



Ventilator Dyssynchrony

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Dyssynchrony

- Uncoupling of mechanical delivered breath and neural respiratory effort



Patient-ventilator Dyssynchrony

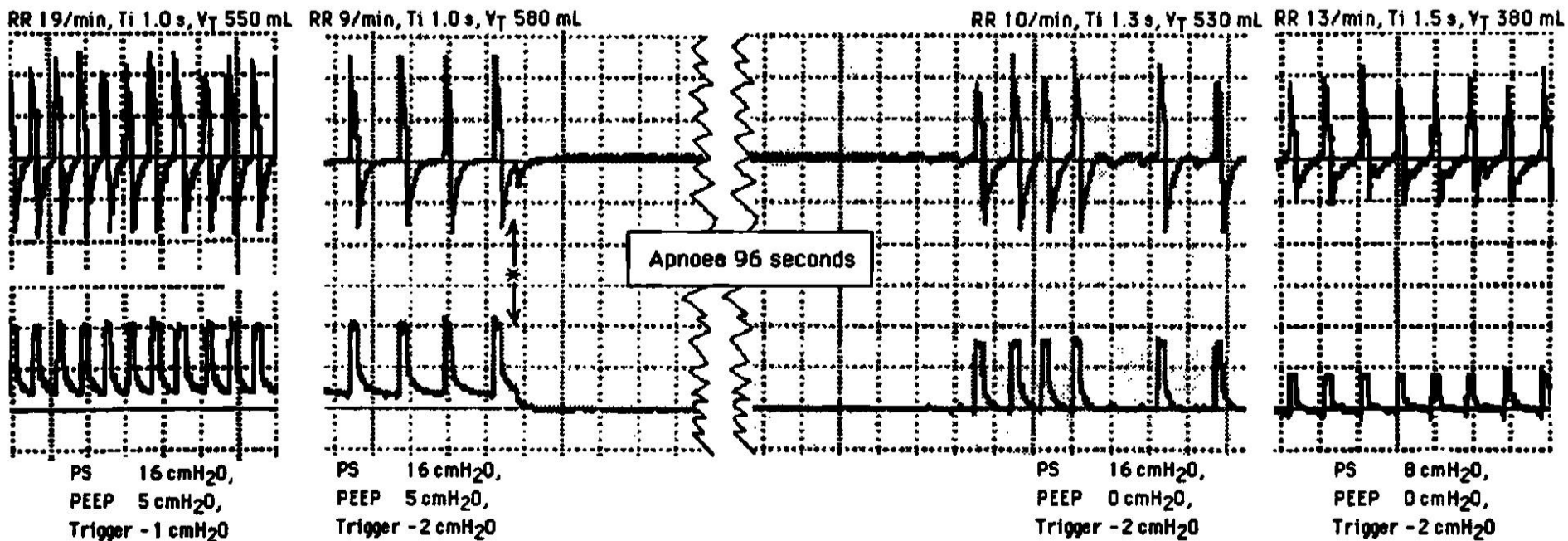
- Consequences
 - Increased WOB
 - Discomfort
 - Fatigue (physical and mental)
- Subtle and frequently unsuspected

Case

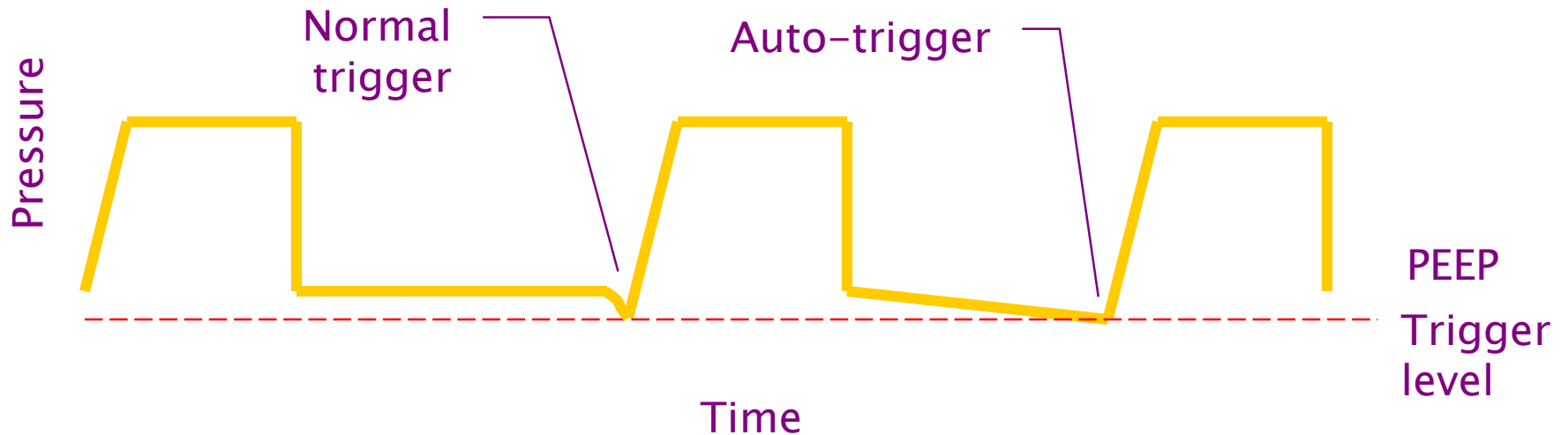
- 42 kg female
 - Grade 4/5 weakness (four limbs)
 - cerebellar ataxia
 - lower cranial nerve dysfunction
 - Post-operative management
 - Meningioma in the foramen magnum

