Healthcare Innovations
How practice has changed

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Lymphatic flow is reduced after birth in preterm piglets

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Background: Preterm infants are susceptible to cardiovascular instability after birth and current treatments do not improve outcomes. Research on preterm lymphatic function is lacking. We propose that impaired lymphatic flow after birth resulting in low blood volume is a major contributor to impaired cardiovascular function.

Aim: To determine changes in blood volume, extracellular water, and lymphatic flow in the 9 hours after birth in preterm and term piglets.

Methods: Piglets were delivered preterm (97/115d gestation; similar to 28wk infant; n=16) and at term (114/115d; n=16). Blood volume and lymphatic flow were measured at birth and at 7-9h postnatal age using new fluorescent dextran tracer techniques. Extracellular water was continuously measured over this postnatal period using multi-frequency bio-electrical impedance analysis.

Results:

Blood volume per kg was lower in preterm than term piglets and decreased significantly in both groups by 9h old (Fig 1).

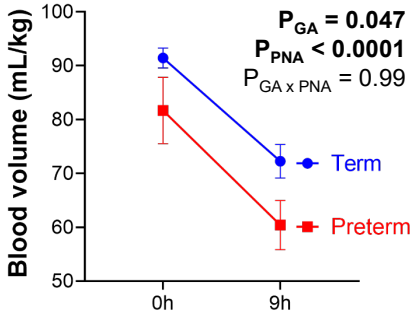

Fig 1.

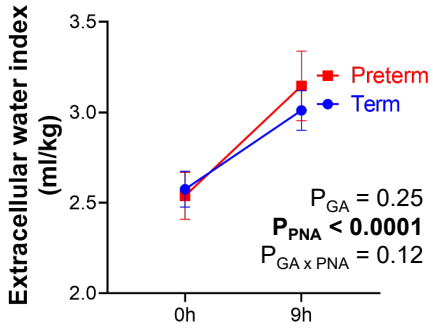

Fig 2.

Extracellular water increased significantly and similarly in both groups after birth (Fig 2).

Preterm piglets had significantly higher lymphatic flow rates at birth and greater reductions in lymphatic flow by 9h old compared to term piglets (Fig 3A&B).

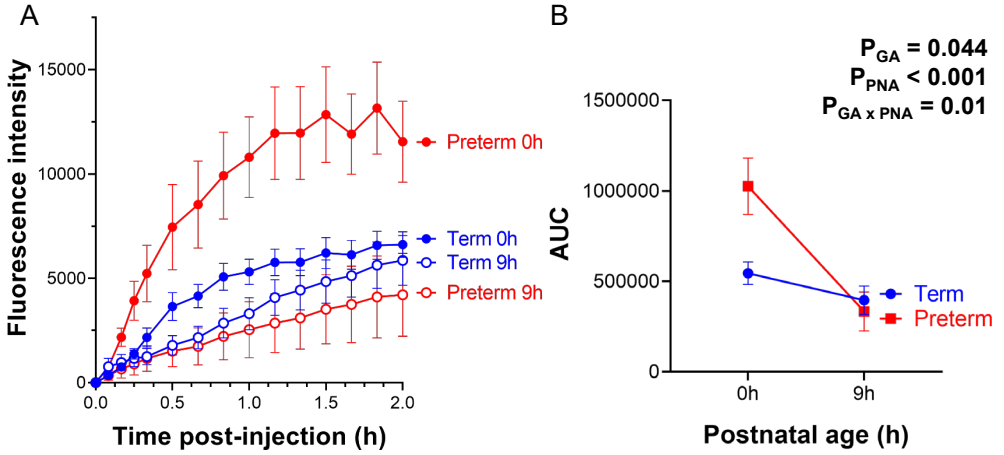

Fig 3. Lymphatic flow rates in preterm and term piglets at 0h and 9h old. (A) appearance of sub-cutaneous tracer in the circulation and (B) appearance AUC.

Conclusions: A small reduction in lymphatic flow, substantial drop in blood volume, and an increase in tissue water is typical in the hours after birth. However, preterm piglets have very high lymphatic flow rates at birth with a more pronounced reduction. How this impacts cardiovascular stability requires further studies of the preterm lymphatic system and are essential to the development of strategies to effectively support preterm cardiovascular function.