9. **Burn Injury**

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**Introduction**

*Burn injury* is defined as an area of tissue damage caused by the effects of heat. It may result directly from the transfer of thermal energy or indirectly when some other form of energy is converted into thermal energy. Examples of the latter are the skin burn seen in electrocution (electrical energy), burns occurring as a result of friction (physical energy), and thermal energy resulting from a chemical reaction (chemical burns). Traditionally injuries resulting from wet heat sources, such as hot water and steam, are known as *scalds*. The annual number of individuals suffering thermal injuries in the United Kingdom (UK) is approximately 250,000, with 175,000 presenting to accident and emergency departments and 13,000 requiring hospital admission. A detailed account of the epidemiology of thermal injuries is given by Lawrence but in summary:

Burns and scalds tend to be seen at the extremes of age and have highest incidence in those less than two years old. Twenty percent of burns occur in children aged up to four years and of these 70% are scalds. Sixty percent of burns occur in patients aged 15 to 64 mostly as a result of contact with flames. About 10% occur in people aged over 65. As with most forms of trauma, burns are commoner in males than females and are often associated with intoxication by alcohol.

Burns on living persons often have considerable medicolegal significance, especially in children when the possibility of nonaccidental injury may be raised. In many jurisdictions if burns may have caused or contributed to death, a medicolegal postmortem examination will result.

The aims of this chapter are to describe the medicolegal assessment of burns, including electrical burns, discuss the mechanisms by which they cause death, and describe the postmortem effects of heat on the human body.

**General Assessment of Burns**

Clinically, burns are assessed primarily according to the percentage of the body surface involved and the depth of the burns. The former is principally of use in predicting the likelihood of systemic complications and death (see later). The latter
determines how the wound will heal and whether skin grafting likely will be necessary. The extent of burns in adults is determined by the rule of nines \( 9^9 \) (Figure 9.1). In infants the head accounts for 18% and each lower limb 13.5%.

Burns are categorized by depth into first, second, and third degree. First- and second-degree burns are both partial thickness, whereas third-degree burns involve complete destruction of all skin appendages. The most superficial type of heat-related damage, erythema, usually resolves in a few days. Even extensive first-degree burns usually heal in 10 to 14 days with no scarring. They are accompanied by blistering and are very painful. Second-degree burns heal more slowly, are relatively painless, and heal with scarring if not treated. Third-degree burns are painless, heal by granulation tissue, and scar if left untreated. Occasionally, most often in black-skinned races, burns are complicated by keloid scar formation characterized by tumor-like growth extending beyond the original injury.