



Effect of various Neurally Adjusted Ventilatory Assist (NAVA) gains on the relationship between diaphragmatic activity ($E_{\text{adi max}}$) and tidal volume (V_t)

YS Chiew ¹⁾, L. Piquilloud ²⁾, , T. Desaive ³⁾, B. Lambermont ⁴⁾, J. Roeseler ⁵⁾, JP Revelly²⁾, E. Bialais ⁵⁾, D. Tassaux ⁶⁾, P. Jolliet ²⁾, J.G. Chase ¹⁾

¹⁾ Department of Mechanical Engineering, University of Canterbury, Christchurch, New Zealand

²⁾ Intensive Care and Burn Unit, University Hospital, Lausanne, Switzerland

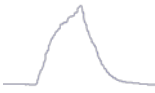
³⁾ Cardiovascular Research Center, University of Liege, Liege, Belgium

⁴⁾ Intensive Care Unit, CHU Sart-Tilman, Liege, Belgique

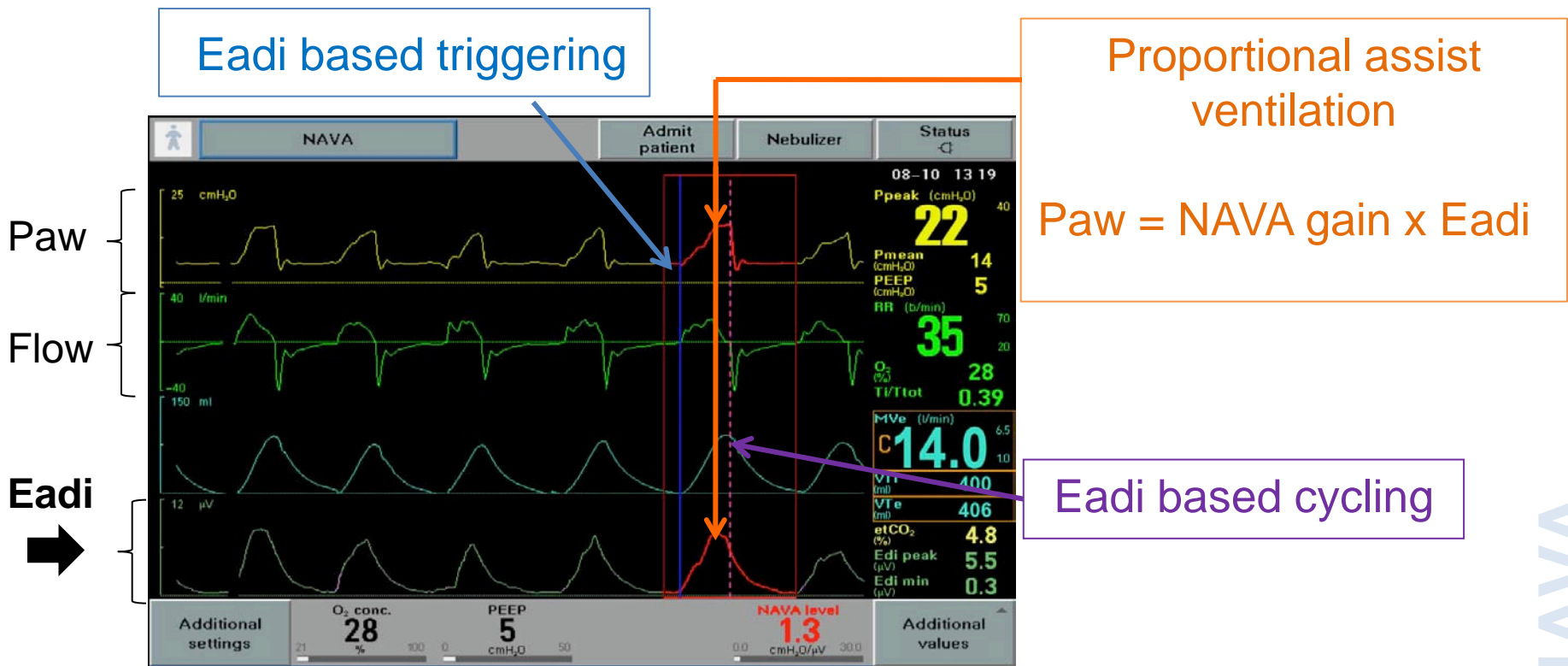
⁵⁾ Intensive Care Unit, Cliniques Universitaires St-Luc, Brussels, Belgium

⁶⁾ Intensive Care Unit, University Hospital, Geneva, Switzerland

Introduction (1)



Neurally adjusted ventilatory assist (NAVA) is an assisted ventilatory mode in which the electrical activity of the diaphragm (Eadi) is used to pilot the ventilator.



Introduction (2)



- NAVA improves patient-ventilator synchrony⁽¹⁾

⁽¹⁾ Piquilloud et al. Intensive Care Med;2011 ; 37 :263-71

- Little is known about how to set the NAVA gain i.e., how to choose the ratio between Eadi and delivered pressure.



Study objectives



- To assess the relationship between Eadi max and tidal volume (V_t) at various NAVA gain settings
- To evaluate whether modifying the gain influenced the V_t /Eadi max relationship in non-invasively ventilated (NIV) patients.



