider when selecting to use the Yo Yo test. The Yo Yo Level 1 Test which starts off slower and rises in speed less quickly, is ideal for female athletes of all ages, and male youth players under the age of 18 years old. The Yo Yo Level 2 Test starts at a slightly faster speed than the Level 1, and its speed increases quicker than that of the Level 1 Test. The Level 2 test is ideal for male athletes over the age of 18 years old. It is also important to note that the test should not be run on players under the age of 14, as emphasis should be placed on skill development rather than physical development.

Effective monitoring of a player's progress through testing should also be incorporated into the player's yearly planning index. Testing can be used to either start or finish specific phases of the season. For example, for a team competing from May to September, ideal times to test might be at the start of the preseason in March, the end of preseason in May, and at the end of the season in September. This will allow the coach to see if the athlete has developed during the critical preseason time period, or if they have maintained their physical fitness levels during the season. Further for effective use, the test should be used over a number of years, with a commitment to test at least three times a year. An increased number of tests can aid in the defining real performance changes rather than seeing the results of test variability. Further, better test interpretation will allow for better comparison of results with existing databases for the Level 1 (Table 1) and Level 2 (Table 2) Yo Yo tests.

In summary, the Yo Yo test is a good predictor of the amount of high intensity running a player is capable of during a game, which appears to be a physiological indicator of elite soccer players. A commitment to run the test correctly and to use the right version of the test for a number of years will not only allow for the useful monitoring of the player's progress, but also allow for effective training programs to be implemented.

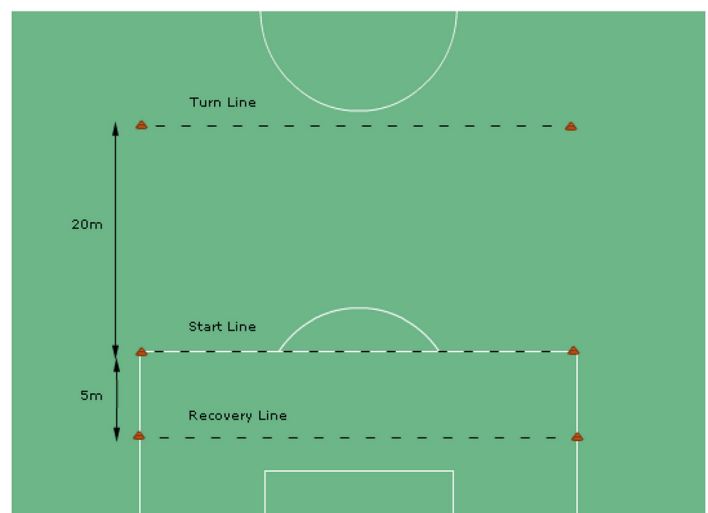


Figure 1: The Yo-Yo Intermittent Recovery Test – Test Set-Up

We are on the Web!
www.soccerfitness.ca

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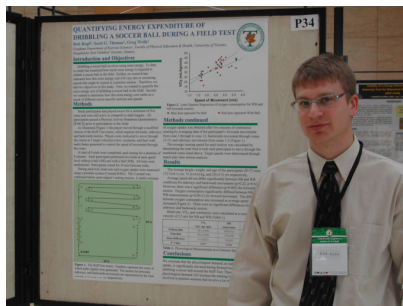
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Robert Rupf, MSc., BEng., is an exercise physiologist with extensive experience in soccer-specific scientific research, as well in the practical coaching and training of soccer players. After completing his undergraduate degree in engineering, Robert began his graduate studies at the Human Physiology Performance Lab at the University of Toronto in 2005. There, he conducted research studies on amateur and professional soccer players, with his particular area of interest being the body's anaerobic contribution to the total energy expenditure in soccer.



Currently Robert works as a research associate at the Canadian Sport Centre Ontario (CSC), a facility dedicated to testing and training elite level Canadian athletes. Robert has authored numerous articles and published papers in various sport-science related journals, many of which have been focused on soccer-specific testing and training. Most recently, along with others at the CSC, Robert has developed a soccer-specific fitness testing protocol that has been used to test over 1000 female soccer players at various levels in Canada, ranging from amateur club and university Varsity athletes, to elite Provincial and National team players.

In addition to his full-time work as a sports-scientist, Robert is also an accomplished soccer coach, holding an Ontario Provincial "B" License and having coached at the Rep. level for over 5 years.

Soccer Fitness was created to help coaches at all levels of the game improve their knowledge and practical skills in training their athletes. With huge and growing numbers of players registered in Canada at the youth level, it often seems that there are just too many players and not enough qualified fitness trainers. Today, most clubs in Ontario have Club Head Coaches and Technical Staffs, whose primary responsibility is to help train, educate their club's "rep" or competitive coaches, and ensure that they are able to plan and deliver appropriate technical and tactical training to their respective teams. Physical training of soccer players, however, seems to be the missing link in most clubs' overall training programs. **Soccer Fitness is a company that aims to help coaches in understanding and implementing appropriate physical training programs for their athletes.**

Level	Distance (m)	Level
Top Class	2400	20.1
Elite	2200	19.4
Sub_elite	2000	18.7
Trained	1800	18.2

Table 1a) Male results for the Yo Yo Level 1 test.

Level	Distance (m)	Level
Top Class	1500	17.2
Elite	1350	16.7
Sub-Elite	1200	16.3

Table 1b) Female results for the Yo Yo Level 1 test.

Level	Distance (m)	Level
Top Elite	1250	22.3
Elite	900	21.4
Trained	650	20.4

Table 2. Male results for the Yo Yo Level 2 test.