

# EPO<sub>2</sub> : PV

## Evaluation of **P**re-**O**xygenation in Morbidly **O**bese:

## Effect of **P**osition and **V**entilation

Clinicaltrials.gov: NCT02121808



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*Frontiers in Anesthesia and Obesity*  
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Etienne J. Couture, MD, PGY-5  
Anesthesiology  
Laval University, Québec



# Conflict of Interest

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None

Funding

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Anesthesiology Research Team *ERA*,  
IUCPQ - Université Laval

# Introduction

## *Importance of Pre-Oxygenation*

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- Problems and complications encountered during the **airway management** is still an important source of **morbidity** in anesthesiology practice.<sup>1,2</sup>
- **Pre-oxygenation** of obese patients **reduce** the risk of **hypoxemia** following the induction of general anesthesia.<sup>3</sup>

1. Anesthesiology, 2006. 105(6): p.1081-6

2. Br J Anaesth, 2011. 106(5): p.617-31

3. Anesth Analg, 2003. 97(2): p.595-600

# Introduction

## *Optimisation of Pre-Oxygenation*

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- The **safe non-hypoxic apneic period** following induction of general anesthesia is dependant of the **functional residual capacity (FRC)** <sup>4</sup>, which can be optimized by:
  - **Positive pressure ventilation** <sup>5</sup>
  - **Head elevated positions** <sup>6</sup>

4. Anesth Analg, 1991. 72 (1): p.89-93.

5. Anesthesiology, 2011. 114(6): p.1354-63.

6. Anesthesiology, 2005. 102(6): p.1110-5

# Introduction

## *Goal of the Trial*

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Assess the best ventilation strategy and position that allows an optimal FRC before induction of general anesthesia in a population of morbidly obese subjects.

## *Primary Outcome*

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FRC after a pre-oxygenation period of 5 minutes according to 6 combinations ;

- 2 Ventilation strategies
- 3 Positions

# Methodology

## *Description of Interventions*

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- Prospective, crossmatched randomized trial
- Study sample size calculated to obtain a power of 80 %: 10 mesures per combinaison.<sup>5</sup>
- Analysis: Mixed linear model with a hierarchical structure
  - Multivariate normality assumption was verified with the Shapiro-Wilk tests after a Cholesky factorization.
  - Alpha error set at 5 %
  - Analysis with SAS v9,4

# Methodology

## *Description of Interventions*

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- Volunteer enrolment from bariatric surgery clinic
- 6 Pre-oxygenation periods of 5 minutes according to:
  - 2 Ventilation strategies
  - 3 Positions
- FRC measured via Helium dilution technique
- Latence period of 20 minutes between each mesure

# Methodology

## *Eligibility Criteria*

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### Inclusion

- Bariatric surgery
- BMI 40 - 80 Kg / m<sup>2</sup>
- Waist circumference
  - Male : > 130 cm
  - Female : > 115 cm

### Exclusion

- Craniofacial dysmorphism
- Claustrophobia
- Asthma
- COPD
- NYHA > 2
- Pregnancy
- Smoking
- Intolerance NIPPV



