Healthcare Innovations
How practice has changed

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Can we detect early changes in the **preterm piglet brain** following therapeutic blood volume expansion with **saline** or **transfusion**?

Kate Matthews[1], Kirat Chand[1], Stephanie Miller[1], Bhavisha Bakrania[1], Tracey Bjorkman[1], Paul Colditz[1,2], Barbara Lingwood[1,2], Yvonne Eiby[1]
1.CCR and Perinatal Research Centre, Faculty of Medicine, The University of Queensland. 2.Dept of Neonatology, RBWH.

Preterm piglet NICU

Preterm infants are at high risk of brain injury due to poor brain oxygenation. Cardiovascular instability contributes to this risk but volume expansion with saline does not improve long-term brain outcomes.

AIM

To determine if **transfusion** is more effective than **saline** for early protection of the preterm piglet brain.

METHODS

Preterm piglets: ~28wk GA infant, 0-11h old
Standard intensive care: ventilated & sedated
Groups: **saline** or **pRBC** 10-20mL/kg IV at 5-6h old, or untreated (n=12). Controls: 0h old (n=6-8)
Measures: Cerebral oxygenation (NIRS)
Porcine cytokine profile on plasma at 11h old was used to assess systemic inflammation.
Astrocyte activation based on GFAP staining was used as a marker of neuroinflammatory response in cortical white matter.

RESULTS

Cardiovascular stability

Brain oxygenation was maintained by **transfusion** but not **saline** or no treatment (p<0.05, Fig 1).

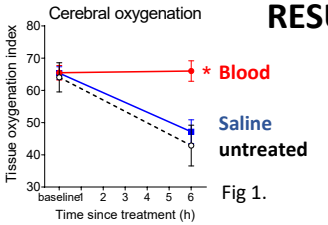
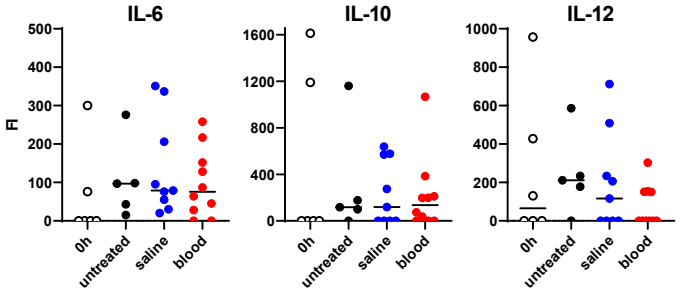


Fig 1.

Systemic inflammation

Circulating cytokines (IL-6, IL-10 and IL-12) were detected in all groups at 11h old and in some 0h controls (p>0.05 Fig 2).

Fig 2.



Neuroinflammation

No difference in astrocyte morphology was detected between any groups (Fig 3, p>0.05) .

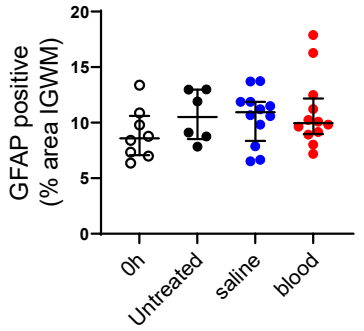
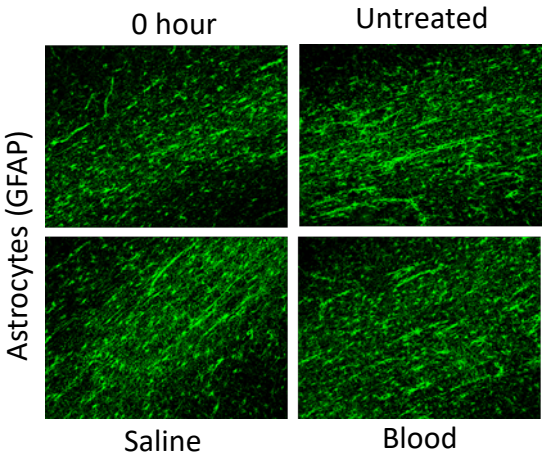


Fig 3: Astrocyte morphology assessed by IHC in intergyral white matter (IGWM).



CONCLUSION Transfusion maintained brain oxygenation across the 6h after treatment started, unlike saline, but this was not linked to systemic inflammation. Neuro-inflammation, a key element of brain injury in preterm infants, did not appear to be present when assessed by IHC. Longer recovery may yield these brain changes, also changes in mRNA expression for inflammatory pathways may identify the initiation of neuroinflammation that precedes changes to glial morphology.