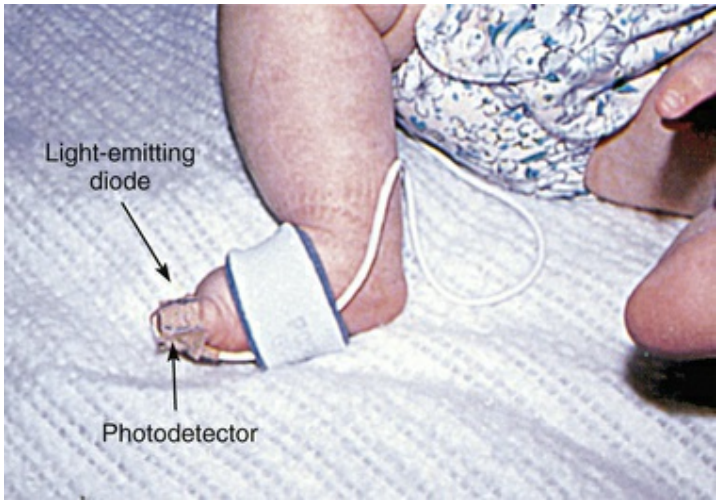

FIG 20-24 Oximeter sensor on the great toe. Note that the sensor is positioned with a light-emitting diode (LED) opposite the photodetector. The cord is secured to the foot to minimize movement of the sensor.

Another noninvasive method is **transcutaneous monitoring (TCM)**, which provides continuous monitoring of transcutaneous partial pressure of oxygen in arterial blood ($tcPaO_2$) and, with some devices, of transcutaneous partial pressure of carbon dioxide in arterial blood ($tcPaCO_2$). An electrode is attached to the warmed skin to facilitate arterialization of cutaneous capillaries. The site of the electrode must be changed every 3 to 4 hours to avoid burning the skin, and the machine must be calibrated with every site change. TCM is used frequently in neonatal intensive care units, but it may not reflect PaO_2 in infants with impaired local circulation.

Oximetry is insensitive to hyperoxia, because hemoglobin approaches 100% saturation for all PaO_2 readings greater than approximately 100 mm Hg, which is a dangerous situation for preterm infants at risk for developing retinopathy of prematurity (see Chapter 8). Therefore, preterm infants being monitored with oximetry should have their upper limits identified, such as 90% to 95%, and a protocol should be established for decreasing oxygen when saturations are high.

Oximetry offers several advantages over TCM. Oximetry (1) does not require heating the skin, thus reducing the risk of burns; (2) eliminates a delay period for transducer equilibration; and (3) maintains an accurate measurement regardless of the patient's age or skin characteristics or the presence of lung disease.