# Methodology

## *Ventilation Strategy*

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Pre-oxygenation x 5 minutes



ZEEP-SV

Insp P: 0 cm H<sub>2</sub>O

PEEP : 0 cm H<sub>2</sub>O

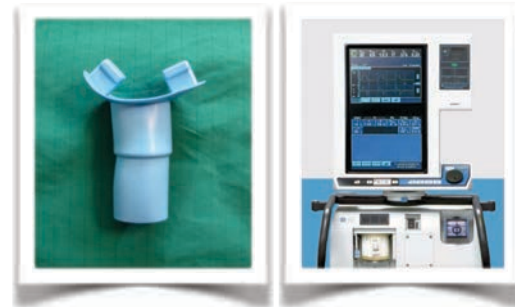
FiO<sub>2</sub>: 0,21

PP-SV

**Insp P: 8 cm H<sub>2</sub>O**

**PEEP : 10 cm H<sub>2</sub>O**

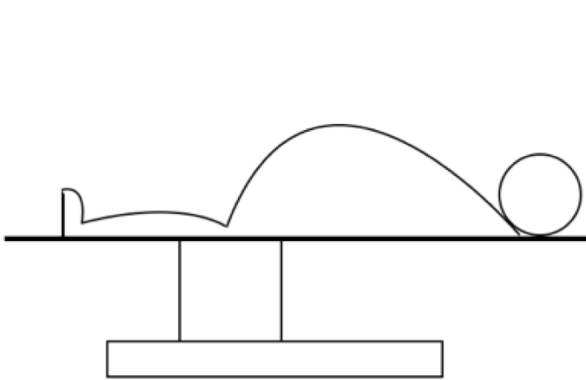
FiO<sub>2</sub>: 0,21



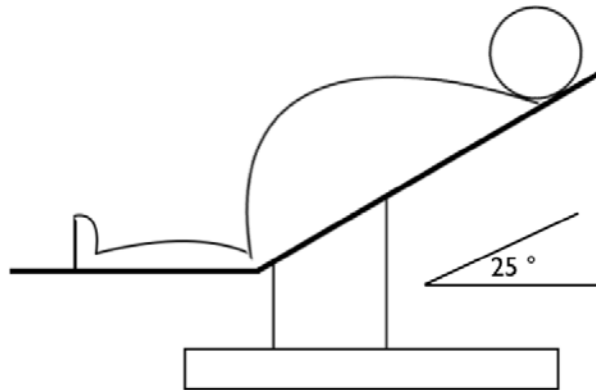
# Methodology

## *Position*

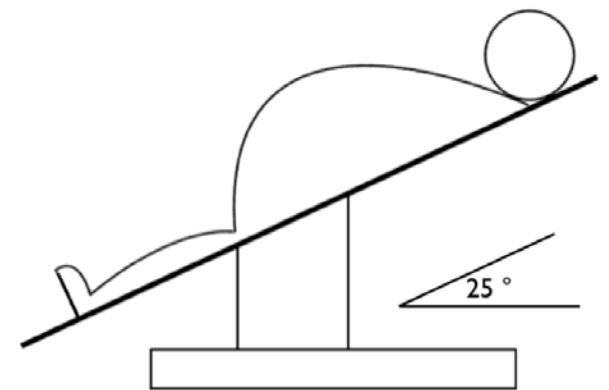
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Supine  
(0°)



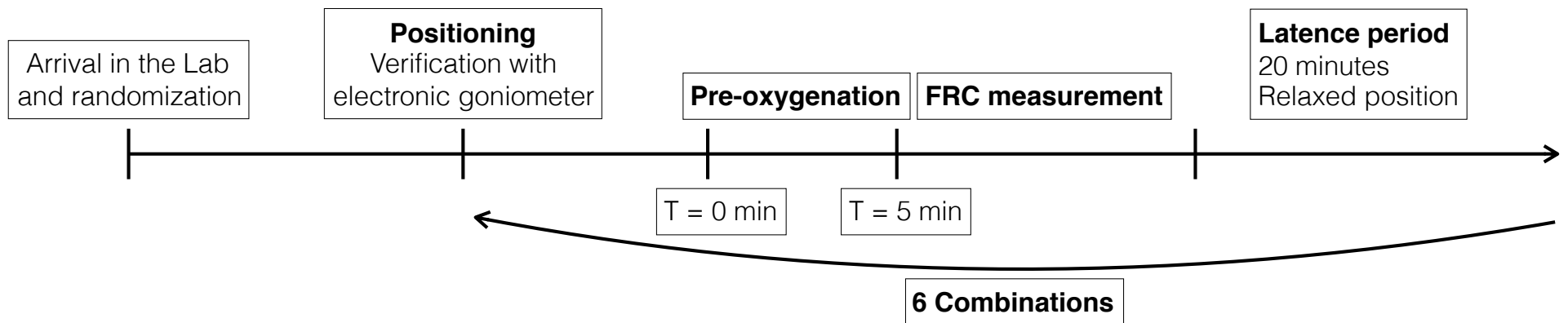
Beach-Chair  
(25°)



Reverse  
Trendelenburg  
(25°)