pH	7.804
P _a CO ₂	14
P _a O ₂	81
HCO ₃ ⁻	20
Base excess	N/A
Saturation	100%

Auto-triggering



Auto-triggering

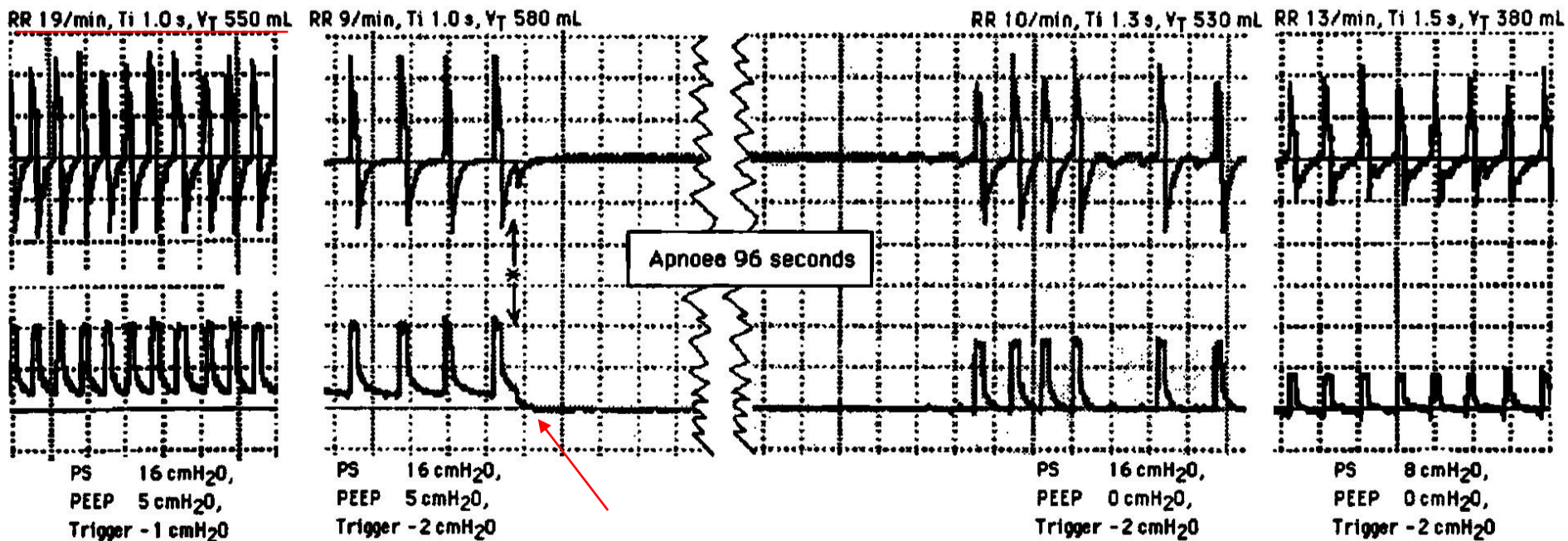


Triggering in the absence of inspiratory muscle contraction

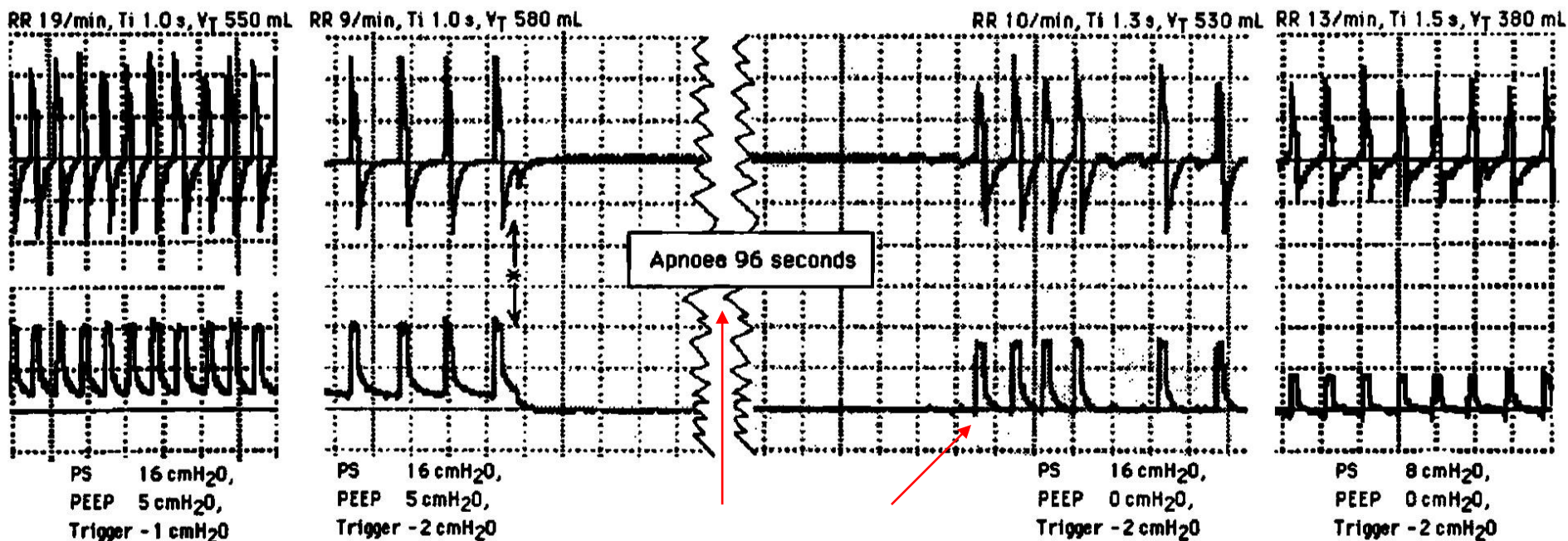
Auto-triggering - solutions

- Check circuit and eliminate the leak/secretions causing oscillations
- Decrease trigger sensitivity
- Reduce or eliminate PEEP
- Change mode of triggering

