

# Ability of Capstesia™, a new smartphone Pulse Pressure Variation (PPV) and Cardiac Output (CO) application, to predict fluid responsiveness in mechanically ventilated patients.

Boudart C<sup>1</sup>, Joosten A<sup>1</sup>, Desebbe O<sup>2</sup>, Huybrechts I<sup>1</sup>, Barvais L<sup>1</sup>, Van Obbergh L<sup>1</sup>

<sup>1</sup> Erasme ULB Bruxelles, Dept of Anaesthesiology, Bruxelles, Belgium,

<sup>2</sup> Clinique de la Sauvegarde, Dept of Anaesthesiology & Intensive Care, Lyon, France

## Background:

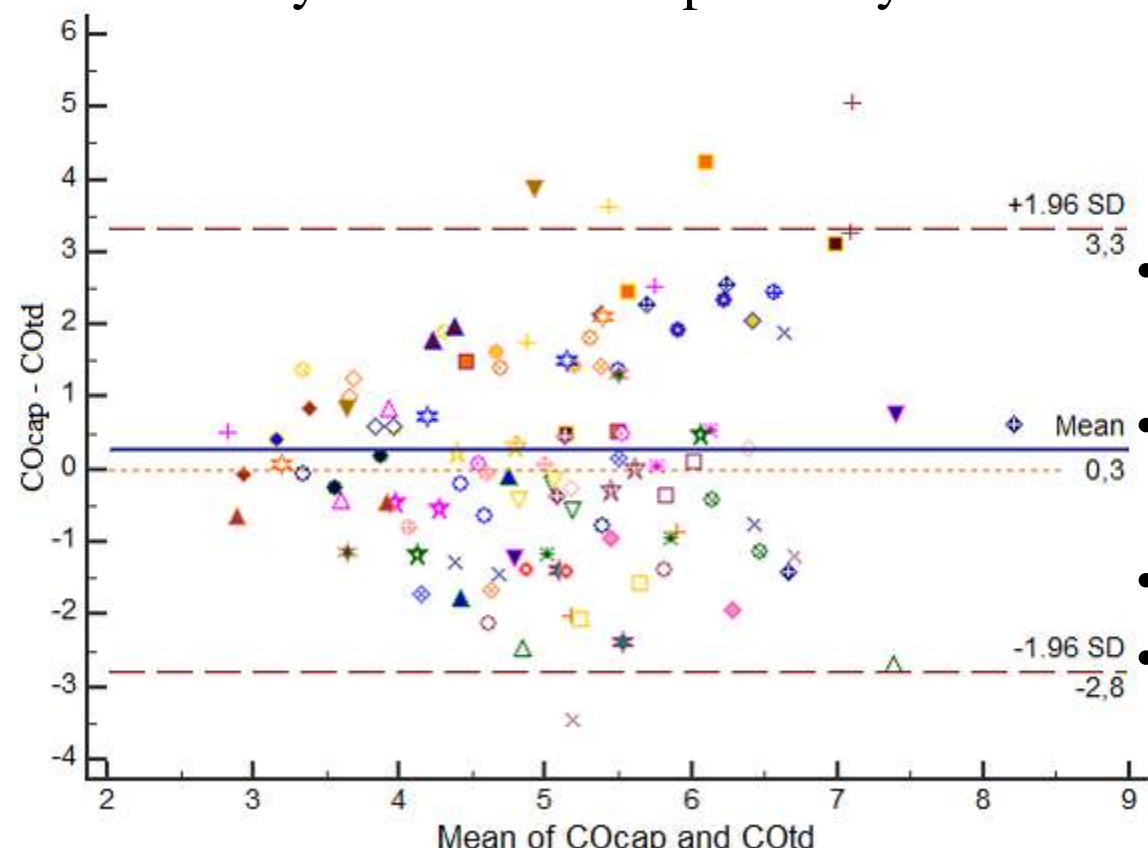
- In mechanically ventilated patient, fluid responsiveness (FR) can be predicted using PPV and evaluated by monitoring CO.
- Capstesia™ is a new smartphone application which automatically calculates PPV and CO from a digital picture of the arterial waveform from any monitor.
- The primary goal of this study was to compare the ability of PPV obtained with the Capstesia™ application (PPVcap) against pulse contour technology (PulsioFlex™ Monitor, Maquet) (PPVpc) to predict FR.
- The secondary goal was to assess the trending ability of CO obtained with the Capstesia™ application (COcap) compared to the gold standard transpulmonary thermodilution method (COtd)