# Methodology

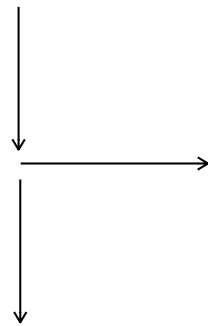
## *Interventions*



# Results

## *From Eligibility to Analysis*

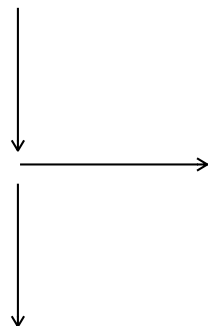
Assessed for eligibility (n = 62)



Excluded (n = 42)

- Meet exclusion criterions : (n = 8)
  - Asthma (n = 7)
  - Smoking (n = 1)
- Refused to participate : (n = 34)
  - Personal reasons (n = 29)
  - Unavailability (n = 5)

Randomized (n = 20)



Discontinued intervention (n = 3)

- CO<sub>2</sub> scavenging malfunction

Analysed (n = 17)

# Results

*Table 1. Description of the Population (n=17)*

Age (Years)	40 ± 10
Gender (M/F)	5 / 12
Weight (kg)	144 ± 30
Ideal Weight(kg)*	62 ± 9
Heigh (cm)	169 ± 8
<b>BMI ( kg / m2 )</b>	<b>50 ± 8</b>
<b>Waist Circumference (cm)</b>	<b>143 ± 17</b>
Neck Circumference (cm)	46 ± 6
CPAP User's	8

