neurodevelopmental outcomes, including genetics (chromosomal abnormalities and microdeletions), family background (parental intelligence quotient [IQ] and socioeconomic status), preoperative factors (including prematurity, cyanosis, shock), intraoperative factors (use of cardiopulmonary bypass, deep hypothermic circulatory arrest), and postoperative factors (hemodynamic instability, hypoxia, acidosis, cardiac arrest, stroke, ischemic events).

Research in the past decade has begun to identify specific risk factors and common developmental concerns for CHD. In complex CHD, altered flow of oxygen to the brain, both in utero and postnatally may impact brain development. One study demonstrated that the brain in utero of infants with complex CHD is delayed, thus the brain is less mature than is by gestational age in a certain population (Licht, Shera, Clancy, et al, 2009). The American Heart Association's 2012 Scientific Statement reinforces that children with CHD are at increased risk of developmental disorder or disabilities or developmental delay. The American Heart Association recommends that all children with CHD be developmentally screened, evaluated and reevaluated, because this may identify deficits and allow therapies and education to assist academic, behavioral, and psychosocial functioning.

Recent efforts to limit the time of deep hypothermic circulatory arrest and provide better neuroprotection during infant surgery may improve outcomes in the future. Although most children with serious heart disease are within the normal range for IQ, there is a higher incidence of neurodevelopmental deficits in children after heart surgery than in the normal population, specifically in speech and language, fine motor skills, and cognitive processes (Majnemer and Limperopoulos, 1999). Severe neurologic problems such as cerebral palsy, epilepsy, and mental retardation are uncommon.

Prepare the Child and Family for Invasive Procedures

Chapter 20 provides an extensive discussion of the principles for preparing children for invasive procedures. The American Heart Association published a scientific statement, “Recommendations for Preparing Children and Adolescents for Invasive Cardiac