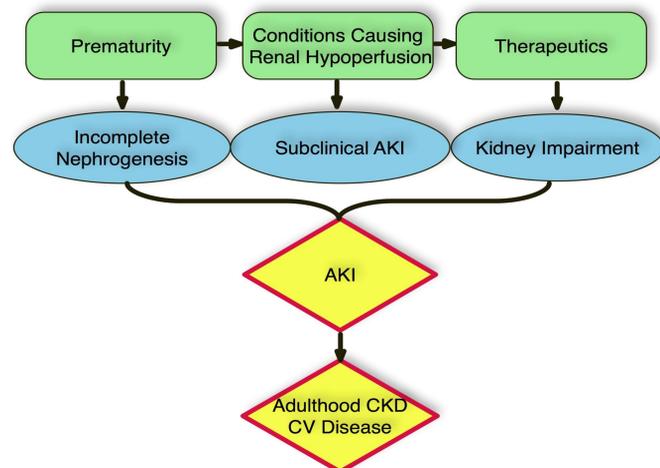


INTRODUCTION

- Incidence of AKI in premature infant ~40%
- Occurs secondary to hypotensive-induced hypoperfusion
- Many therapeutics nephrotoxic, potentially increasing AKI risk
- Nephrogenesis incomplete until 34 weeks gestation and underdeveloped kidney only receives 3% total CO (compared to 20% in term infant)
- Developing nephrons highly vulnerable to permanent damage
- Mortality > 50% when AKI develops
- Survivors predisposed to life-long CKD and CVD
- Current AKI diagnosis using sCr and oliguria non-specific for early-onset AKI in preterm population



PURPOSE

Determine the prognostic value of renal NIRS trends and urinary biomarker levels associated with renal hypoperfusion in VLBW infants ≤ 1800 grams during the first 2 weeks of life. We hypothesized that there is an inverse relationship between renal rSO₂ values and urinary biomarkers with renal hypoperfusion.

