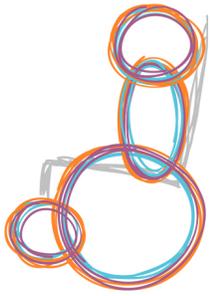


Injury to the cerebellum in premature infants can be accompanied by region-specific impairments to cerebral growth

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Summary

Injury to the cerebellum is common among premature newborns and can have lasting effects. Premature newborns are vulnerable to brain injury; however, monitoring for such injuries usually focuses on the cerebral hemispheres. Recently, it has become clear that the cerebellum, the lower, slightly detached brain region known for coordinating movement, is susceptible to injury in premature newborns. As cerebellar injury has previously been associated with restricted growth in the cerebral hemispheres, this study aims to further characterize this secondary reduction in growth. Cerebellar injury in premature newborns is associated with restricted growth in particular cerebral regions. This study included a cohort of 38 infants born before 32 weeks of gestation, who had a cerebellar injury confirmed by neonatal MRI. In 24 infants, cerebellar injury affected one hemisphere only, and in 14 infants, injury affected both hemispheres. All infants underwent a follow-up 3D volumetric MRI (MRI) at a mean age of 35.5 months. Volumetric MRI demonstrated significantly impaired growth in the contralateral cerebral hemisphere compared to the ipsilateral hemisphere when cerebellar injury was unilateral. Growth impairment was evident in both gray and white matter of the dorsolateral prefrontal, premotor, sensorimotor, and mid-temporal regions. No asymmetry in cerebral growth was observed following bilateral cerebellar injury.

What families should know

Brain development accelerates rapidly during the third trimester of gestation, and infants born before this process is complete are vulnerable to brain injury in the cerebral hemispheres or the cerebellum. Cerebellar injury is most common among extremely premature infants born before 28 weeks of gestation, when the third trimester begins. Cerebral or cerebellar injury can affect neurodevelopment, impairing later motor, social, behavioral, cognitive, and language abilities. Improved early detection of brain injuries and a deeper understanding of their full extent will allow practitioners to develop valuable therapies for improving long-term outcomes among preterm infants.

What practitioners should know

This study presents evidence that, among ex-preterm infants, cerebral growth is restricted in certain regions secondary to cerebellar injury in the perinatal period. This secondary growth restriction was maintained until up to three years of age. MRI studies demonstrate neural connections between the cerebellum and cerebral hemispheres that develop during late fetal life and early postnatal life. It is possible that cerebellar injury interrupts cerebellar-cerebral signaling that is required for proper development. Supporting this hypothesis, the cerebral regions shown to be affected in this study correspond to target regions of cerebellar projection pathways. By clearly delineating brain areas of injury, it may eventually be possible to map certain neurodevelopmental phenotypes to regional deficits and thereby improve prognostic predictions as well as treatment options.

Reference

Limperopoulos, C., Chilingaryan, G., Guizard, N., Robertson, R., and Du Plessis, A. (2010). Cerebellar injury in the premature infant is associated with impaired growth of specific cerebral regions. *Pediatric Research*, 68, 145-150.

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