

PLAYING IN THE HEAT – TOP TIPS

Barry Drust of Liverpool John Moores University uses his experience to provide five top tips for playing in the heat.



Major international tournaments are frequently played in countries where the environmental temperature is hot (25 - 30 °C). It is also common for both pre-season training and games early in the season in the UK to be played in such temperatures. Performing in such environments places additional physiological stress on the human body when it is exercising. These additional physiological stresses are a direct result of the body's need to lose the additional heat that is generated when the ambient temperature is elevated. These physiological changes may have implications for both the effectiveness of training and the outcome of games. The following five key points will attempt to provide some information on both the problems associated with playing in the heat and potential strategies that may limit its effect.

Performance is affected by high ambient temperatures

Successful performance relies on the ability of players to complete both low and high intensity exercise bouts. The performance of low intensity exercise such as jogging is lower when the ambient temperature is high. The temperature at which this type of performance is affected is lower than would be expected been around 20 °C. These temperatures would frequently be experienced even in a normal British summer time.

The effects of increases in temperature on high intensity sprint type activity is not as clear, although recent evidence suggests that sprinting ability is also negatively affected when the temperature of the body is around 39.5 °C. It is therefore not surprising that the work-rate of players during matches, especially at higher exercise intensities, is lower

when the climatic conditions are high. This would suggest that a team's performance could be adversely affected under such conditions.

Careful attention should be paid to warm up strategies when the temperature is hot

One of the key factors that seem to explain the reduced ability to exercise in the heat is reaching a "critical" level of core body temperature. This temperature is thought to be around 39.5 – 40 °C. High core temperatures are thought to affect the messages that are sent by the brain to the muscle, via the nervous systems, that tells the muscles to contract thereby reducing the "drive" to exercise.



Warm ups, which are almost always incorporated in the pre-match routine, lead to elevations in the temperature of the body. These increases are important for the majority of performance benefits that are normally associated with warming up prior to exercise. The elevations in body temperature will also move the body closer to the critical thermal limit thereby reducing the margin before temperature mediated fatigue mechanisms are activated.

This would suggest that the usual pre-match routines should be altered to prevent excessive elevations in body temperature prior to exercise. Such alterations would include a reduction in the amount of high intensity exercise that is completed as this type of activity is associated with large increases in body temperature. It is also important to incorporate additional strategies in the warm up that may help to limit the increase in body temperature. These may include a careful consideration of the location of the warm up (i.e. exercising away from heat of the sun) and the provision of suitable amounts of fluid. Cooling aids such as ice vests may also be worn during the pre-match routines to help ensure that increases in temperature are restricted

to the working muscles rather than core.

Acclimatisation can help improve performance in the heat

Players will acclimatise to repeated exposures to hot conditions. These adaptations include changes in the sweating response (sweating occurs quicker and is more dilute) and a better distribution of blood to the skin. Both these changes help improve the individual's ability to lose heat. A period of 10 to 14 days is required for these adaptations to take place. This would indicate that the team should be exposed to the climate of the host country for at least 2 weeks before the start of a tournament. If such suggestions are impractical, some degree of acclimatisation may be achieved by players exercising at the hottest time of the day in their own climate, using specialist facilities such as environmental chambers (rooms in which the temperature can be accurately controlled) or wearing heavy sweat suits during activity that increase the heat load imposed on players. Exercise is an important factor in any strategy as resting exposure to high temperatures is only partially effective in acclimatising players.

Pre-competition nutrition may be very important in the heat

Exercising in the heat also changes the energy sources that the body uses to support

exercise. When the temperature is high the body increases its reliance on carbohydrates as a source of fuel. This may mean that the body may run out of glycogen, the body's storage form of carbohydrate, faster than normal. This may have important implications for the player's work-rate as low glycogen stores are related to fatigue and tiredness.



High temperatures also lead to greater changes in the body's fluid levels. Large sweat losses lead to reductions in both body water and essential salts. These changes make it harder for the body to lose heat as they prevent further increases in skin blood flow that are essential for the transfer of heat from the body to the environment. They will also increase the likelihood that exercise performance will be affected thereby further affecting an individual's work-rate.

Nutritional strategies may play an important part in reducing the impact of high ambient temperatures on performance. Such strategies should incorporate careful attention to an adequate intake of both carbohydrate and fluid prior to performance. It is also vital to ensure that every opportunity to consume fluid is also taken during match-

play or training especially when these are infrequent during competitive games. Effective post competition nutrition may be key in helping maintain performance by maximising fluid and glycogen replenishment especially when the gap between matches or training sessions is short as in tournament play.

Clothing can help alleviate thermal strain

The correct choice of clothing is also important when

preparing to perform in hot conditions. Lightweight, loose fitting clothing allows the skin to cool by creating convective air currents close to the skin to aid dry heat loss and the evaporation of sweat. Natural fibres such as cotton have traditionally been desirable though modern man made fabrics now offer the best alternatives. Colour is also important as dark colours absorb light rays and will increase radiant heat gain. Light colours will, in contrast, reflect heat rays. Such information may help

inform both the design and the choice of clothing for both team strips and training wear.

Biography

Dr Barry Drust is Programme Leader for the BSc (Hons) Science and Football at the Research Institute for Sport and Exercise Sciences, Liverpool John Moores University. He has experience of providing sport science support to professional football clubs.