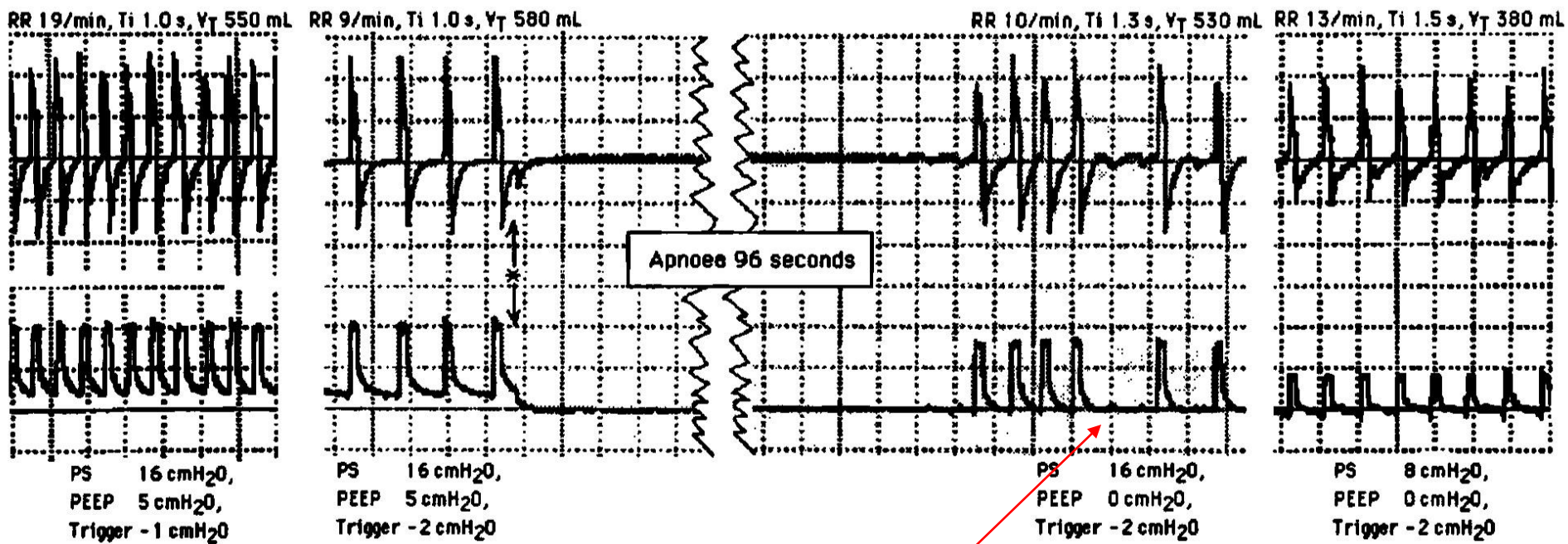
Auto-triggering



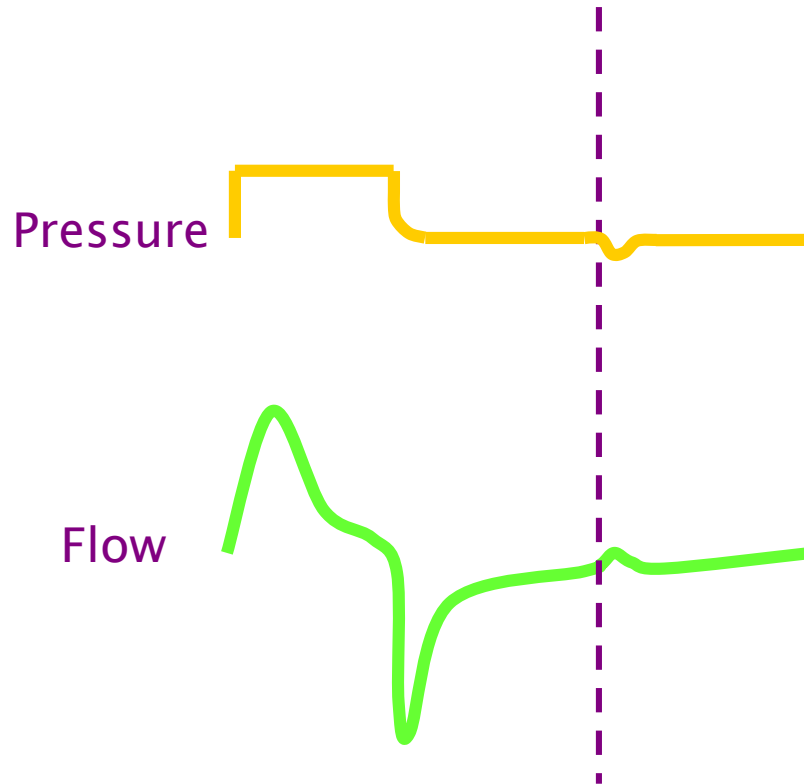
PEEP_i and triggering



PEEP_i and triggering



Ineffective triggering



Discomfort and increased work of breathing

Ineffective efforts

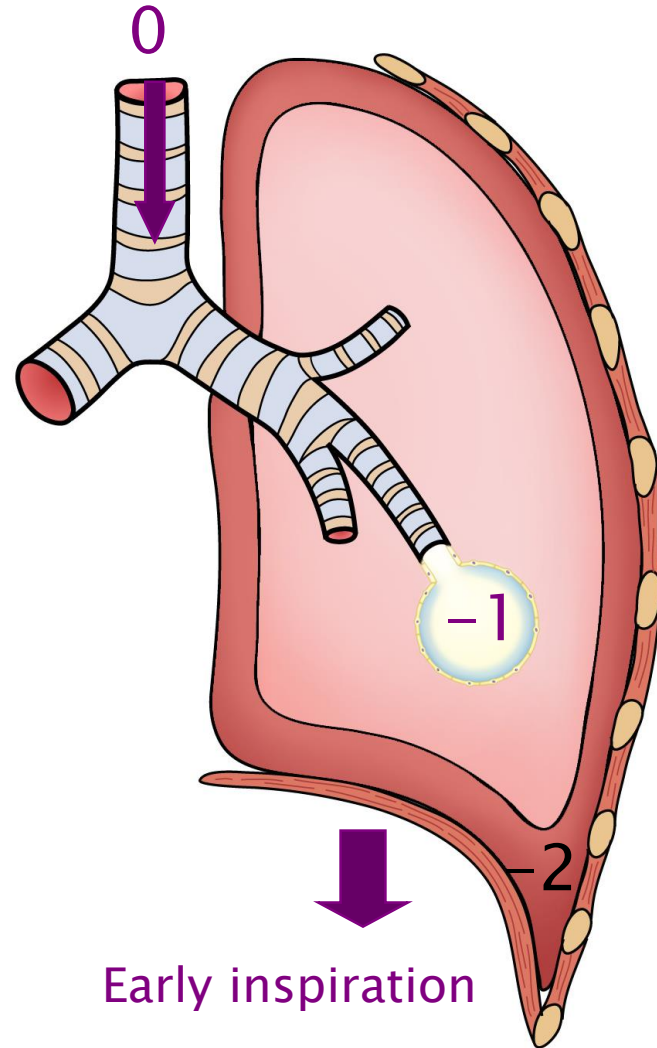
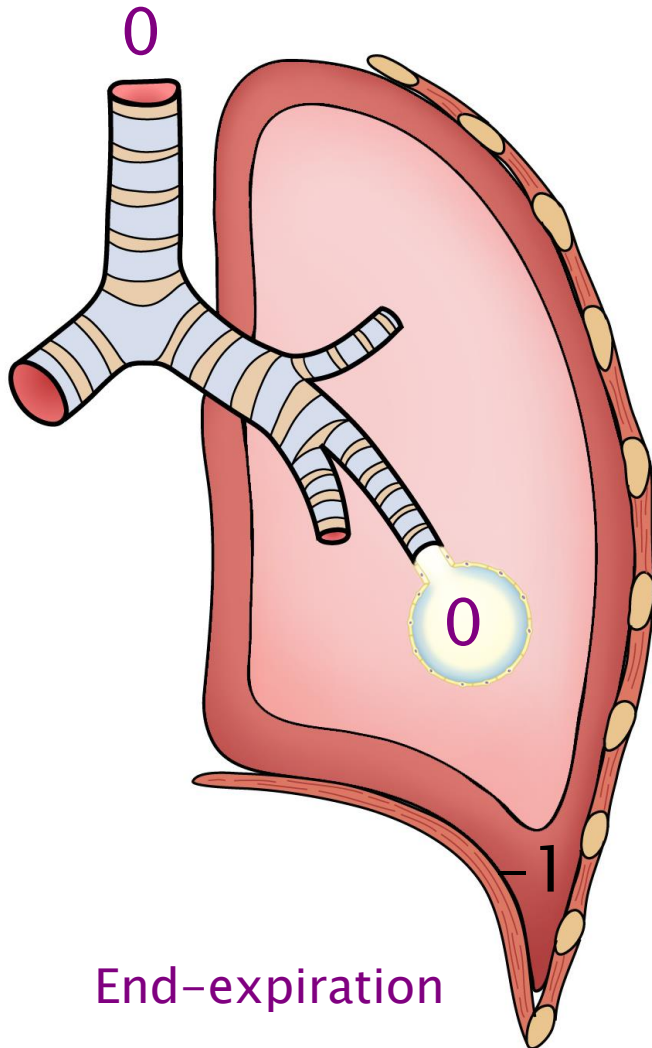
- Patient factors
 - Dynamic hyperinflation
 - Low respiratory drive (drugs)
 - Weak inspiratory muscles
- Ventilator factors
 - Excessively high tidal volumes
 - Incorrect trigger sensitivity setting
 - Malfunction (sticky valves)
- Important others
 - Partially blocked ETT/circuit component



