

A Novel Quantitative Simple Brain Metric Using MR Imaging for Preterm Infants

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BACKGROUND AND PURPOSE: The application of volumetric techniques to preterm infants has revealed brain volume reductions. Such quantitative data are not available in routine neonatal radiologic care. The objective of this study was to develop simple brain metrics to compare brain size in preterm and term infants and to correlate these metrics with brain volumes from volumetric MR imaging techniques.**MATERIALS AND METHODS:** MR images from 189 preterm infants <30 weeks' gestational age or <1250 g birthweight scanned at term-equivalent age and 36 term infants were studied. Fifteen tissue and fluid measures were systematically evaluated on 4 selected sections. The results were correlated with total brain, gray matter, white matter, and CSF volumes. **RESULTS:** The mean bifrontal, biparietal, and transverse cerebellar diameters were reduced (−11.6%, 95% confidence interval [CI], −13.8% to −9.3%; −12%, 95% CI, −14% to −9.8%; and −8.7%, 95% CI, −10.5% to −7% respectively) and the mean left ventricle diameter was increased (+22.3%, 95% CI, 2.9%–41.6%) in preterm infants ($P < .01$). Strong correlations were found between the bifrontal and biparietal measures with total brain tissue volume, whereas the size of the ventricles and the interhemispheric measure correlated with CSF volume. Intraobserver reliability was high (intraclass correlation coefficients [ICC], >0.7), where interobserver agreement was acceptable for tissue measures (ICC, >0.6) but lower for fluid measures (ICC, <0.4) **CONCLUSIONS:** Simple brain metrics at term-equivalent age showed smaller brain diameters and increased ventricle size in preterm infants compared with full-term infants. These measures represent a reliable and easily applicable method to quantify brain growth and assess brain atrophy in this at-risk population.

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