

**#23"Shah, Divyen" <Shah\_D@kids.wustl.edu>**

**Cerebral pathways for poor cognitive outcomes with prolonged ventilation in preterm infants.**

Divyen K Shah, Lex Doyle, Peter Anderson, Marilyn Bear, Rod Hunt and Terrie E Inder.

Hypothesis: Premature infants requiring prolonged ventilation are at increased risk of adverse neurodevelopment, independent of other confounders, which is mediated by white matter abnormality as seen on MR images at term.

Methods: 192 preterm infants (< 30 weeks gestation) underwent MR imaging at term corrected and 2-year Bayley II assessments. MR images were qualitatively assessed for white matter and gray matter abnormalities and abnormality scores were obtained.

Results: There was a strong association between mental developmental index (MDI) and hours of total ventilation time (R squared 0.20,  $p=0.008$ ), hours of (endotracheal) ET ventilation (R squared 0.22,  $p<0.001$ ) and period of oxygen treatment (R squared 0.19,  $p=0.03$ ) which persisted despite adjusting for gestational age at birth, gender, growth restriction, antenatal and postnatal steroids, PDA and sepsis. These findings persisted despite further adjusting for white matter abnormality score. ET ventilation period was associated with delayed gyral folding and increased extra-axial space representing gray matter atrophy (R squared 0.07,  $p=0.02$ ).

Conclusion: Prolonged ET ventilation in premature infants is associated with more selective cognitive impairments which appear to be mediated by gray matter rather than white matter abnormalities. The factors influencing gray matter vulnerability in association with prolonged ET ventilation require further elucidation and may represent a new focus for neuroprotection in the preterm infant.