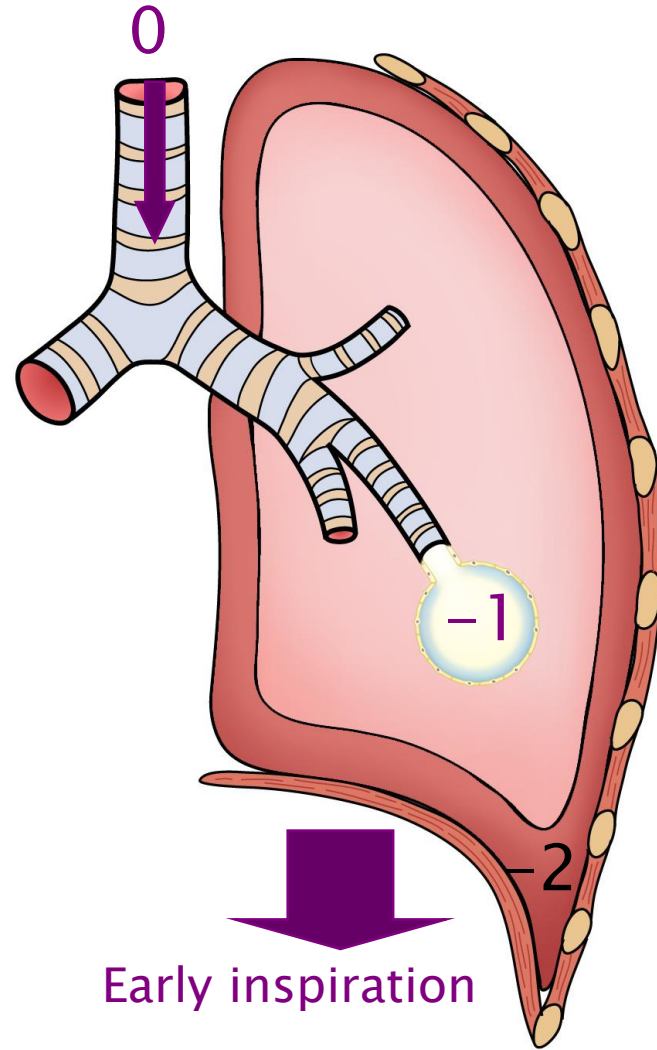
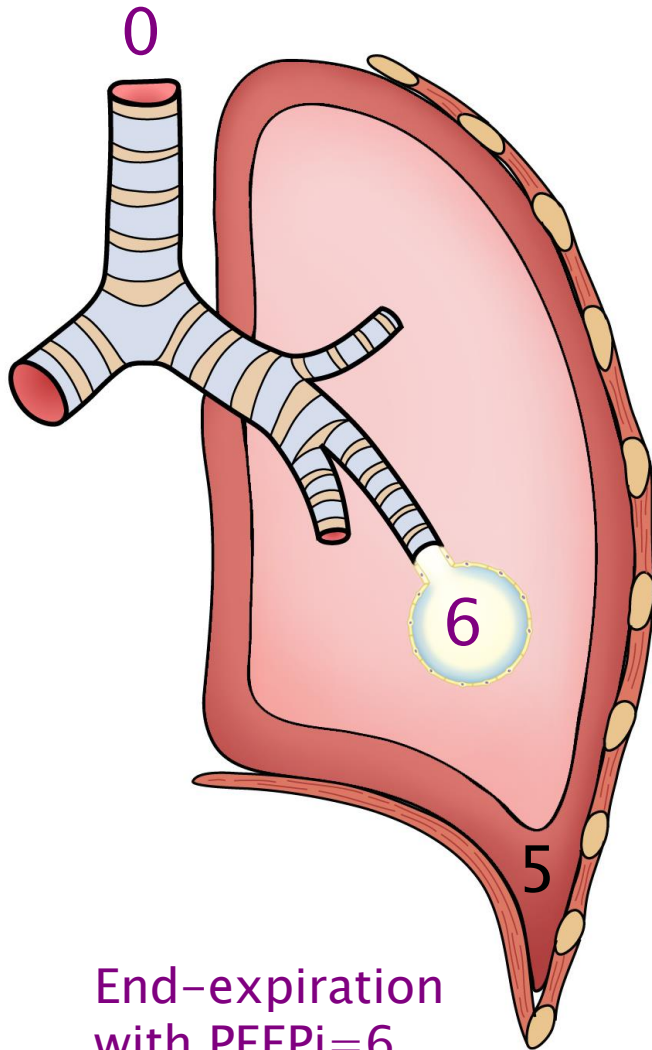
Ineffective efforts

- Patient factors
 - Dynamic hyperinflation
 - Low respiratory drive (drugs)
 - Weak inspiratory muscles
- Ventilator factors
 - Excessively high tidal volumes (high level of PS)
 - Incorrect trigger sensitivity setting
 - Malfunction (sticky valves)
- Important others
 - Partially blocked ETT/circuit component

