However, LBW infants are placed at further disadvantage by a number of additional problems. They have an even smaller muscle mass and fewer deposits of brown fat for producing heat, lack insulating subcutaneous fat, and have poor reflex control of skin capillaries.

To reduce the risk of cold stress, at-risk newborns are placed skin-to-skin with their mother if medically stable or in a heated environment immediately after birth, where they remain until they are able to maintain **thermal stability**, which is the capacity to balance heat production and conservation with heat dissipation. Because overheating produces an increase in oxygen and calorie consumption, infants are also jeopardized in a hyperthermic environment. A **neutral thermal environment** is one that permits the infant to maintain a normal core temperature with minimum oxygen consumption and calorie expenditure (Bissinger and Annibale, 2010). Studies indicate that optimum thermoneutrality cannot be predicted for every high-risk infant's needs. In healthy term infants, it is recommended that axillary temperatures be maintained at 36.5° to 37.5° C (97.7° to 99.5° F); in preterm infants, axillary temperatures of 36.3° and 36.9° C (97.3° and 98.4° F) are considered appropriate (Brown and Landers, 2011).

VLBW and ELBW infants, with thin skin and almost no subcutaneous fat, can control body heat loss or gain only within a limited range of environmental temperatures. In these infants, heat loss from radiation, evaporation, and transepidermal water loss is three to five times greater than in larger infants, and a decrease in body temperature is associated with an increase in mortality. Further research is needed to define a neutral thermal environment for ELBW infants.

The consequences of cold stress that produce additional hazards to neonates are (1) hypoxia, (2) metabolic acidosis, and (3) hypoglycemia. Increased metabolism in response to chilling creates a compensatory increase in oxygen and calorie consumption. If available oxygen is not increased to accommodate this need, arterial oxygen tension is decreased. This is further complicated by a smaller lung volume in relation to the metabolic rate, which creates diminished oxygen in the blood and concurrent pulmonary disorders. A small advantage is gained by the presence of fetal hemoglobin because its increased capacity to carry oxygen allows