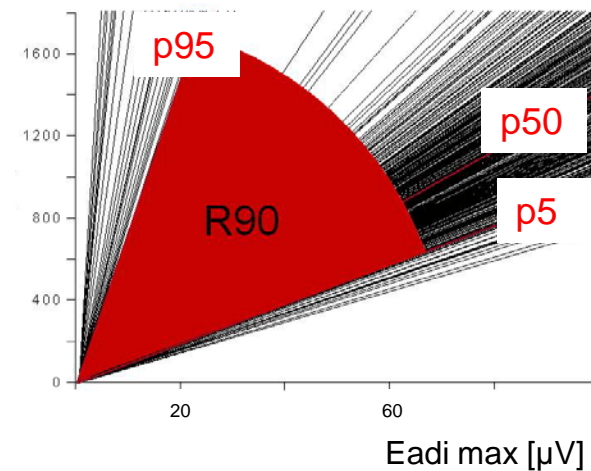
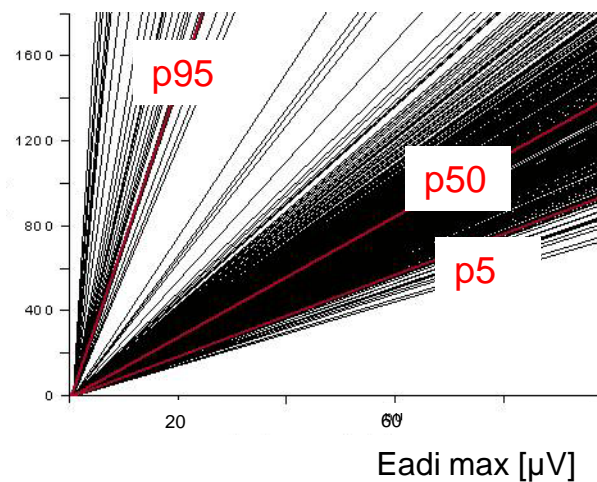
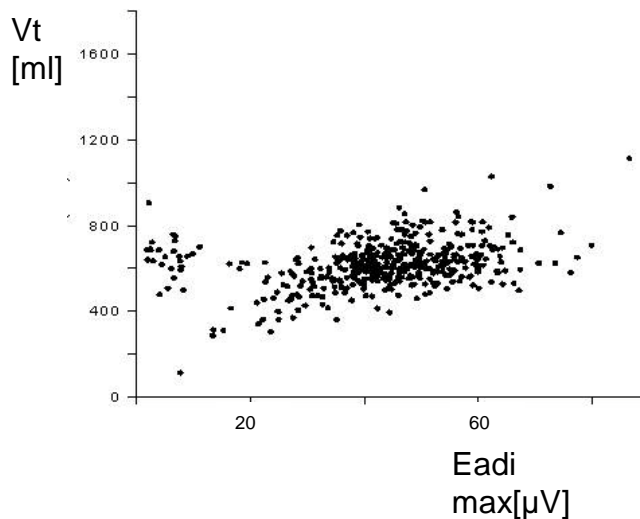
Methods (1)

- Prospective interventional study
- Comparison of 3 NAVA gain values during NIV (20 minutes each).
 - NAVA100: gain set by the clinician according to the manufacturer's recommendations (same P max as in pressure support)
 - NAVA50: gain set as -50% of NAVA100 gain
 - NAVA150: gain set as +50% of NAVA100 gain
- Recording of Eadi max and tidal volume (Vt) for each respiratory cycle

Methods (2)



- Assessment of V_t/E_{adi} max ratio for each breath and each NAVA gain
- Determination of Range 90 (Range 5-95) for each patient and each NAVA gain setting



A smaller Range90 indicates a better matching of V_t to E_{adi} max.



Results (1)

- 12 patients included
 - 5 COPD
 - 2 mixed pulmonary disease
- Median [IQR] Range 90 for each gain setting:

	NAVA 50	NAVA 100	NAVA 150
Range 90	37 [20-95]	32 [19-87]	33 [16-92]

- ➔ Globally NAVA100 allowed the best matching between Eadi max and Vt



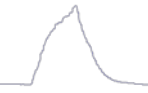
Results (2)

- If Range 90 was considered for each NAVA gain setting patient by patient:

Lowest Range90 value was:

- under NAVA 100 in 4 / 12 patients (33%)
- under NAVA 150 in 2 /12 patients (17%)
- under NAVA 50 in 6/12 patients (50%)

- ➔ NAVA100 was not the best NAVA gain for minimizing Range 90 in every patients.



Results (3)

- If the lowest Range90 value was compared to the next lowest for each patient
 - 3 patients had differences of less than 10%
 - 9 patients had differences from 17-24%

- ➔ most patients (9/12 or 75%) had a clear better match between Eadi max and Vt for one specific NAVA gain.

Conclusions

- Range 90 assesses the matching between Eadi max and V_t
- Different NAVA gains yield a different ability to match V_t to Eadi max.
- Range 90 approach could be a new way to determine the optimal NAVA gain for a given patient at a given time but requires further investigations.

