negative feedback, so that any variation produces a physiological response to bring it back to a set point (around 37°C). The centre for regulating body temperature is in the hypothalamus of the brain (Fig 1). This set point can be reset by substances called pyrogens (fever-producing proteins) released by monocytes and macrophages (phagocytic cells responsible for the body's defence system). These act on the thermoregulation centre in the hypothalamus, causing the release of prostaglandins which reset the hypothalamic thermostat to a higher level. This triggers mechanisms to conserve and generate heat such as vasoconstriction and shivering, until the new set point temperature is reached (Waugh and Grant, 2006). This results in the development of pyrexia (Royal College of Nursing, 2008).

CAUSES OF PYREXIA

There are many causes of pyrexia including:
- Infection: 50% of pyrexia cases are due to infection (Leach, 2009);
- High ambient temperature: heat and humidity in the environment can reduce the amount of heat lost through the skin;
- Drugs: amphetamine derivatives, for example, methylenedioxymethylamphetamine (ecstasy) and anaesthetics, can induce malignant hyperpyrexia (Leach, 2009);
- Stroke: leading to injury to the hypothalamus;
- Increased muscular activity: following strenuous exercise (particularly in a hot environment) and fitting;
- Endocrine: for example, thyroid storm;
- Myocardial infarction;
- Pyrexia of unknown origin: is a consistently elevated body temperature >37.5°C persisting for over two weeks with no diagnosis despite investigations (Boon et al, 2006). In 15% of cases either no diagnosis is made or the pyrexia resolves spontaneously (Boon et al, 2006).

ADVERSE EFFECTS ASSOCIATED WITH PYREXIA

Temperatures above 37.4°C or a trend of increase towards this level should prompt appropriate reporting, in line with early warning scoring systems.

Adverse effects linked to pyrexia include:
- Increased metabolic rate, increased oxygen consumption (10% rise with each 1°C increase in temperature) and increased production of carbon dioxide;
- Hypovolaemia due to sweating, dehydration and vasodilation;
- Metabolic acidosis;
- Epileptic fit;
- Neurological impairment;
- Renal failure;
- Rhabdomyolysis (rapid breakdown of muscle tissue);
- Death (Leach, 2009; Hussein, 2004). Adverse effects are usually only associated with hyperpyrexia (>40°C).

NURSING CARE AND MANAGEMENT

Pyrexia is abnormal and should be considered an adverse sign. It is an important component of early warning scoring systems and can be associated with serious life threatening illness. Nursing care and treatment will be dictated by the severity of the pyrexia and its probable cause, patients’ condition, prognosis, local protocols and whether they are symptomatic (feeling hot, sweating profusely).

General principles of care include the following:
- Assess patients following the airway, breathing, circulation, disability, exposure (ABCDE) approach advocated by the Resuscitation Council UK (2006). If necessary, summon expert help, administer high concentration oxygen and treat life threatening problems;
- Ensure early warning score (EWS) charts (or similar) are completed following local protocols; local EWS escalation policies should be followed;
- Monitor vital signs;
- Monitor fluid balance, ensuring patients remain adequately hydrated. Observe for signs of dehydration, particularly a prolonged capillary refill time of three seconds or longer, cool extremities and reduced urine output (RCN, 2008);
- Try to make patients as comfortable as possible. If they feel hot or are sweating profusely, consider gentle physical cooling methods to make them feel more comfortable, for example, careful use of a fan (see below). If patients are shivering, add a blanket to assist heat conservation (Brooker and Waugh, 2007), Cool, fresh and dry bedding and clothing/nightwear usually help to make them more comfortable;
- Consider offering mouthwashes and ice to suck;
- If patients have life threatening hyperpyrexia, administer physical cooling methods (Leach, 2009; Wyatt et al, 2006; Brooker and Nicol, 2003);
- Do not routinely administer antipyretic drugs (see below);
- Try to establish the probable cause of the pyrexia.

Investigations

One approach to identifying the cause of pyrexia is to check the six Cs:
- Chest: does the patient have a chest infection?
- Cannula: is the cannula site infected?
- Calves: do they have a deep vein thrombosis?
- Catheter: do they have a urinary tract infection?
- Cut: do they have an infected wound?
- CVC: do they have an infected central venous catheter?

It may be necessary to send off sputum samples for investigations.