physiologic responses to a life-threatening challenge during sleep (Bejjani, Machaalani, and Waters, 2013). Abnormalities include prolonged sleep apnea, increased frequency of brief inspiratory pauses, excessive periodic breathing, and impaired arousal responsiveness to increased carbon dioxide or decreased oxygen. However, *sleep apnea is not the cause of SIDS.* The vast majority of infants with apnea do not die, and only a minority of SIDS victims have documented apparent life-threatening events (ALTEs) (see Apparent Life-Threatening Event later in this chapter). Numerous studies and meta-analysis indicate that no association exists between SIDS and any childhood vaccine (Moon and Fu, 2012).

A genetic predisposition to SIDS has been postulated as a cause. A deficiency of the complement component C4 is associated with SIDS cases (Opdal and Rognum, 2011). In addition, polymorphisms among interleukin genes, transforming growth factor, tumor necrosis factor, and interferon gamma are closely associated with cases of SIDS (Opdal and Rognum, 2011).

A number of triple-risk model hypotheses have been proposed to explain the etiology of SIDS. Some of the proposed factors include an underlying infant vulnerability factor such as a brain abnormality, a critical incident in the fetal developmental period or in early neonatal life, and an environmental stressor such as prone sleep positioning (Matthews and Moore, 2013).

Risk Factors for Sudden Infant Death Syndrome

Maternal smoking during pregnancy has emerged in numerous epidemiologic studies as a major factor in SIDS, and tobacco smoke in the infant's environment after birth has also been shown to have a possible relationship to the incidence of SIDS (American Academy of Pediatrics, Task Force on Sudden Infant Death Syndrome, 2011). A meta-analysis shows that exposure to tobacco smoke significantly increases an infant's risk for SIDS with an odds ratio of 2.25 for prenatal maternal smoking and 1.97 for postnatal maternal smoking (Zhang and Wang, 2013).

Co-sleeping, or an infant sharing a bed with an adult or older child on a non-infant bed, has been reported to have a positive association with SIDS. Two recent meta-analyses found a significant increase in the risk of SIDS among infants that bed shared compared to infants who slept alone (Das, Sankar, Agarwal, et al,