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Impact of repeated procedural pain-related stress in infants born very preterm.

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Abstract

The majority of infants born very preterm (24-32 wk gestational age) now survive; however, long-term neurodevelopmental and behavioral problems remain a concern. As part of their neonatal care, very preterm infants undergo repeated painful procedures during a period of rapid brain development and programming of stress systems. Infants born this early have the nociceptive circuitry required to perceive pain, however, their sensory systems are functionally immature. An imbalance of excitatory vs. inhibitory processes leads to increased nociceptive signaling in the central nervous system. Specific cell populations in the central nervous system of preterm neonates are particularly vulnerable to excitotoxicity, oxidative stress, and inflammation. Neonatal rat models have demonstrated that persistent or repeated pain increases apoptosis of neurons, and neonatal pain and stress lead to anxiety-like behaviors during adulthood. In humans, greater exposure to neonatal pain-related stress has been associated with altered brain microstructure and stress hormone levels, as well as with poorer cognitive, motor, and behavioral neurodevelopment in infants and children born very preterm. Therefore, it is important that pain-related stress in preterm neonates is accurately identified, appropriately managed, and that pain management strategies are evaluated for protective or adverse effects in the long term.

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