

## TEXTURE ANALYSIS OF PERVENTRICULAR WHITE MATTER HYPERECHOGENICITY ON NEONATAL CRANIAL ULTRASOUND SCANS AND RISK OF PERIVENTRICULAR LEUKOMALACIA

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**Background and aims:** White matter periventricular echogenicity (PVE) on neonatal cranial ultrasound (US) scans may be followed by periventricular leukomalacia (PVL) associated with neurodevelopment disability, or might resolve spontaneously with benign outcome. Follow up with serial US are therefore needed to clarify the final outcome.

Texture analysis (TA) is a computerised method of analysing images enabling representation of findings undetectable by the human eye. It quantifies the spatial variations within an image and the relationships between grey-level intensities of the neighbouring pixels.

We evaluated TA of PVE to find out whether it can predict PVL.

**Methods:** Premature infants (< 32 weeks gestational age) were studied. Ten infants (group A) had serial normal scans, group B (n=10) had initial PVE which later resolved, and in group C (n=10) it developed into PVL.

TA was performed blindly on the coronal and sagittal sections. Texture parameters were tested for their Fisher-coefficient values and the ten highest parameters were entered into a Linear Discriminant Analysis (LDA) classifier. The results of LDA were validated using Cross-Validation (CV).

**Results:** Three distinct and homogenous classes corresponding to the three groups were identified. On the sagittal sections the classification accuracy was 100%, 66%, and 82% for group A, B and C, respectively, and 100%, 75%, and 80% on coronal sections. Sensitivity, specificity and Receiver Operating Characteristic curves were developed.

**Conclusion:** TA can therefore predict which PVE are likely to resolve and which ones will develop into PVL before the latter becomes visually detectable on ultrasound.