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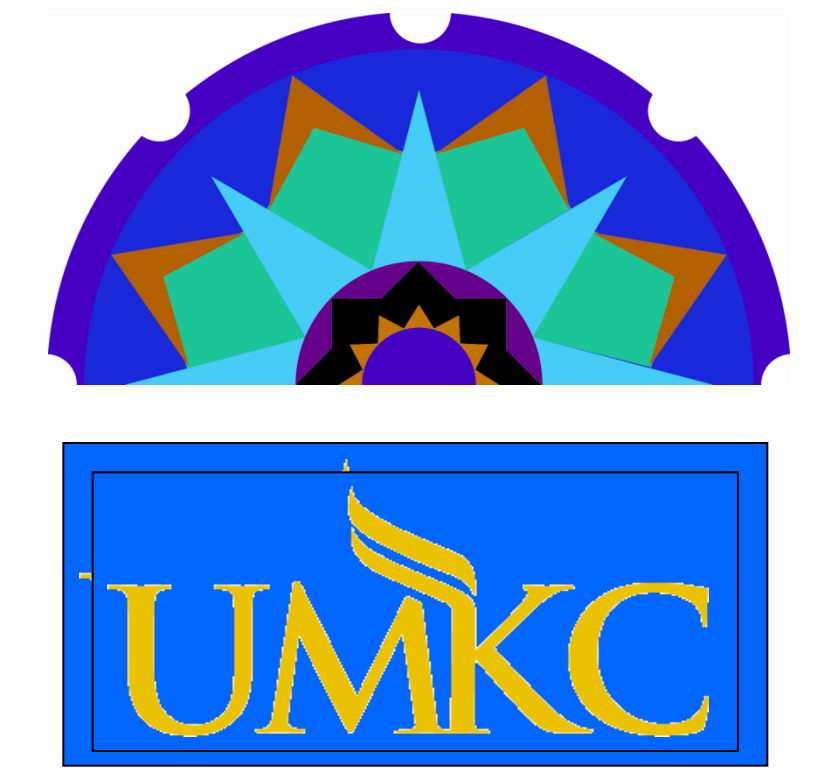
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# B-TYPE NATRIURETIC PEPTIDE (BNP): A POTENTIAL BIOMARKER FOR EXTUBATION FAILURE IN INFANTS FOLLOWING CARDIAC SURGERY

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**Background:** BNP is a hormone released from the cardiac ventricles in response to increased pressure and volume overload<sup>1</sup> and is an important biomarker in heart failure. Following congenital heart surgery, elevated BNP levels correlate with longer duration of mechanical ventilation, low cardiac output syndrome, and increased ICU length of stay<sup>2-4</sup>. Mechanical ventilation (MV) has an exaggerated impact on cardiopulmonary interactions in children with myocardial dysfunction, and extubation readiness can be difficult to determine post-operatively following congenital heart surgery.

**Hypothesis:** An increase in post-extubation BNP levels can predict extubation failure and the need for reintubation within 48 hours.