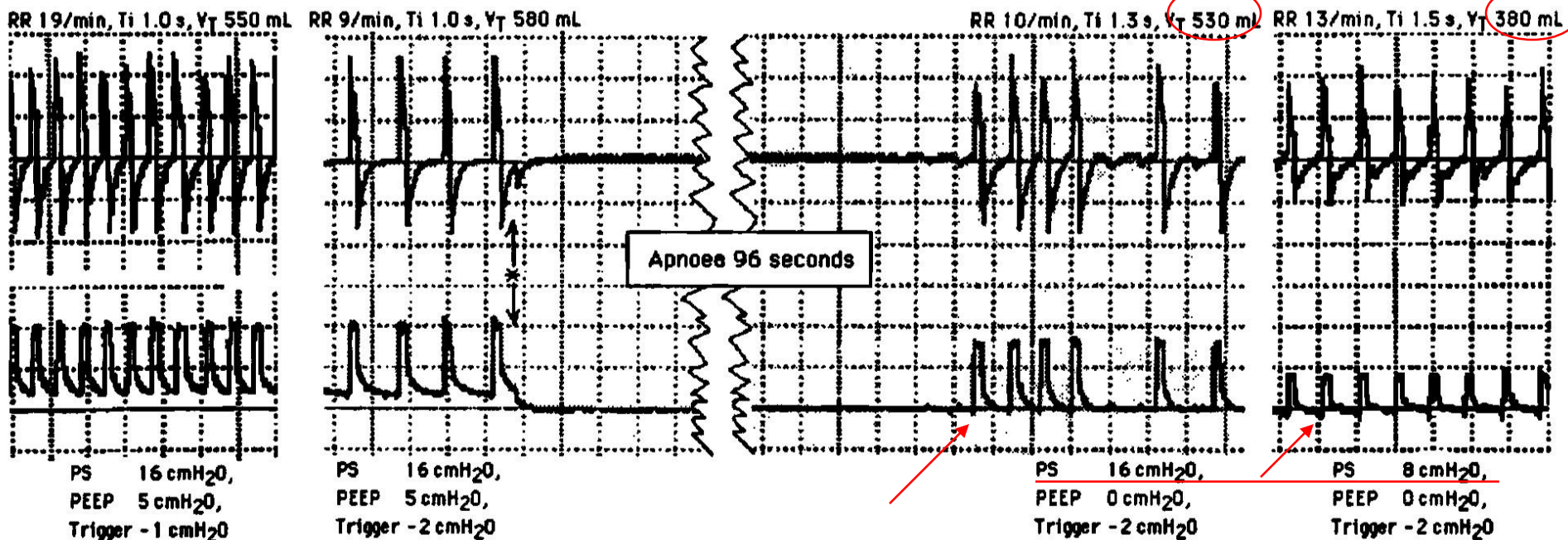
Dynamic hyperinflation



Dynamic hyperinflation



PEEP_i and triggering





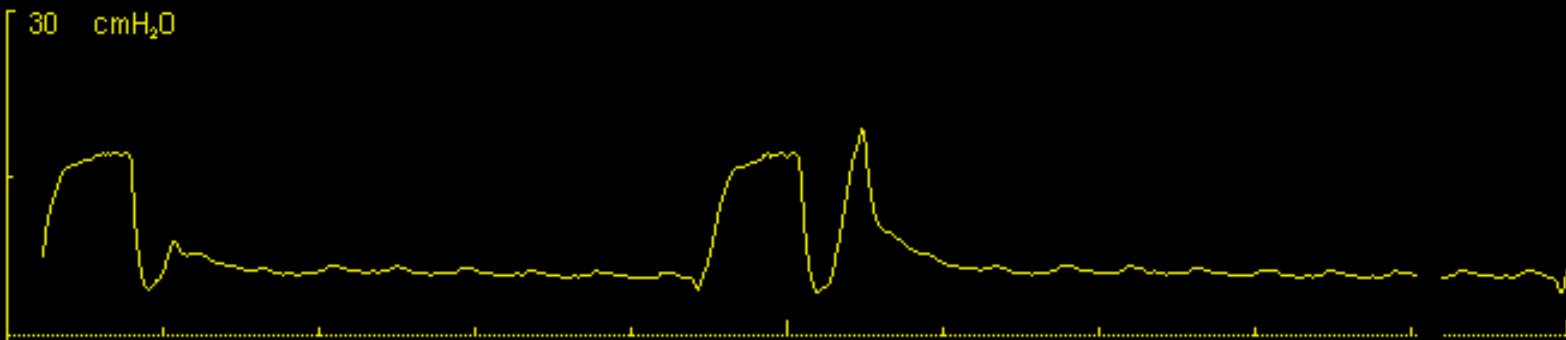
PS/CPAP

Admit patient

Nebulizer

Status

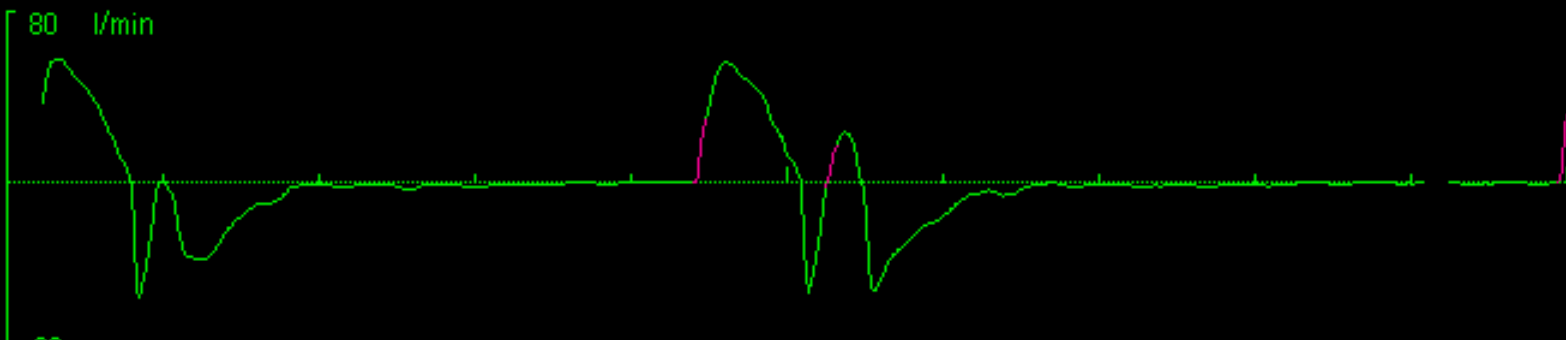
07/02 13:00



Ppeak (cmH₂O) **17** 40

Pmean (cmH₂O) **13**

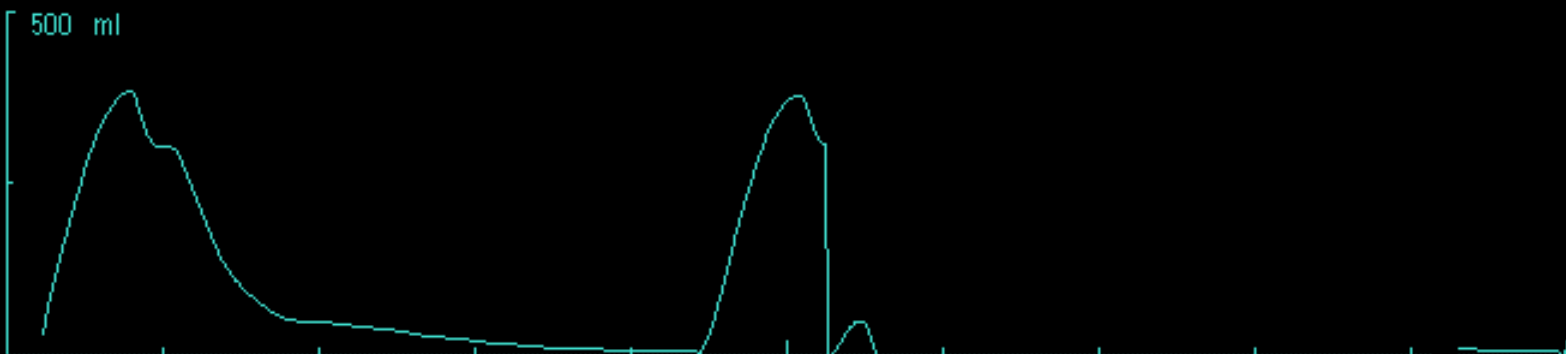
PEEP (cmH₂O) **4**



RR (b/min) **16** 60

O₂ (%) **40** 45

