Inflammatory and Iron-Related Indices Relate to Neonatal White Matter Microstructure

METHODS

• Statistical Analyses: Statistical analyses of relationships between iron/cytokine levels and WM microstructure were performed using linear regression. Associations were considered significant if p < 0.05, uncorrected; marginal significance was considered if p < 0.15, FWE corrected.

• Voxelwise analyses revealed correlations across early developing white matter regions.

• Figure 1 provides representative sagittal and coronal views of white matter correlations. Areas of red-yellow denote regions of marginal significance (p < 0.15, FWE-corrected).

• Ferritin levels negatively associated with Orientation Dispersion Index (ODI; p < 0.05, uncorrected; Fig. 1a) and the intracellular volume fraction (FICVF; p < 0.05, uncorrected; Fig. 1a). Regions associated with ferritin included the cerebellum, pons, and brain stem.

• IL-6 was negatively related to indices of WM, including fractional anisotropy (FA), diffusivity, and orientation dispersion (p < 0.05, uncorrected; Fig. 1b). Regions included cerebellar WM, brain stem, and corpus callosum.

• Negative correlations between IL-10 and ODI were also observed in the body of the corpus callosum and brain stem (p < 0.05, uncorrected; Fig. 1c).

RESULTS

A. Ferritin

B. IL-6

C. IL-10

Microstructure of the cerebellum and corpus callosum observed to be associated with levels of ferritin and inflammatory cytokines at 1 month of age.

CONCLUSIONS

• Findings link levels of CB inflammatory cytokines and iron stores at delivery to WM maturation in several brain regions including cerebellum and corpus callosum.

• Results did not survive correction for multiple comparisons, but potentially offer insights into associations between iron-mediated inflammatory pathways and WM development.

• Future analyses will test the strength of associations between cytokine and iron biology and WM maturation in a larger sample of infants.

ADDITIONAL KEY INFORMATION

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References


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