



### Introduction

- Passive leg raise (PLR) is commonly used to evaluate preload fluid responsiveness and may be considered more reproducible than the fluid bolus technique<sup>1</sup>.
- The PLR test has the same effect as mobilization of 300 cc of blood from the lower body into the cardiac chambers.
- The peripheral venous catheter is the most commonly used method of vascular access, and the peripheral venous pressure (PVP) reflects 'downstream' pressure to the right atrium. In this experiment,
- PVP waveform analysis was utilized to assess blood volume status and fluid responsiveness during mild blood volume changes, autotransfusion of 300 cc of blood (PLR test) as shown in (figure 1-A) and the loss of 600 cc of blood at -30 mmHg of Lower Body Negative Pressure (LBNP), mild hypovolemia.

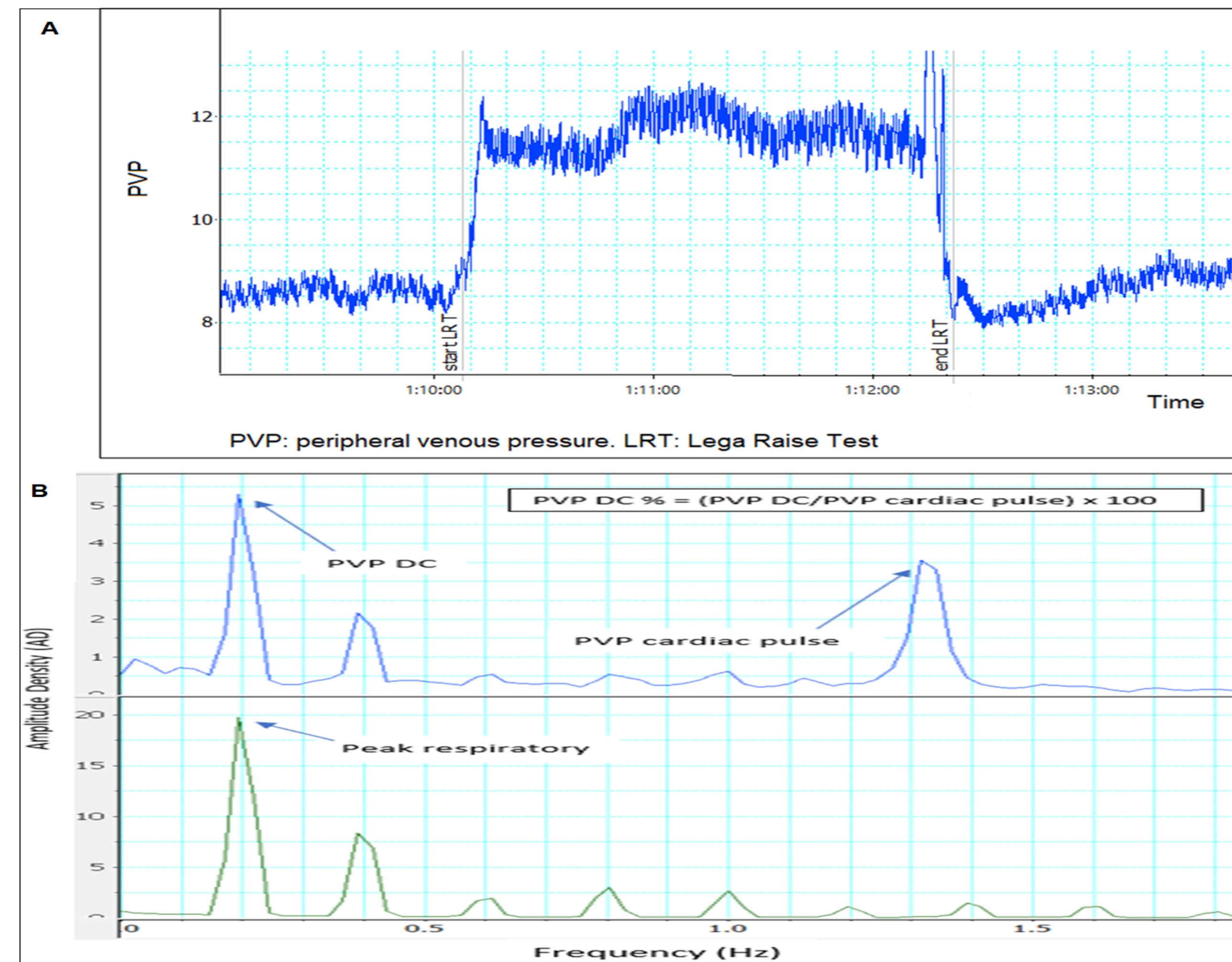


Fig 1:A) PVP waveforms during LRT B) Frequency analysis of PVP waveforms

### Methodology

- EKG, BP monitor, and NICOM (Cheetah Medical, MA, USA) were used to measure Thoracic Fluid Content (TFC).
- PVP waveform was analyzed using time domain analysis (mean PVP value) and frequency analysis (spectrum, 2K, Hamming, Amplitude Density (AD), 93.75% overlap) with LabChart 7.3.7 (ADInstruments) as shown in (figure 1-B).