Ti/Ttot **0.82** 35

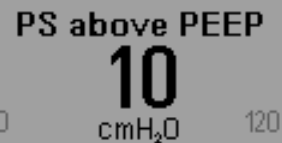


MVe (l/min) **5.5** 21.0

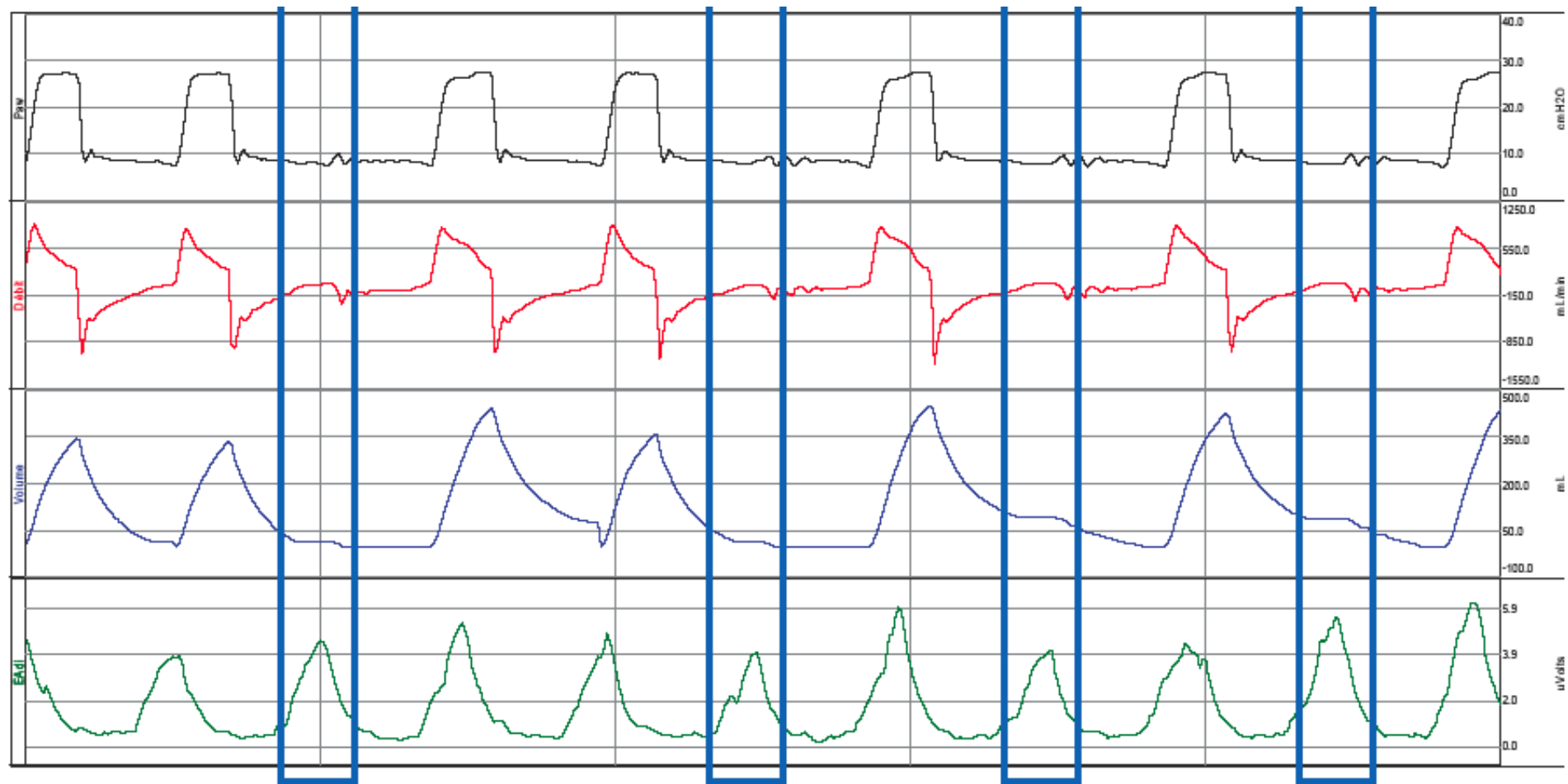
VTi (ml) **50** 3.5

VT_e (ml) **70**

Additional settings



Additional values

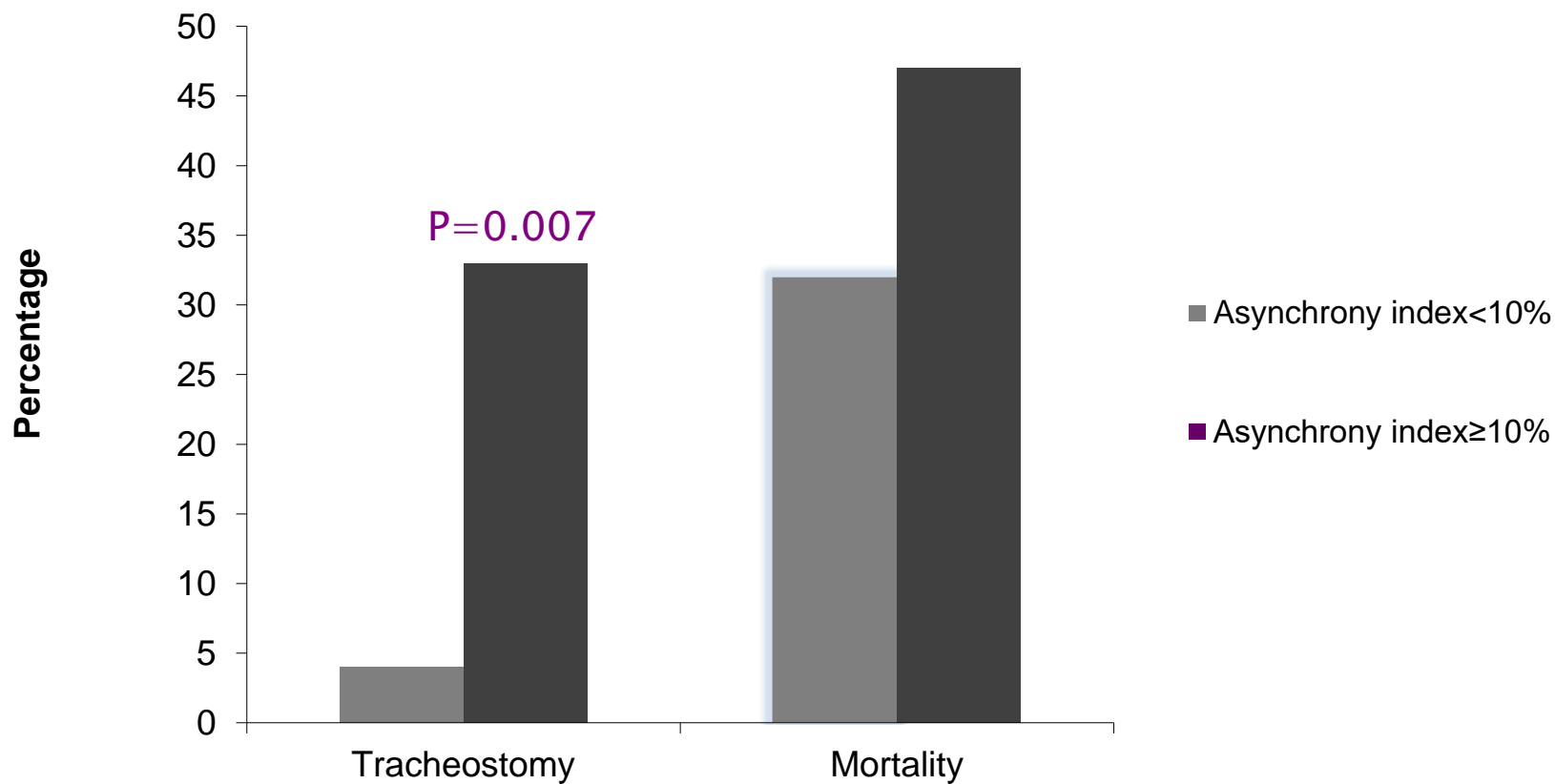


Incidence

- Over a 30 min period
 - Waveform inspection 73%
 - NAVA neural Edi detection 91%
 - Major dyssynchrony (AI > 10%) in 15%
- Previously reported rates 54-85%