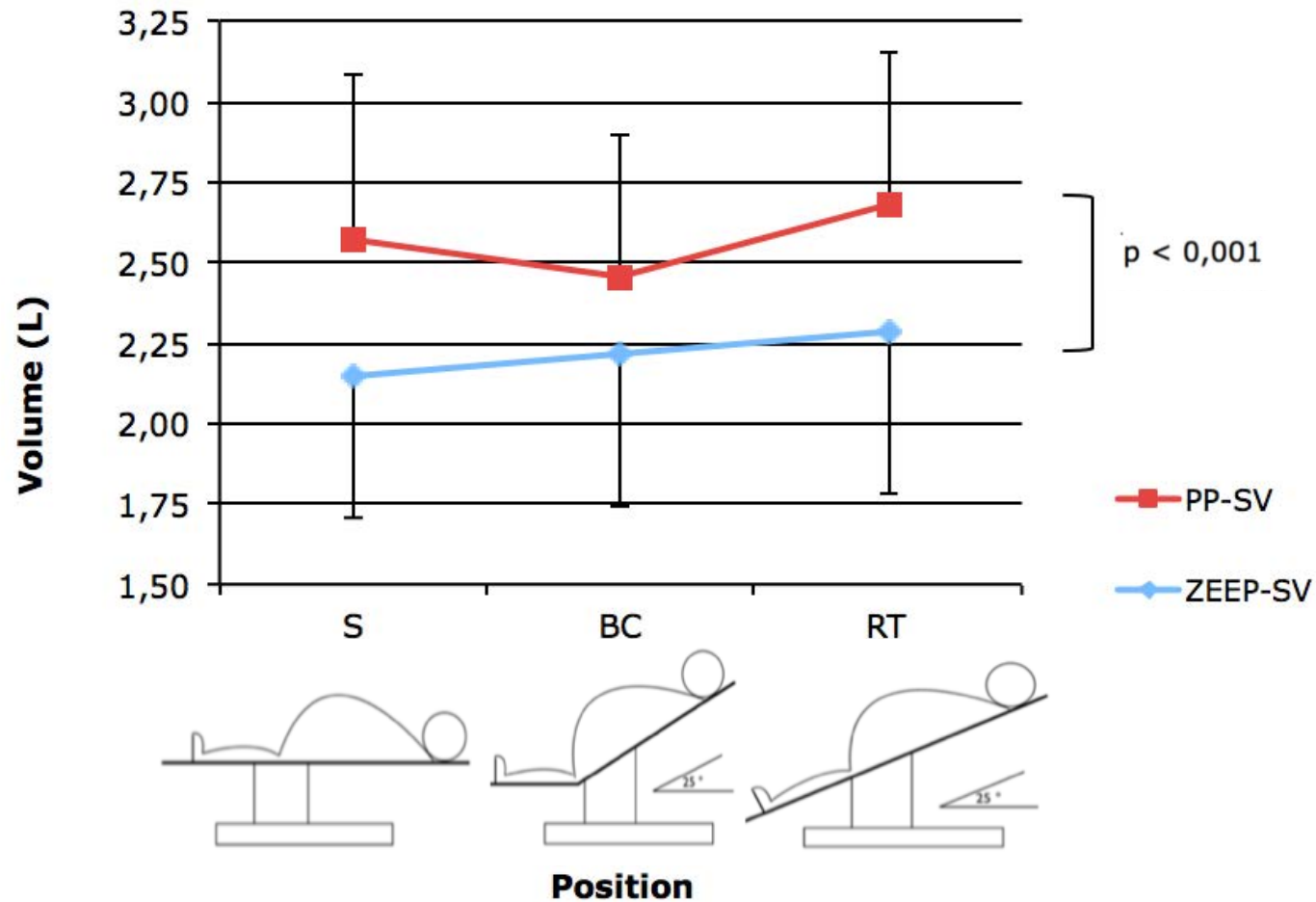
\*Ideal weight

Female :  $45,5+0,91*(\text{Height (cm)}-152,4)$

