WARMING DOWN

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1. The warm-down allows for a graded decrease in body temperature

After a game or a strenuous training session, the body will have stored heat from its muscle activities and caused inner core temperature to rise. Muscle temperature will also be elevated above its normal resting value. Core temperature is usually 37^{o}C, but may exceed 39^{o}C after 90-120 minutes of training, and even higher than this value if the exercise is conducted in the heat. Even in cold winter conditions, heat production will exceed heat loss to the environment [except for low-level recreational play], so that an overall heat gain is evident.

Emphasis in football has been focused on the warm-up for forthcoming activity with little attention given to what happens after the formal part of training (or competition) is completed. In sports such as swimming, track-and-field, cycling, triathlon, rowing and others, the warm-down or cool-down is very much a part of the routine. The basic principle is to avoid abrupt changes to the challenge being presented to the various physiological systems. Therefore, a light exercise intensity which will enable the heat balance equation to be reversed gradually and allow a smooth graded fall in core temperature should be effective (see Reilly, 2001; Insight, 4, 2, 37).

2. The warm-down should start within 5-10 minutes of finishing matches

After exercise stops, hot blood is still being re-circulated around the body. Sweating continues whilst skin, muscle and core temperatures remain elevated for about five minutes or so, as are blood pressure and heart rate. This short period allows players the opportunity to towel down, change from football boots into ‘trainers’, drink some fluid and don clothing compatible with thermal comfort during the ‘warm-down’ routine. If it is windy, appropriate head-gear should be worn due to the large losses of heat through the head. A water-proof top is advised if it is raining. It is especially important not to become quickly overcooled in wet-windy conditions. For this reason, hanging around to talk or chat is not recommended in the cold or interruptions to the warm-down should be avoided.

3. Warm-down assists dispersal of blood lactate

Oxygen uptake continues above its resting level even if the player is inactive after training. This phenomenon used to be known as ‘oxygen debt’, but is now

referred to as ‘elevated post-exercise oxygen consumption’ (EPOC). The increased metabolic rate also contributes to the heat load. Football has anaerobic as well as aerobic components, especially if the final part of the training includes intense exercise bouts. The consequence is that lactate will be produced within the active muscles and within 3-5 minutes will appear in the circulation.

There is evidence that active recovery is superior to passive rest in promoting the oxidation of lactate. This metabolite of the anaerobic breakdown of glycogen is a source of energy and not just a waste product implicated in muscle fatigue. It is oxidized in the heart, skeletal muscle and other tissues as it is recirculated around the body in the so-called lactate shuttle. The oxidation rate is dependent on the exercise intensity up to about 50%VO_2max, so that light exercise helps the dispersal of lactate from the blood. Easy jogging is probably best for achieving this objective. In Olympic sports such as swimming and rowing, lactate dispersal profiles are monitored on an individual basis from ear-lobe samples so that the athlete can determine when the warm-down can be concluded. Such information is not available to footballers, but it is likely that a light jog of 7-12 minutes is adequate.

4. Warm-down represents good hygiene

There is a j-shaped relationship between exercise and the immune response. Strenuous exercise has a depressant effect on immune function whereas light exercise has a beneficial influence. The ‘open window’ theory proposes that the body is more vulnerable than normal to infection, particularly upper respiratory tract infections, for a 4-6 hour period after exercise. Finishing off the session with a light warm-down could help to offset the detrimental effects of the preceding intensive exercise on the immune system
It would also help to avoid a sudden a sudden change in thermal state that is implicated in picking up a common cold. The warm-down may be especially important after a match in periods where the fixture list is congested and it is essential to remain infection-free for the next game.

5. Warm-down helps recovery

Football sessions make heavy demands on the body’s energy reserves but differ from non-contact sports in that soft tissue may be aggravated during tackles or contests for possession of the ball. Additionally, joint stiffness may set in soon after exercise finishes. The frequent ‘eccentric’ muscle actions entailed in decelerating the body, controlling and kicking the ball, jumping and stretching (the so-called stretch-shortening cycle) lead to the phenomenon known as delayed onset muscle soreness which tends to peak 48-72 hours after exercise. There is evidence that a formal warm-down can help reduce this type of soreness in the days immediately following a match and speed the recovery of muscle strength to normal. Leaving the warm-down until the next morning makes no physiological sense. Including some dynamic flexibility exercises into the warm-down routine can help in alleviating feelings of stiffness. The stretching exercises can engage calves, hamstrings, quadriceps, adductors, gluteals and lower back muscles.

Concluding remarks

The warm-down allows the players a few moments of

reflection after the day's match or training. It may be a group activity after training or more individualistic after a game. In the latter case, thoughts can revolve around things done well or focus on aspects that were less successful. Emotions can be held in check whilst composure is regained should there have been any critical incidents in the game. By the time the player returns to the dressing room the arousal level is restored towards normality and the activities of the day can be evaluated in a balanced manner. In this way the warm-down draws the professional aspects of the day's work to closure.

Further Reading

Reilly, T. (2001). The physiology of warming down. Insight: the FA Coaches Association Journal, 4 (2), 37.

Reilly, T. and Rigby, M. (2002).Effect of an active warm-down following competitive soccer. In: Science and Football IV (edited by W. Spinks, T. Reilly and A. Murphy), pp. 226-229, London: Routledge.