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Oscillometry in Term Neonates without Respiratory Disease

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Background

- Oscillometry is a bedside tool that measures the reactance of the pulmonary parenchyma and resistance of the airways
- We sought to establish normative standards of oscillometry in term neonates without respiratory disease to better characterize Bronchopulmonary Dysplasia (BPD), endotypes in the future.
- BPD can be classified as parenchymal, airway or pulmonary vascular disease
- We hypothesize that oscillometry could help establish whether a neonate has parenchymal or airway disease.
- The Tremoflo N-100 is an oscillometer specifically calibrated for neonates.

Methods

- Inclusion criteria:
  - Gestational age ≥36 weeks, ≤28 days of age, in room air
- Three to five measurements, 30 seconds each, were obtained per participant
- The measurements were averaged by the device, which then calculated the coefficient of variation between measurements in the same participant and coherence of the signal

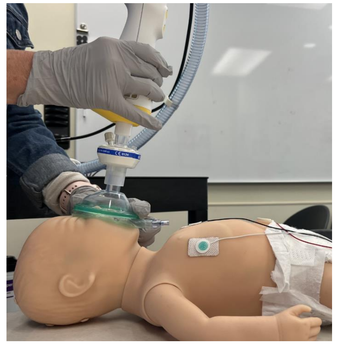

Figure 1. Testing set-up: Neonates are tested in their crib, laying supine in a neutral sniffing position, head midline, with their arms swaddled for comfort.

Demographics (n=13)	
Race, (%)	
White	69.2%
Black	15.4%
Hispanic	15.4%
Male Sex, (%)	61.5%
Vaginal Delivery, (%)	69.2%
Gestational Age, weeks (mean)	38
Birth Weight, grams (mean)	3175
Birth Length, cm (mean)	50.5
Age at test, days (mean)	8

Figure 2. Demographics for the participants.

Oscillometry in Term Neonates

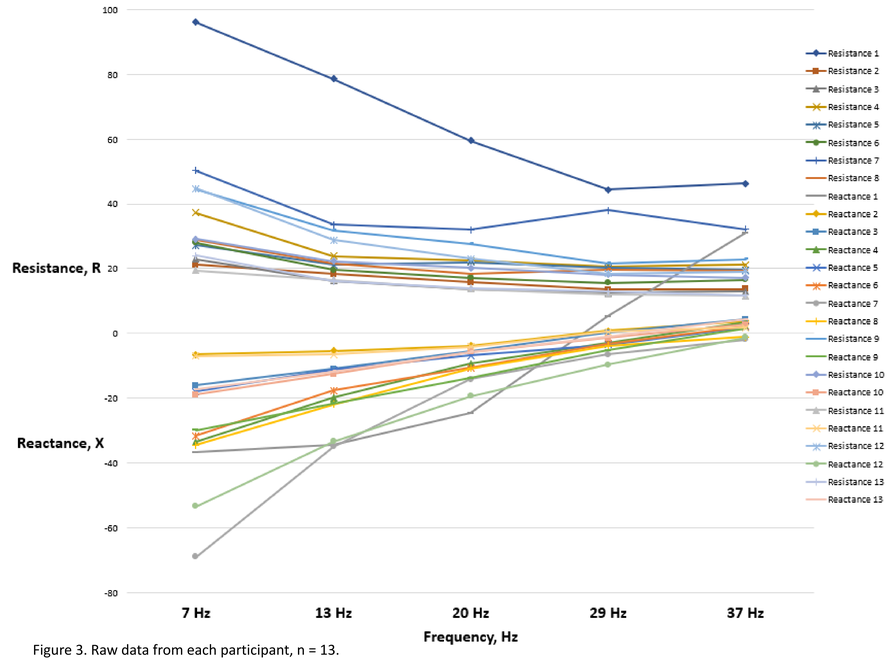

Figure 3. Raw data from each participant, n = 13.

R7Hz	R13Hz	R20Hz	R29Hz	R37Hz
19.5 to 44.7	16.2 to 28.9	13.7 to 27.6	12.1 to 21.7	11.6 to 22.9
X7Hz	**X13Hz**	**X20Hz**	**X29Hz**	**X37Hz**
-34.5 to -6.4	-22.0 to -5.4	-14.2 to -3.8	-5.2 to 0.8	-1.1 to 4.4

Figure 4. Range of Resistance, R, and Reactance, X, at each frequency, excluding the outliers.

Participant	CV%	Coherence
1	26.15	0.42
2	9.36	0.84
3	18.94	0.57
4	n/a	0.29
5	25.94	0.47
6	11.85	0.70
7	27.48	1.00
8	11.00	0.90
9	15.29	1.00
10	5.07	0.80
11	n/a	0.90
12	10.39	1.00
13	27.75	1.00

Figure 5. The Coefficient of Variation (CV%) and Coherence for each participant.

Discussion

- Oscillometry provides consistent and reliable data for evaluating the pulmonary function of term, healthy neonates based on a coefficient of variation <30%.
- The device had some difficulty with calibration until participant 8, then demonstrated more consistent coherence thereafter.
- No clear relationship between participants length and R or X.
- Similar results from the study by Klinger et al that utilized the Tremoflo C-100.
- The next step is to utilize oscillometry in participants with BPD.

References

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