

Sleep Disorders in Infants- Sudden Infant Death Syndrome (SIDS).

Sudden Infant Death Syndrome (SIDS) is a sleep related disorder defined as the sudden and unexplained death of an infant who is between 1 month and 1 year of age. It is a devastating occurrence because it usually happens without warning and affects seemingly healthy babies. The deaths are also associated with sleep (occur during a sleep period) with no signs of suffering. The reasons behind these sudden deaths are still unknown, thus the continued research in this field. However, factors that increase the risk of death have been identified and a strong hypothesis for the mechanism of death involves a dysfunction of the brain's control of the physiological parameters of sleep and arousal, breathing and heart regulation.

When an infant dies suddenly, a review of the infant's medical history, sleeping environment, and autopsy is performed to help provide a diagnosis. Unlike many other conditions or diseases which are usually diagnosed by the presence of specific symptoms, the diagnosis of SIDS is one of exclusion; that is, it is diagnosed only after all other possible causes of death have been ruled out. Most often than not, this process is time consuming leaving the parents and family members struggling with grief not knowing why their baby died often up to 1 year later.

The current SIDS rate in Australia is estimated at 0.5/1000 births (which equates to approximately 150 deaths per year). Most SIDS deaths occur between 2 and 4 months of age, and the incidence increases during winter months. There tends to be a male predominance and greater incidence amongst the indigenous population. The two main modifiable factors that increase the risk for SIDS are sleeping on the stomach (prone sleeping) and exposure to cigarette smoke (during pregnancy and/or after birth). Thus, campaigns have been designed and are currently implemented in all hospitals in Australia educating mothers to keep a smoke free environment around the baby and to place babies to sleep on their backs (SIDS & KIDS: <http://www.sidsandkids.org/safe-sleeping/>). These campaigns have been very successful, reducing the incidence of SIDS by up to 70% since they were first introduced in the early 1990's. However, SIDS still persists and as such, research continues to provide answers as to why this is so.

The brain has been a target of research in SIDS, especially in the brain regions that regulate sleep and arousal, breathing and heart function. For example, regarding stomach sleeping, some researchers hypothesize that this can increase an infant's risk of "rebreathing" his or her own exhaled air, particularly if the infant is sleeping on a soft mattress or with bedding, stuffed toys, or a pillow near the face. In this scenario, the soft

surface could create a small enclosure around the baby's mouth and trap exhaled air. As the baby breathes exhaled air, the oxygen level in the body drops and carbon dioxide accumulates. The brain in this case, would sense the change in oxygen levels and usually triggers the baby to wake up and cry. This crying changes the breathing and heart rate, making up for the lack of oxygen. But in a baby where this sensing by the brain is not working, the baby is put at great risk for SIDS. But why would this sensing mechanism not work in some babies but is present in all others remains a question of research.

Indeed, researchers have found abnormalities in the brains of infants diagnosed with SIDS compared to those that died of other causes. Some of these abnormalities include a greater amount of dying brain cells, and changes in the level of important brain transmitters, proteins and growth factors. However, the abnormalities were not present in all SIDS infants and so, research persists. Understanding the role of these important mediators of the brain and how they become dysfunctional in some infants and not others, is important in helping to understand the mechanisms leading to SIDS and thus, provide clinicians with tools in trying to prevent such devastating deaths from occurring in seemingly otherwise healthy babies.