Preterm infant

Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. There are sub-categories of preterm birth, based on gestational age: extremely preterm (less than 28 weeks) very preterm (28 to 32 weeks) moderate to late preterm (32 to 37 weeks).

The cause of preterm birth is in many situations elusive and unknown; many factors appear to be associated with the development of preterm birth, making the reduction of preterm birth a challenging proposition.

In preterm birth germinal matrix hemorrhages (GMHs) and the consequent posthemorrhagic hydrocephalus (PHH), the neuroepithelium/ependyma development is disrupted.

Diffusion-weighted magnetic resonance imaging studies suggest a link between white matter microstructure and math in very preterm and full-term children, although longitudinal studies using advanced modeling are lacking. In a prospective longitudinal cohort of VPT and FT children, they used Fixel-Based Analysis to investigate associations between the maturation of white matter fiber density (FD), fiber-bundle cross-section (FC), and combined fiber density and cross-section (FDC) and math computation ability at 7 (n = 136 VPT; n = 32 FT) and 13 (n = 130 VPT; n = 44 FT) years, as well as between change in white matter and math computation ability from 7 to 13 years (n = 103 VPT; n = 21 FT). In both VPT and FT children, higher FD, FC, and FDC in visual, sensorimotor, and cortico-thalamic/thalamocortical white matter tracts were associated with better math computation ability at 7 and 13 years. Longitudinally, accelerated maturation of the posterior body of the corpus callosum (FDC) was associated with greater math computation development. White matter-math associations were similar for VPT and FT children. In conclusion, white matter maturation is associated with math computation ability across late childhood, irrespective of birth group [1)].

Complications

Periventricular-Intraventricular hemorrhage (IVH-IPH), periventricular leukomalacia (PVL), seizures, meningitis and hypoxic-ischaemic encephalopathy are the most common complications.

Preterm birth can result in significant developmental disability, and numerous studies have identified intraventricular hemorrhage (IVH) as a major cause of adverse outcome for very low birth weight (VLBW) preterm neonates. IVH, or hemorrhage into the germinal matrix tissues of the developing brain, has been attributed to changes in cerebral blood flow to the immature germinal matrix microvasculature and secondary periventricular venous infarction. The more severe grades of IVH are characterized by the acute distension of the cerebral ventricular system with blood and intraventricular hemorrhage with parenchymal venous infarction and are associated with high degrees of morbidity and mortality.

Cerebellar hemorrhage [2)].

Neuroimaging plays a key role in detecting and assessing these neurologic injuries that preterm infants are at risk for. It is essential to diagnose these events early on to assess neurologic damage, minimize disease progression, and provide supportive care. Brain MRI and cranial ultrasound (CUS) are both extensively used neuroimaging techniques to assess WMA, and it has become ever more important to determine the best imaging techniques and modalities with the increasing survival rates and high incidence of comorbidities among these infants [3].

1)
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