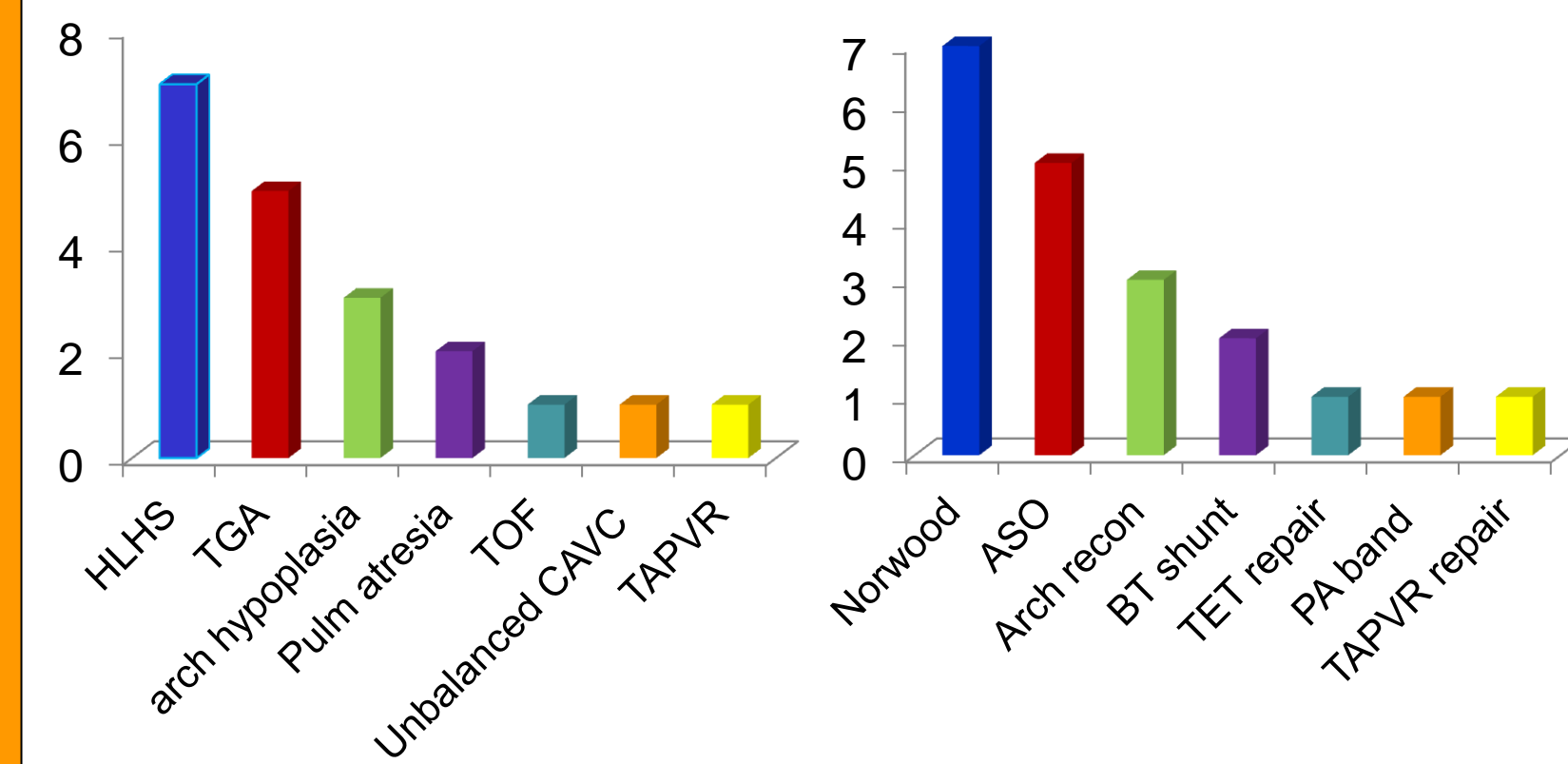
### Methods:

**Design:** prospective, observational, blinded pilot

**Participants:** Infants  $\leq 30$  days of age with RACHS-1<sup>5</sup> score  $\geq 3$  admitted to the PICU following congenital heart surgery