Male :  $50+0,91*(\text{Height (cm)}-152,4)$

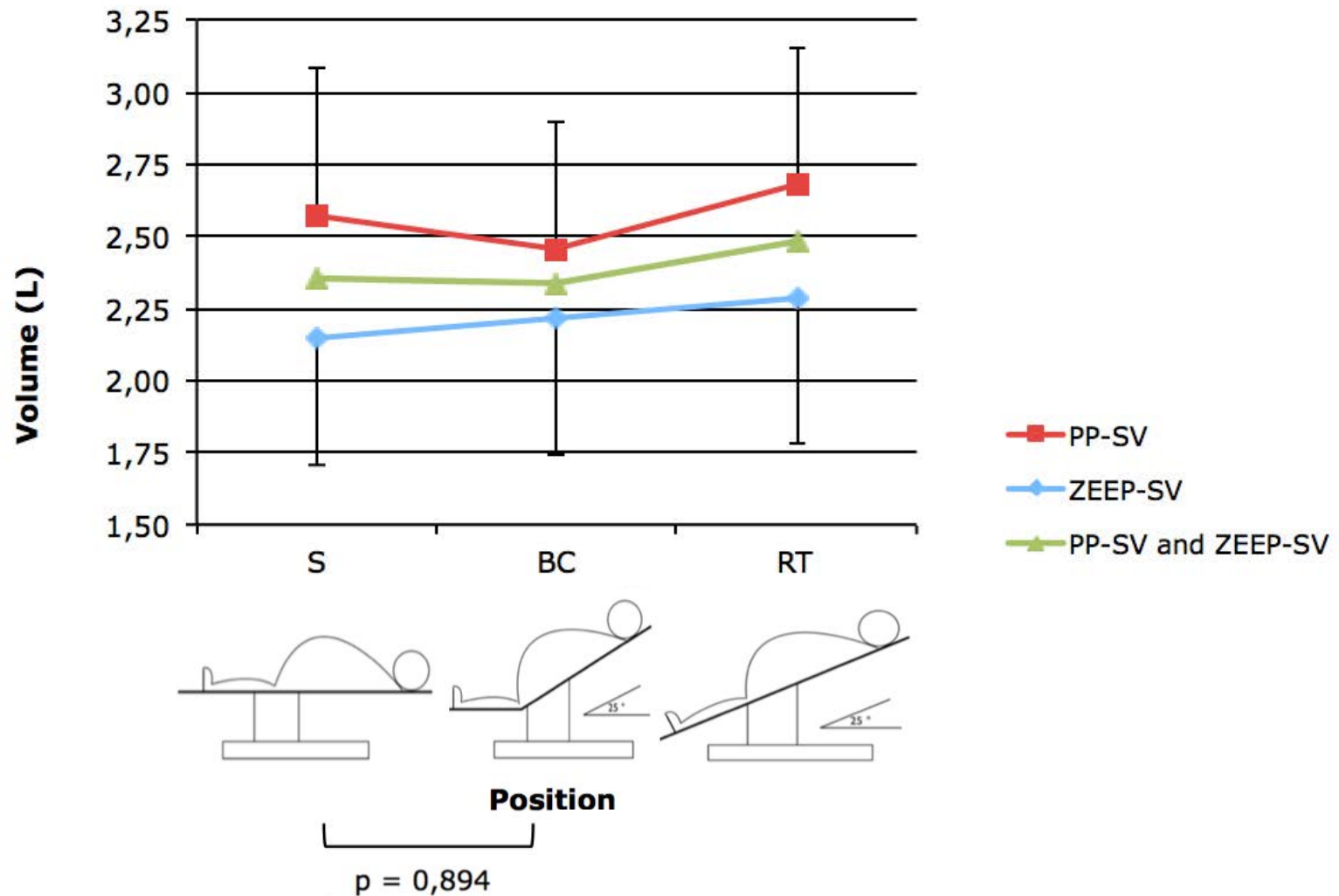
# Results

Figure 1. Functional Residual Capacity (L)