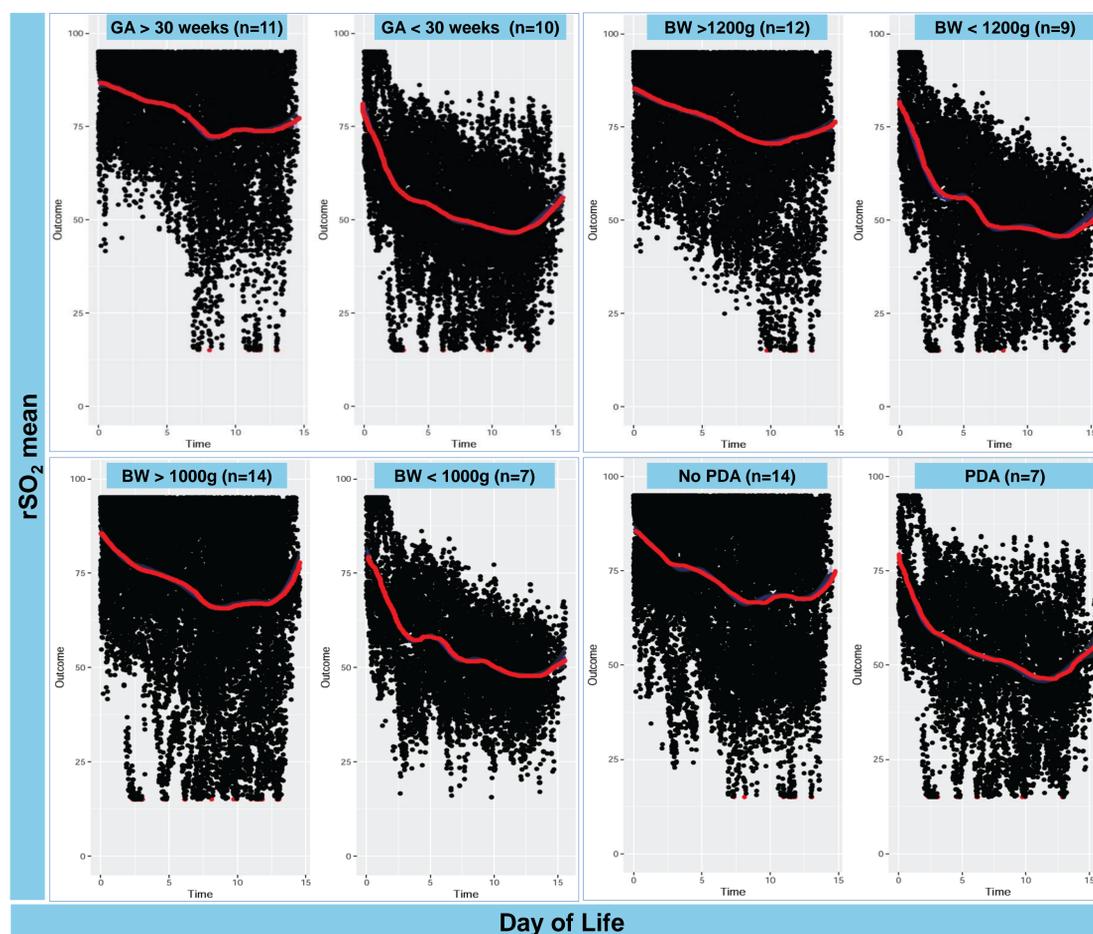
METHODS

- Prospective observational pilot study in a Level IV NICU
- NIRS routinely placed for renal rSO₂ monitoring on admission and continued for 14 days (values recorded every 30 seconds)
- Urine collected for biomarker measurement DOL 3, 7, 10 and 14
- Using R statistical package, mean area under the curve (MAUC) and slope estimates were calculated from 15 minute interval means
- Correlations determined between slope change and biomarker trends
- p value = 0.05

RESULTS

Male	62% (13/21)
Female	38% (8/21)
Birthweight	1154.3 (± 348.71)
Gestational Age	30.2 (± 2.97)
AA	67% (14/21)
Caucasian	33% (7/21)

	ACR	CysC	IL-18	NGAL	OPN	KIM-1	URO
Correlation Coefficient (Spearman's Rho)	0.160	-0.493	-1.088	0.089	-0.532	0.019	0.060
P-value (2-tailed)	0.49	0.032	0.72	0.71	0.019	0.937	0.81
n	21	19	19	19	19	19	19



CONCLUSIONS

- The number of hypoperfusion events (defined as mean daily value 25% less than baseline mean value) was positively associated with median serum creatinine levels (p = 0.45; p < .05)
- 19% of infants experienced hypoperfusion for 2 or more days over a 14-day period without meeting the clinical diagnostic criteria for AKI according to KDIGO guidelines.
- 14% experienced hypoperfusion events over an 8-day period without reaching diagnostic clinical criteria.
- As NIRS trends decrease, urinary Biomarkers increase (OPN, Cys C significant)
- NIRS trends were significantly lower in babies with PDA, with lower gestational age and lower birthweight

IMPLICATIONS

- Hypoperfusion events measured by NIRS are likely to predict variations in serum creatinine levels and urinary biomarker changes indicating impending renal damage
- sCr based diagnostic criteria is an insufficient and inconsistent predictor of renal damage caused by prolonged periods of hypoperfusion
- It would take approximately 5 days for premature infants to reach acute diagnostic clinical status defined by current guidelines

REFERENCES

- Askenazi, D. J., Koralkar, R., Patil, N., Halloran, B., Ambalavanan, N., & Griffin, R. (2016). Acute kidney injury urine biomarkers in very low-birth-weight infants. *Clinical journal of the American Society of Nephrology*, 11(9): 1527-1535.
- Carmody, J. B., Swanson, J. R., Rhone, E. T., & Charlton, J. R. (2014). Recognition and reporting of AKI in very low birth weight infants. *Clinical journal of the American Society of Nephrology*, 9(12), 2036-43.
- El-Badawy, A., Makar, S., Abdel-Razek, A., & Abd Elaziz, D. (2011). Incidence and risk factors of acute kidney injury among the critically ill neonates. *Saudi Journal of Kidney Diseases and Transplantation*, 26(3): 549-555.
- Koralkar, R., Ambalavanan, N., Levitan, E., McGwin, G., Goldstein, S., & Askenazi, D. (2011). Acute kidney injury reduces survival in very low birth weight infants. *Pediatr Res*, 69(4): 354-358.
- Nada, A., Bonachea, E., & Askenazi D. (2017). Acute kidney injury in the fetus and neonate. *Seminars in Fetal Neonatal Medicine*, 22(2): 90-97.
- Selewski, D., Charlton, J., Jetton, J., Guillet, R., Mhanna, M., Askenazi, D., Kent, A. (2015). Neonatal acute kidney injury. *Pediatrics*, 136(2): 463-473.

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