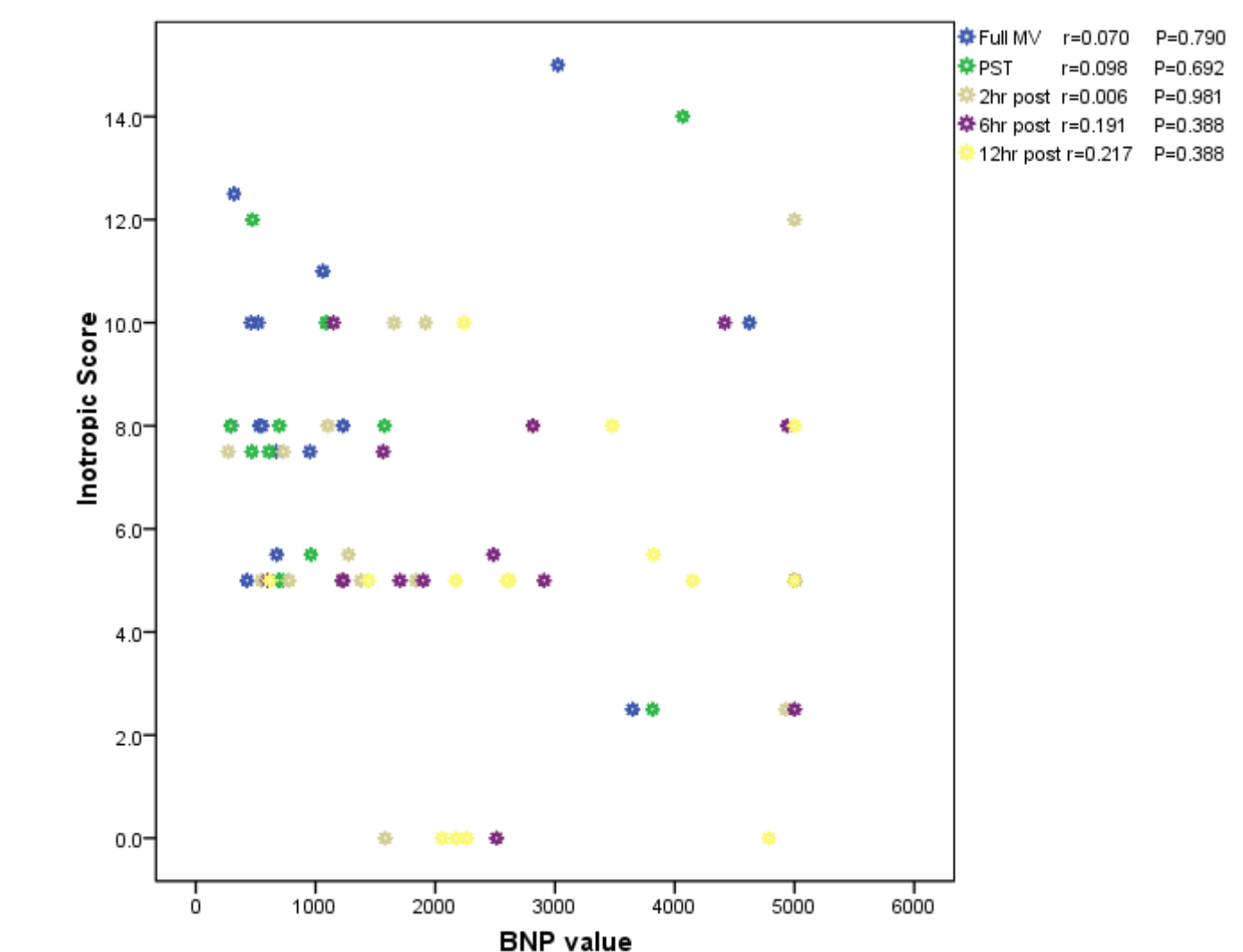
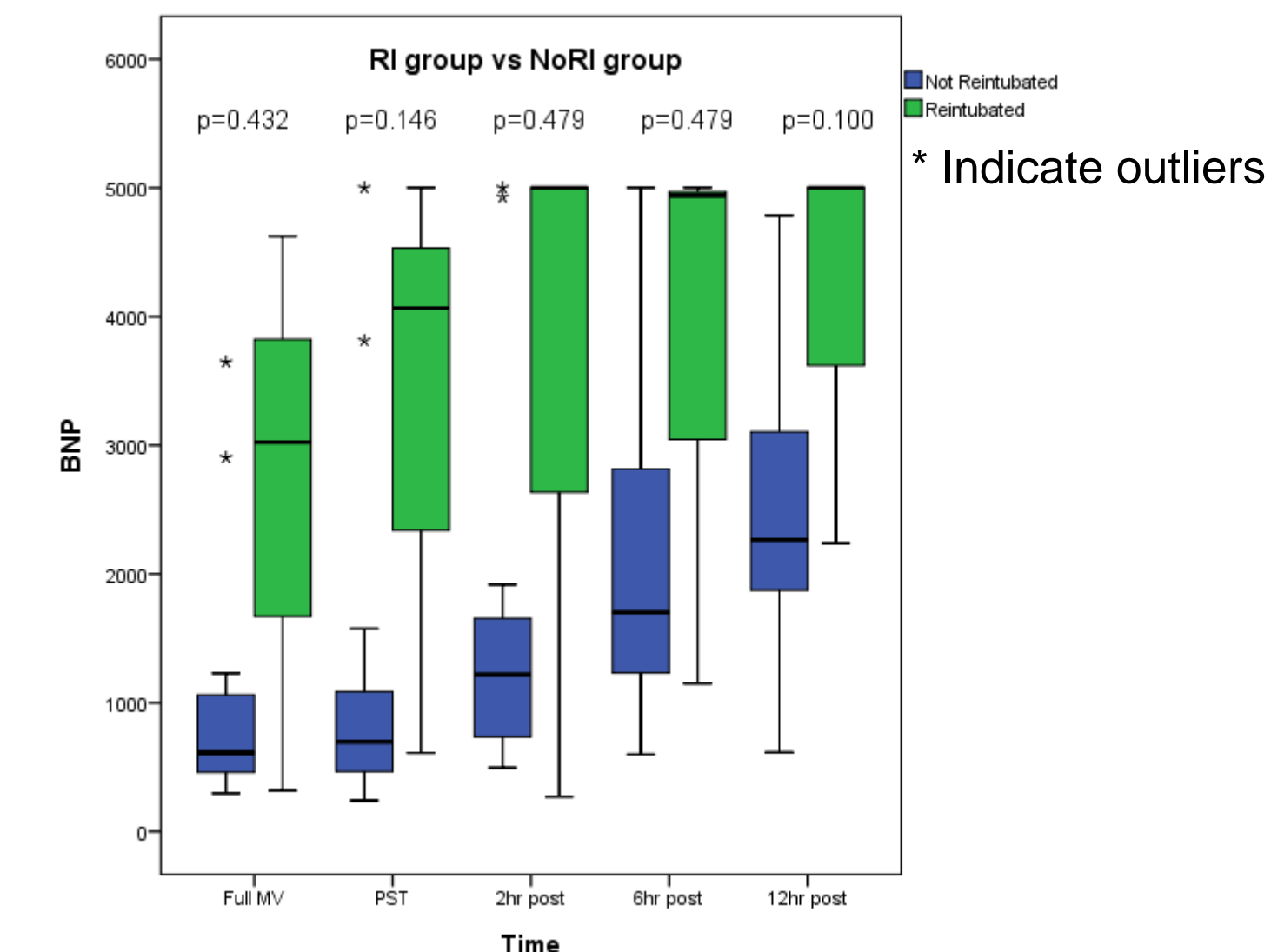
**Measurements:** BNP levels were obtained on full MV just prior to weaning per standardized weaning protocol, one hour following a pressure support trial (PST), and at 2, 6, and 12 hours following extubation. Inotropic scores<sup>6</sup> were calculated at each interval.