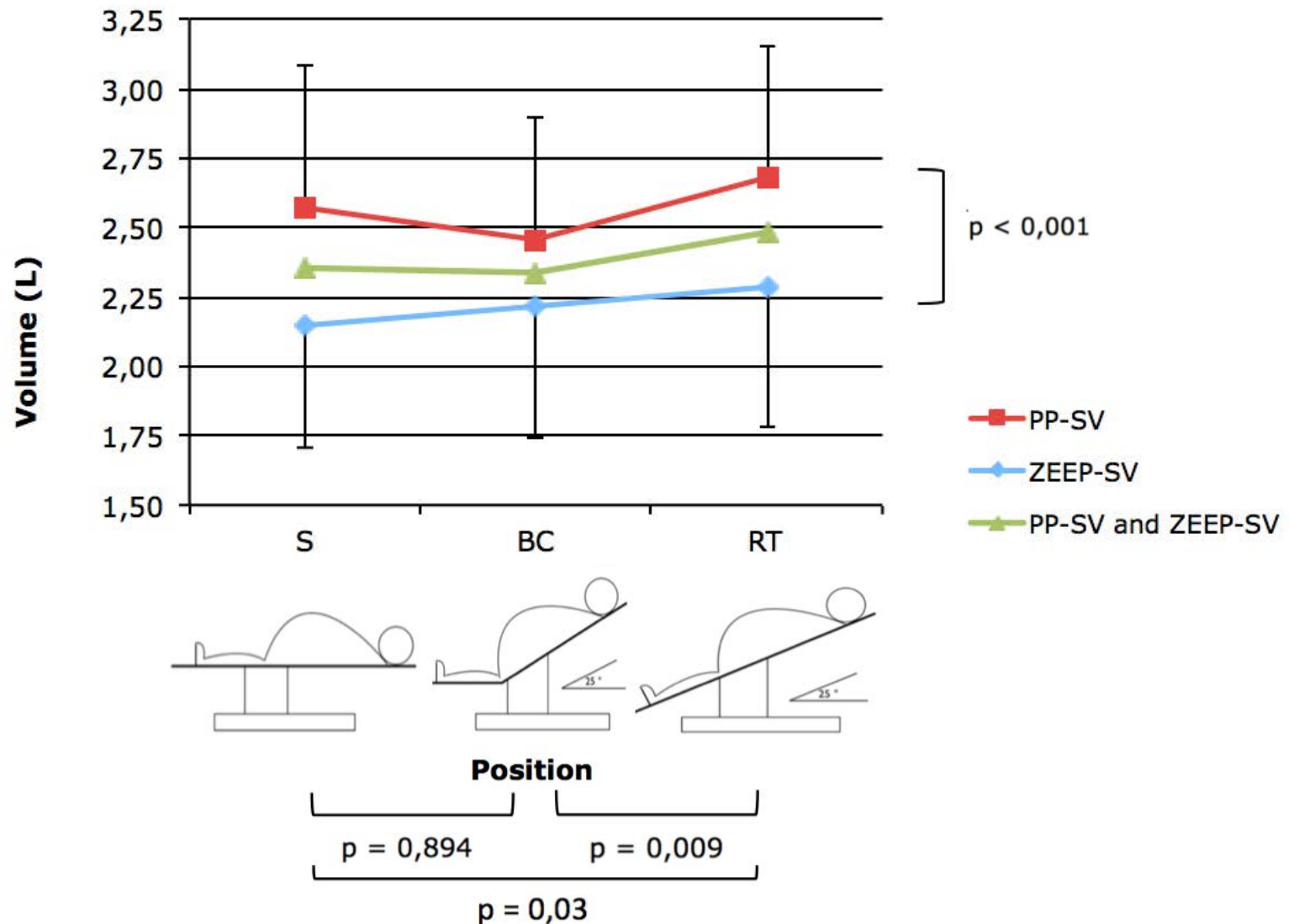
# Results

Figure 1. Functional Residual Capacity (L)



# Results

Figure 1. Functional Residual Capacity (L)

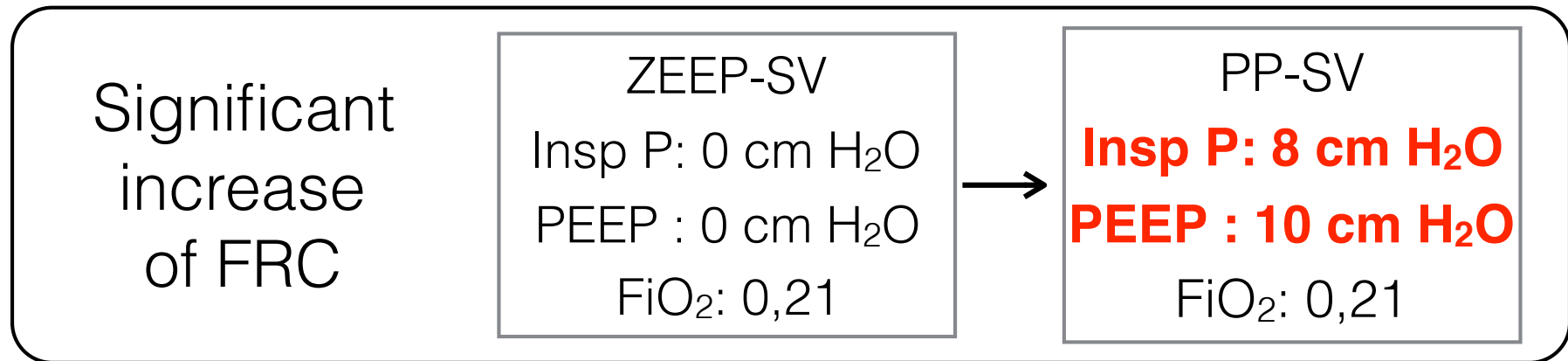




# Discussion

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Ventilation: Independent of the position

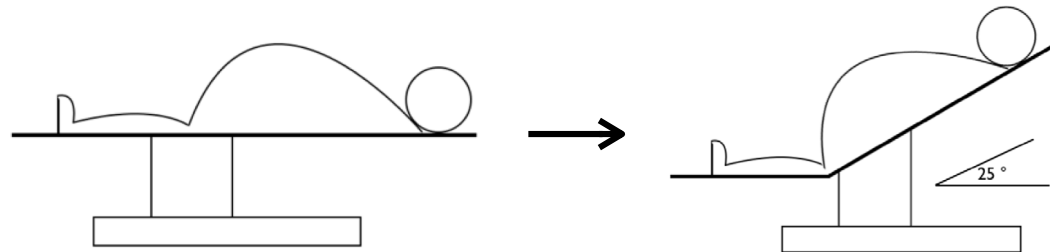


# Discussion

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Position: Independent of the ventilation strategy;

