SOCCER: AEROBIC OR ANAEROBIC SPORT?

Soccer is such a fantastic game because not only is it magic to watch, but it consists of such a large physiological demand on the human body. Muscular strength, muscular endurance, cardiovascular endurance, speed, quickness, agility, power, flexibility… The list goes on and on. However, often we think of soccer as a predominantly aerobic sport. Whereas in reality, it is the opposite.

First of all, let’s look at the difference between aerobic and anaerobic activity. Aerobic activity is defined as an activity lasting more than 2 minutes, where oxygen must be present in order to generate adenosine triphosphate (ATP). Often this is referred to as the “aerobic system”. Anaerobic activity is defined as an activity that requires shorter bursts of energy usually lasting anywhere from less than 10 seconds up to 2 minutes, where oxygen is not present in ATP production. This is often classified as two separate systems; “The immediate energy system” (0-10 seconds) and “the nonoxidative energy system” (10 sec to 2 minutes).

When soccer is broken down, the game is played by players performing at various speeds and intensities; walking, jogging, and sprinting. The majority of play is in intervals and the activity does not last for long periods of time (e.g. chasing a lose ball, making a run into space etc…) This is the most important factor to consider when doing soccer conditioning. There definitely is a need for aerobic conditioning as well, due to the fact that the intervals mentioned are repeated at various intensities and durations over the course of a 90 minute match. However, because of the nature of the sport, anaerobic conditioning should take up the majority of the cardiovascular conditioning.

In one study conducted by Jan Helgerud and his colleagues at the Norwegian University of Science and Technology in Trondheim, the effects of a twice weekly interval training program in addition to regular practices (over the period of 8 weeks) was compared to a program of additional skills training (in addition to regular practices). The results found that, without surprise, those who performed the additional interval training program over the period of the 8 week study, had greater benefits as far as specific match conditioning goes than those who strictly performed skills training. More specifically, those who performed the interval training twice per week increased the total distance covered during games by 20% (from 8,619 to 10,335m). They also doubled the number of times they sprinted during games (a sprint being defined as an all-out run lasting at least two seconds). These athletes were also able to perform at a higher intensity throughout the game. After the 8 weeks, the athletes maintained an average of 85.6% of their max heart rate during their games, compared with just 82.7% beforehand. These athletes also spent 19 minutes longer, than those who performed the skills training, in the high-intensity zone (i.e. above 90% of max heart rate) during an actual game. (1)
What this study proves is that interval training benefits soccer players during actual games, and can benefit them even more with an additional combination of aerobic intervals and/or aerobic conditioning.

With this in mind, the amount and type of conditioning necessary also depends on the position of the athlete. Strikers and keepers for example will need a greater amount of anaerobic training and less aerobic training. Whereas midfielders will need a closer ratio between aerobic and anaerobic training (outside midfielders would need slightly more aerobic conditioning than central midfielders). Fullbacks would need a similar cardiovascular training schedule as midfielders, however with slightly less aerobic training and slightly more anaerobic training. Below is an example of a cardiovascular conditioning program for a Striker and a central midfielder along with the different movements required in a game:

<table>
<thead>
<tr>
<th>Position</th>
<th>Primary Movements</th>
<th>Ratio (aerobic: anaerobic)</th>
<th>Sample Program (5 day routine) based on ratio (Weekly)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Striker</td>
<td>Sprints, explosiveness, speed, agility &amp; quickness</td>
<td>20%:80%</td>
<td>Aerobic – 1 day/week       Anaerobic – 4 days/week</td>
</tr>
<tr>
<td>Centre Midfield</td>
<td>Speed, agility &amp; quickness, sprints, jogging (additional field coverage), explosiveness, (longer duration of jogging/running periods)</td>
<td>40%:60%</td>
<td>Aerobic – 2       Anaerobic – 3 days/week</td>
</tr>
</tbody>
</table>

Of course much more is needed to create a well rounded conditioning program for the sport. This debate of soccer being predominately an aerobic or anaerobic sport is now a thing of the past. Present day human physiology and fitness knowledge allows for proper sport analysis and a better understanding of what is involved.

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1) Andersen, Owen; [www.pponline.co.uk](http://www.pponline.co.uk) , “soccer fitness training…..”