## Methods:

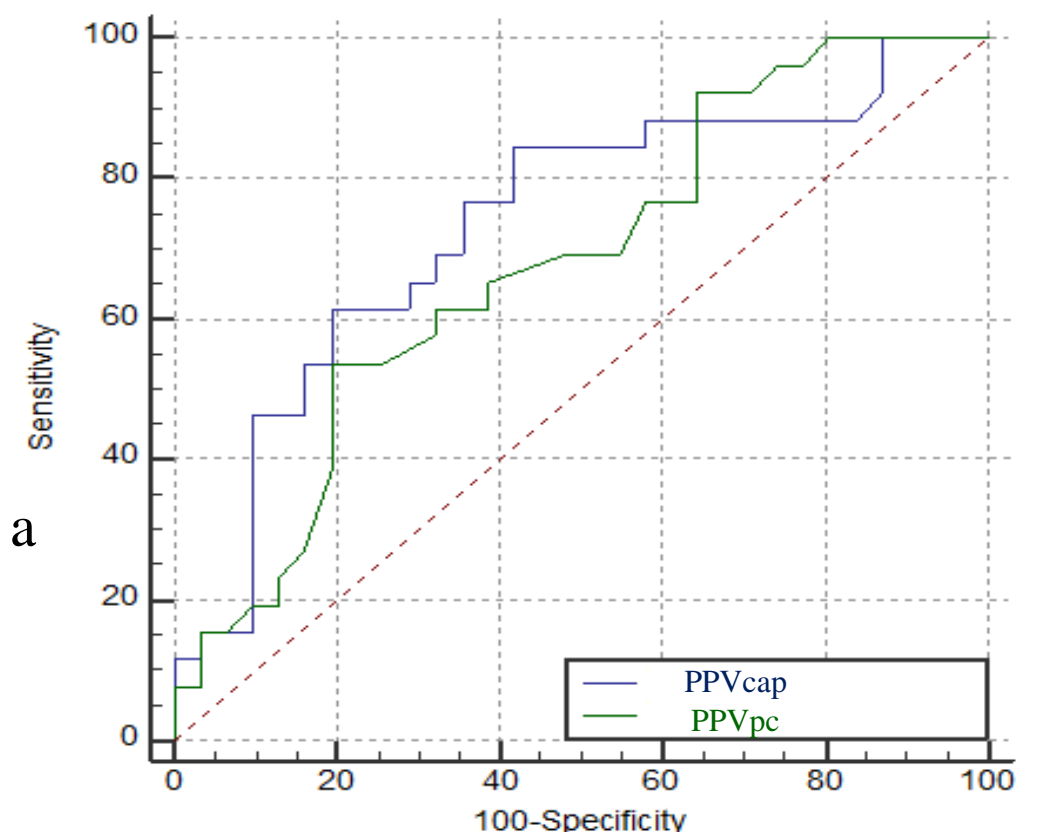
- After ethical approval and written informed consent, mechanically ventilated patients undergoing CABG were included.
- FR was defined as an increase in COtd greater than 10% following a volume expansion of 5 mL/kg ideal body weight of 3% modified gelatin.
- COtd measurement, COcap and PPVcap were obtained simultaneously. COtd, COcap, PPVcap and PPVpc were all obtained before and after the fluid loading.
- A ROC curve analysis determined the ability of PPVcap and PPVpc to predict FR.
- The agreement between COcap and COtd was assessed with the Bland-Altman analysis.
- The ability of COcap to follow the variations of COtd before and after fluid loading was assessed by a four-quadrant plot analysis.

## Results:

- A total of 57 patients were included.
- There was no difference in the ability of PPVcap and PPVpc to predict FR (AUC 0.736 (CI95%: 0.603-0.844) vs. 0.677 (CI95% : 0.540-0.795, p=0.3).
- PPVcap > 7.6 % could predict FR with a sensitivity of 85% and a specificity of 58% whereas PPVpc > 10.3% could predict FR with a sensitivity of 54% and a specificity of 81%.



- Mean COcap was 5.2 L/min (range: 4.1-9.6 L/min)
- Mean COtd was 4.9 L/min (range: 4.0-8.7 L/min).
- The Bland-Altman analysis showed a mean bias of 0.3 L/min with limits of agreement of -2.8 L/min and +3.3 L/min.
- The percentage error was 60%.
- The concordance rate between variations of COtd and COcap was 73% (95%CI: 68-78).



**Conclusion:** Our findings show that PPVcap and PPVpc can both weakly predict fluid responsiveness. The CO calculated by Capstesia™ application is not in agreement with the gold standard pulmonary thermodilution method and cannot be used to assess the fluid responsiveness.