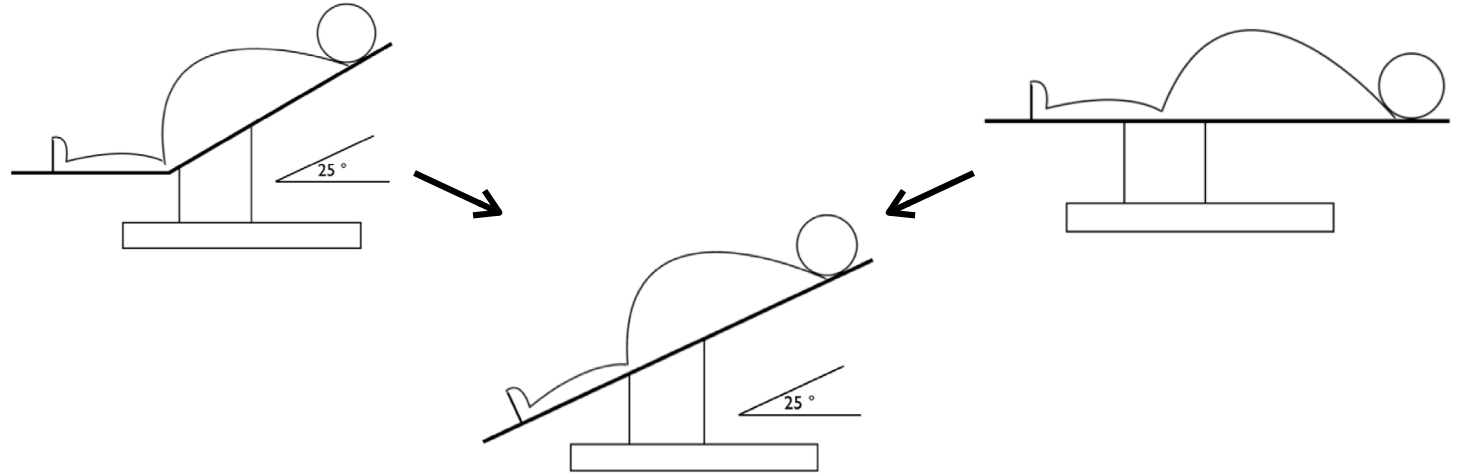
Absence of  
modification  
of FRC



# Discussion

Position: Independent of the ventilation strategy;

Significant  
increase  
of FRC



# Discussion

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## Strengths

- Standardized measurements of FRC in a respiratory physiology laboratory.
- Mean BMI :  $50 \pm 8$  kg / m<sup>2</sup>
- Mean waist circumference:  $143 \pm 17$  cm
- First data on FRC of morbidly obese according to 3 positions used in a clinical set-up

## Limits

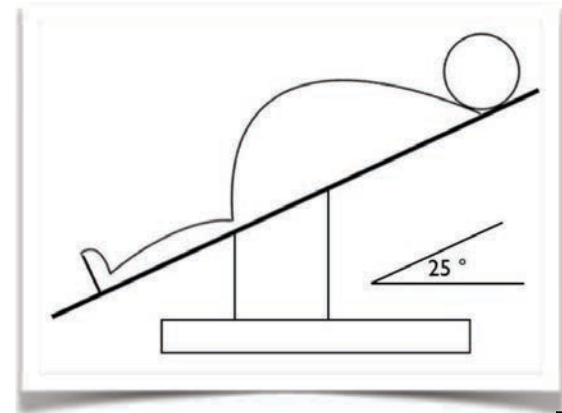
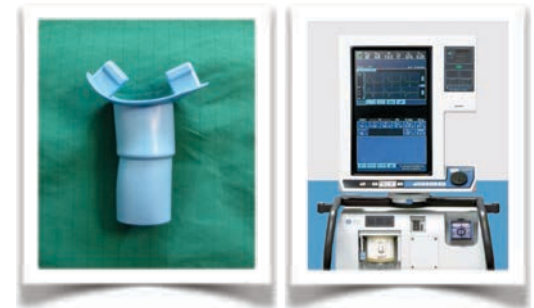
- FRC results not correlated with non-hypoxic apnea time.

# Conclusion

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Optimal conditions to maximize FRC after a period of pre-oxygenation of 5 minutes;

- Ventilation: Positive Pressure
- Position: Reverse Trendelenburg



# Thank you !



Quebec City