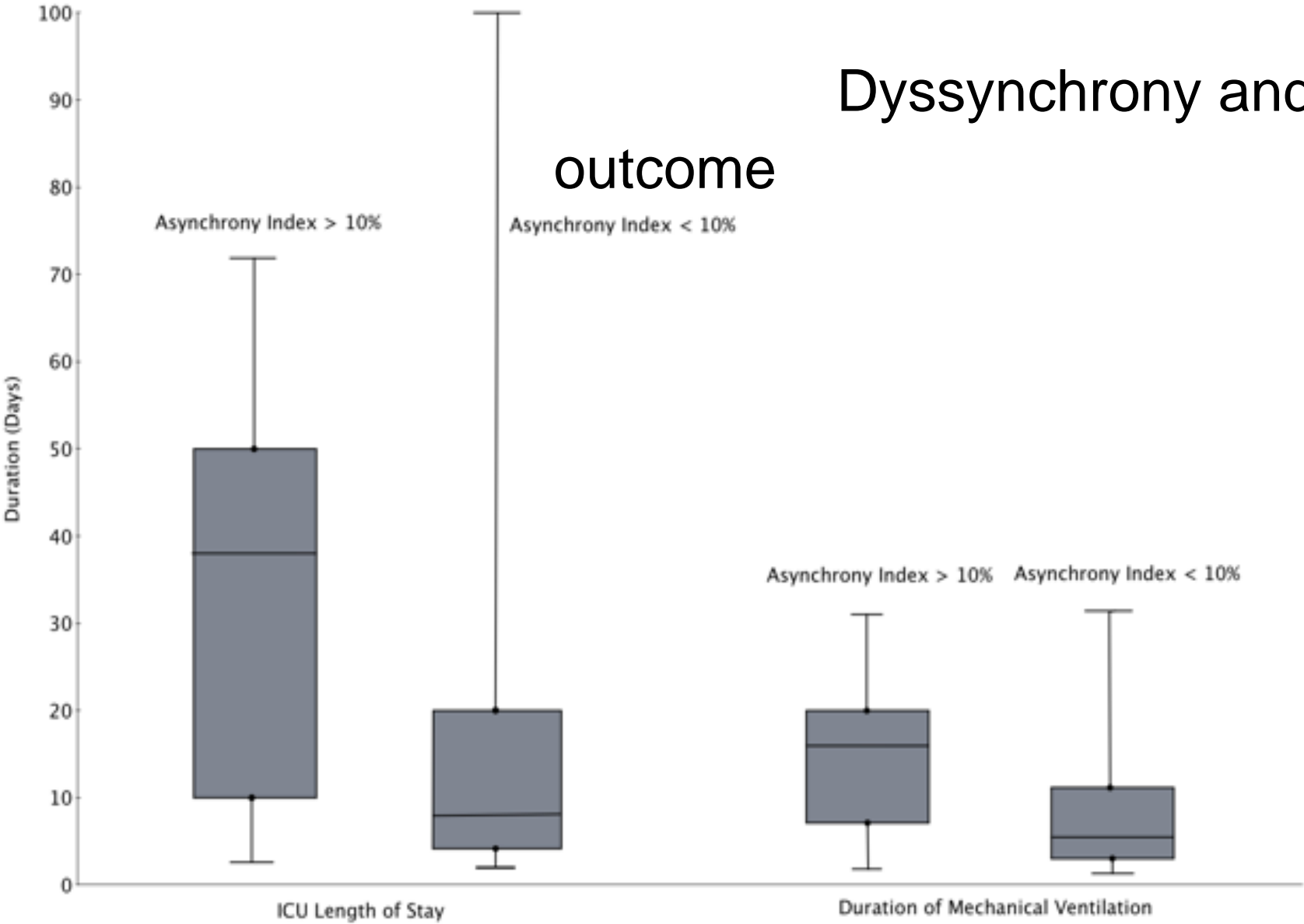
Li AMMY et al. Manuscript in preparation
Fabri B et al. Chest 1995 107:1387-94
Nava S et al. European Resp J 1997 10:177-83
De Wit M. J Crit Care 2009 24:74-80

