

Several types of endocrine dysfunction cause hypothermia. Hypothyroidism—particularly when extreme, as in myxedema coma—reduces the metabolic rate and impairs thermogenesis and behavioral responses. Adrenal insufficiency and hypopituitarism also increase susceptibility to hypothermia. Hypoglycemia, most commonly caused by insulin or oral hypoglycemic agents, is associated with hypothermia, in part because of neuroglycopenic effects on hypothalamic function. Increased osmolality and metabolic derangements associated with uremia, diabetic ketoacidosis, and lactic acidosis can lead to altered hypothalamic thermoregulation.

Neurologic injury from trauma, cerebrovascular accident, subarachnoid hemorrhage, and a hypothalamic lesion increases susceptibility to hypothermia. Agenesis of the corpus callosum (*Shapiro's syndrome*) is one cause of episodic hypothermia. In this syndrome, profuse perspiration is followed by a rapid fall in temperature. Acute spinal cord injury disrupts the autonomic pathways that lead to shivering and will prevent cold-induced reflex vasoconstrictive responses.

Hypothermia associated with sepsis is a poor prognostic sign. Hepatic failure causes decreased glycogen storage and gluconeogenesis as well as a diminished shivering response. In acute myocardial infarction associated with low cardiac output, hypothermia may be reversed after adequate resuscitation. With extensive burns, psoriasis, erythrodermas, and other skin diseases, increased peripheral-blood flow leads to excessive heat loss.

■ THERMOREGULATION

Heat loss occurs through five mechanisms: radiation (55–65% of heat loss), conduction (10–15% of heat loss, increased in cold water), convection (increased in the wind), respiration, and evaporation; both of the latter two mechanisms are affected by the ambient temperature and the relative humidity.

The preoptic anterior hypothalamus normally orchestrates thermoregulation ([Chap. 18](#)). The immediate defense of thermoneutrality is via the autonomic nervous system, whereas delayed control is mediated by the endocrine system. Autonomic nervous system responses include the release of norepinephrine,