

Neurostructural Effects of Postnatal Corticosteroid Treatment for Bronchopulmonary Dysplasia in Very Preterm Infants

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Introduction

Bronchopulmonary dysplasia (BPD) is a chronic inflammatory lung disease that occurs as a common complication of preterm birth. Preterm infants with BPD are at higher risk of mortality or neurodevelopmental impairment. It is known that postnatal corticosteroid (PNC) therapy effectively reduces the incidence of BPD, but PNC remains controversial due to concerns of possible adverse effects on the developing brain.

Hypothesis

We hypothesize that low-dose PNC therapy for very preterm (VPT, ≤ 32 weeks gestational age [GA]) infants at risk for BPD is associated with improved brain injury and maturation outcomes compared to at-risk infants who did not receive therapy.

Methods

We enrolled 392 VPT infants as part of a large prospective cohort study. Structural MRI was acquired at term-equivalent age. We used the developing Human Connectome Project pipeline to derive brain volumes and cortical morphometrics. We calculated a propensity score for each subject, representing the subject's probability of receiving PNC based on their clinical and demographic factors. This score was used in weighted linear regression to determine the effect of PNC on measures of brain development.

Results

Of 392 VPT infants, 41 received PNC for BPD: 21 males; mean (SD) GA 25.5 (1.6) weeks; postmenstrual age at MRI 43.7 (1.2) weeks; 33 had severe BPD. In multiple linear regression, PNC was positively associated with volume of the amygdala and right hippocampus; sulcal depth of the occipital and left parietal/temporal lobes, and curvature of the parietal and right occipital lobes. PNC was negatively associated with volume and surface area of the left occipital lobe and volume of the left thalamus.

Conclusions

Low-dose PNC therapy for BPD does not have a widespread, adverse effect on brain development and may be neuroprotective in specific brain regions of VPT infants at term-equivalent age.

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