Dyssynchrony and outcome

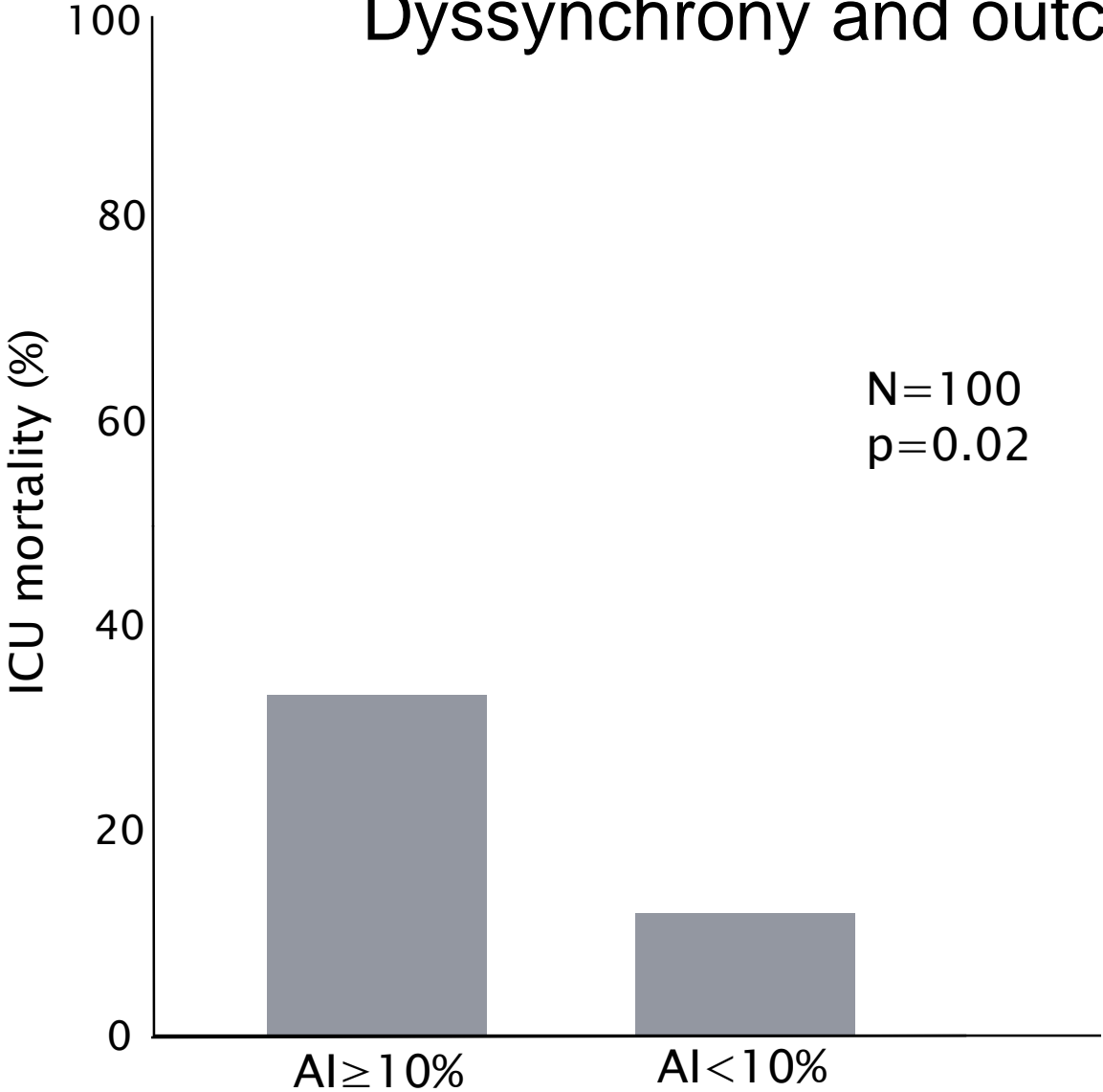


Dyssynchrony and

outcome

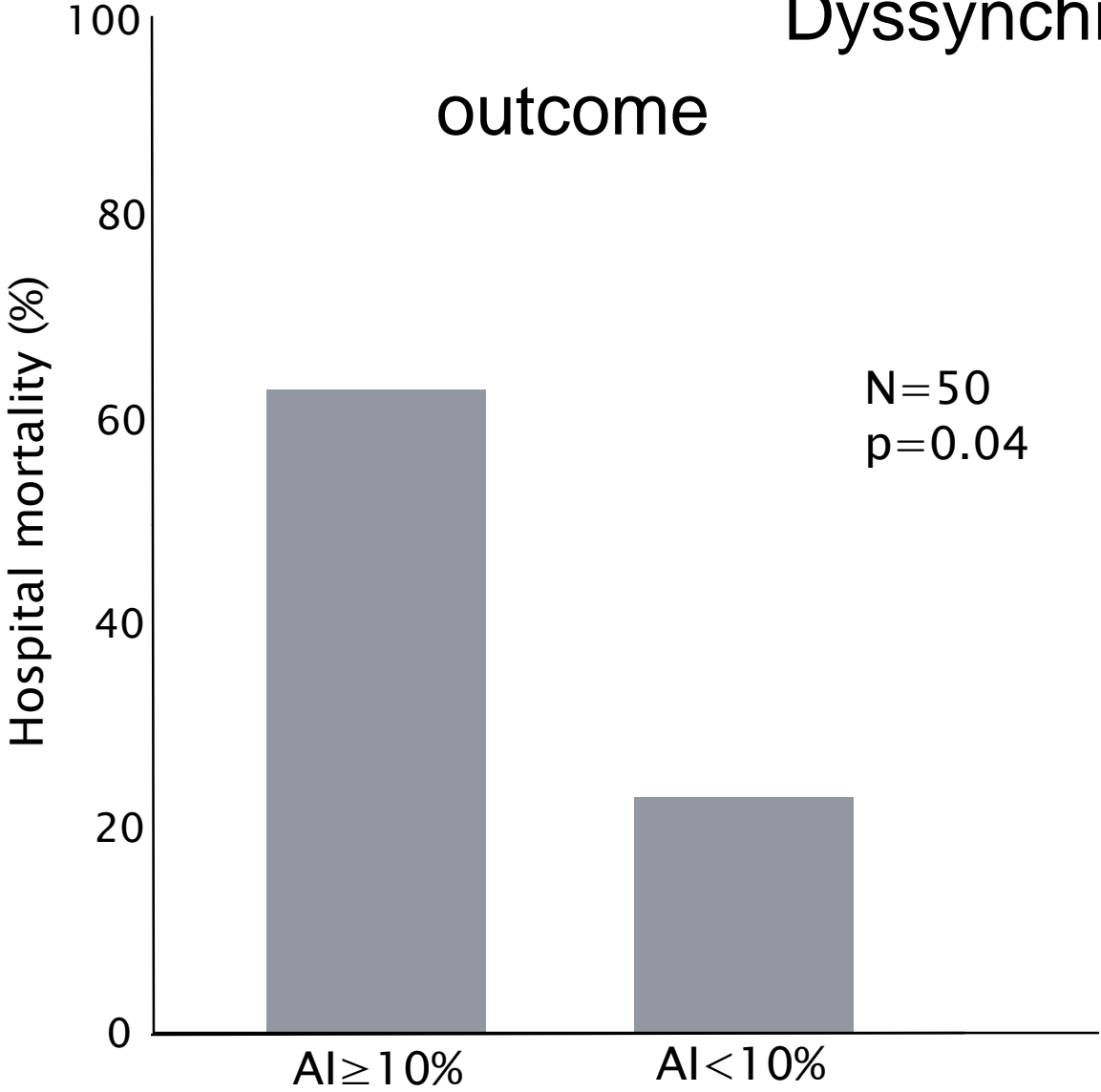


Dyssynchrony and outcome

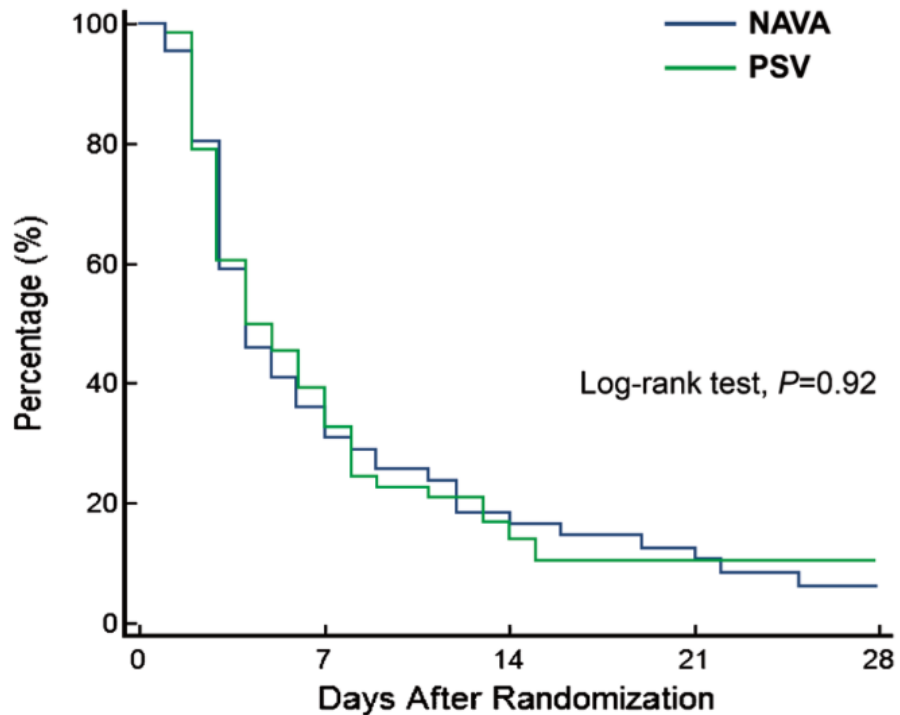


Dyssynchrony and

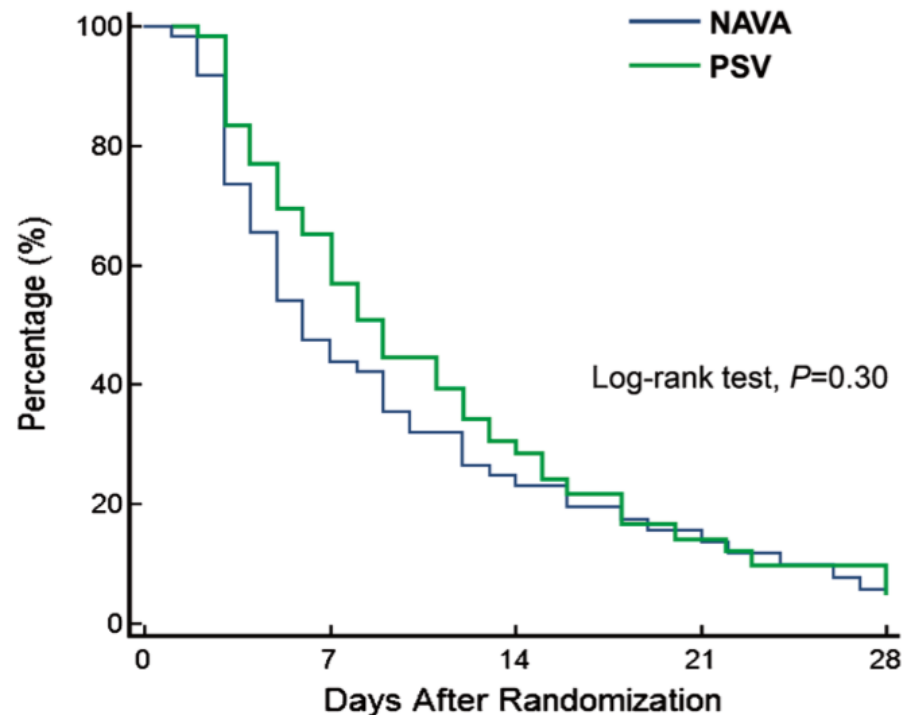
outcome



successful extubation



breathing without assistance



Conclusions

- Dyssynchrony is common
- Associated with
 - prolonged weaning
 - mortality
- Diagnosed from waveform analysis & examination of patient
- Treatment is multi-modal