### Results: Data analyzed on first 20 patients



	RI group BNP (pg/mL)	NoRI group BNP (pg/mL)	p value
Full MV	3023 (319-4624)	611 (296-3647)	0.432
PST	4066 (611-5001)	712 (291-3814)	0.146
2hr post	5001 (270-5001)	1326 (548-4928)	0.479
6hr post	4940 (1150-5001)	2191 (600-5001)	0.479
12hr post	5001 (2239-5001)	2265 (615-4785)	0.100

Median BNP levels were compared using Mann Whitney test  
3 required reintubation (RI group), 17 did not (NoRI group)



There was no correlation in BNP values and inotropic scores

### Conclusions:

1. Patients who failed extubation had a trend towards higher BNP levels compared to those who did not fail extubation
2. BNP levels increased in all patients with MV weaning and following extubation
3. Inotropic scores did not correlate with BNP values

### Speculations:

1. BNP may be an important biomarker in predicting extubation failure
2. MV weaning causes more cardiac stress than what is clinically appreciated
3. Serial BNP levels may be useful to determine extubation readiness and guide the use of peri-extubation inotropic support

### References:

1. Mair J. Biochemistry of B-type natriuretic peptide-where are we now? Clin Chem Lab Med 2008;46(11):1507-14.
2. Niedner MF, Foley JL, Riffenburgh RH, Bichell DP, Peterson BM, Rodarte A. B-type natriuretic peptide: perioperative patterns in congenital heart disease. Congenit Heart Dis 2010;f:243-55.
3. Shih CY, Sapru A, Oishi P, Azakie A, Karl TR, Harmon C, Asija R, Adatia I, Fineman JR. Alterations in plasma B-type natriuretic peptide levels after repair of congenital heart defects: a potential perioperative biomarker. J Thorac Cardiovasc Surg 2006;131:632-8.
4. Berry JG, Askovich B, Shaddy RE, Hawkins JA, Crowley CG. Prognostic value of B-type natriuretic peptide in surgical palliation of children with single-ventricle congenital heart disease. Pediatr Cardiol 2008;29:70-5.
5. Jenkins KJ, Gauvreau K, Newburger JW, Spray TL, Moller JH, Lezzoni LI. Consensus-based method for risk adjustment for surgery for congenital heart disease. J Thorac Cardiovasc Surg 2002;123:110-8.
6. Gaies MG, Gurney JG, Yen AH, Napoli ML, Gajarski RJ, Ohye RG, Charpie JR, Hirsch JC. Vasoactive-inotropic score as a predictor of morbidity and mortality in infants after cardiopulmonary bypass. Pediatr Crit Care Med 2010;11(2):234-38.