### Results

- According to the PVP waveforms analysis, from the baseline to the PLR test, the mean PVP and TFC significantly increased by 48% and 1% respectively, while the DC% PVP decreased significantly by 2%.
- However, from the PLR test to -30 mmHg, the mean PVP and TFC significantly decreased by 50% and 6% respectively, while the DC% PVP significantly increased by 109%, as shown in figure 2 and 3.

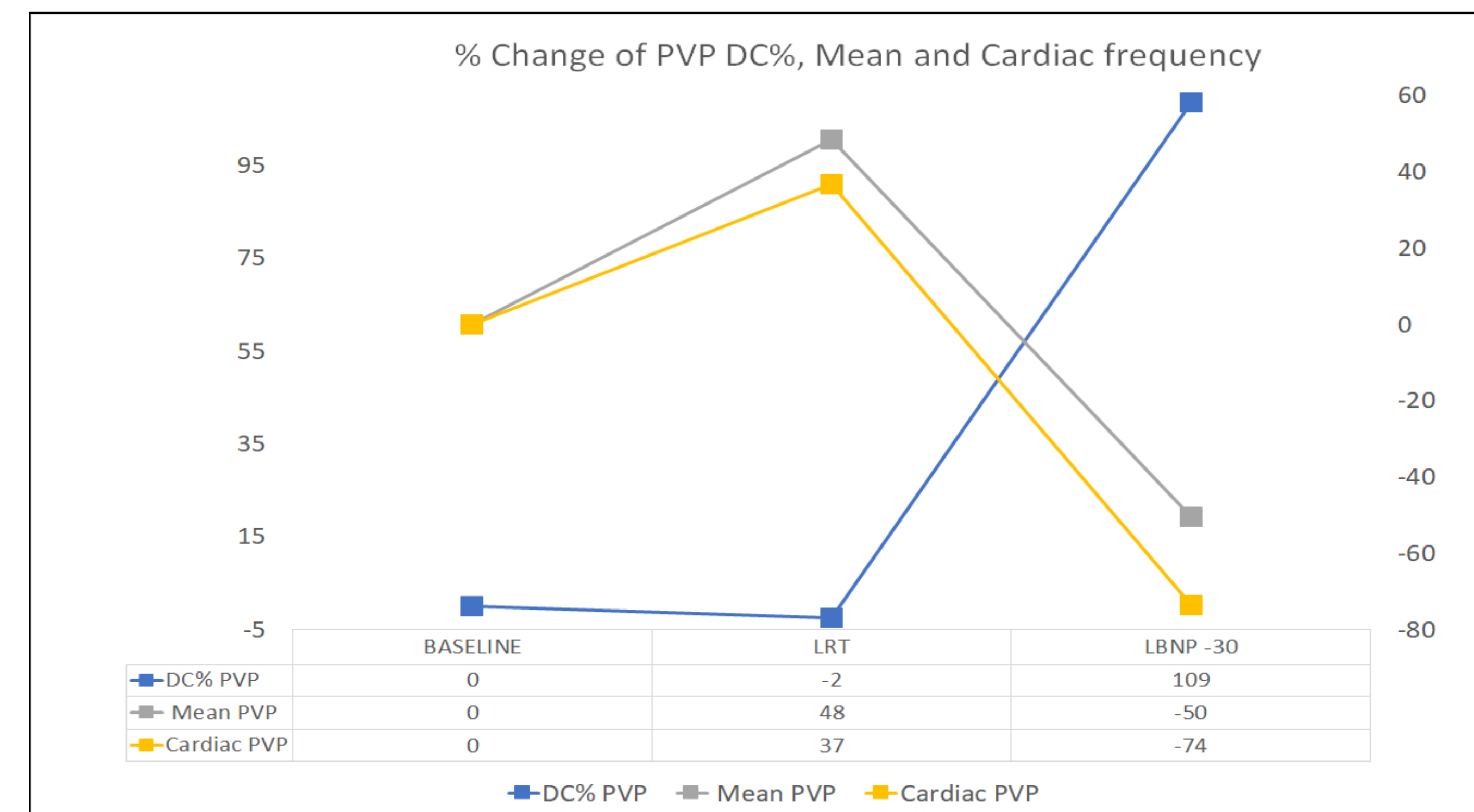


Fig 2: %Change of PVP DC%, Mean PVP and PVP Cardiac frequency

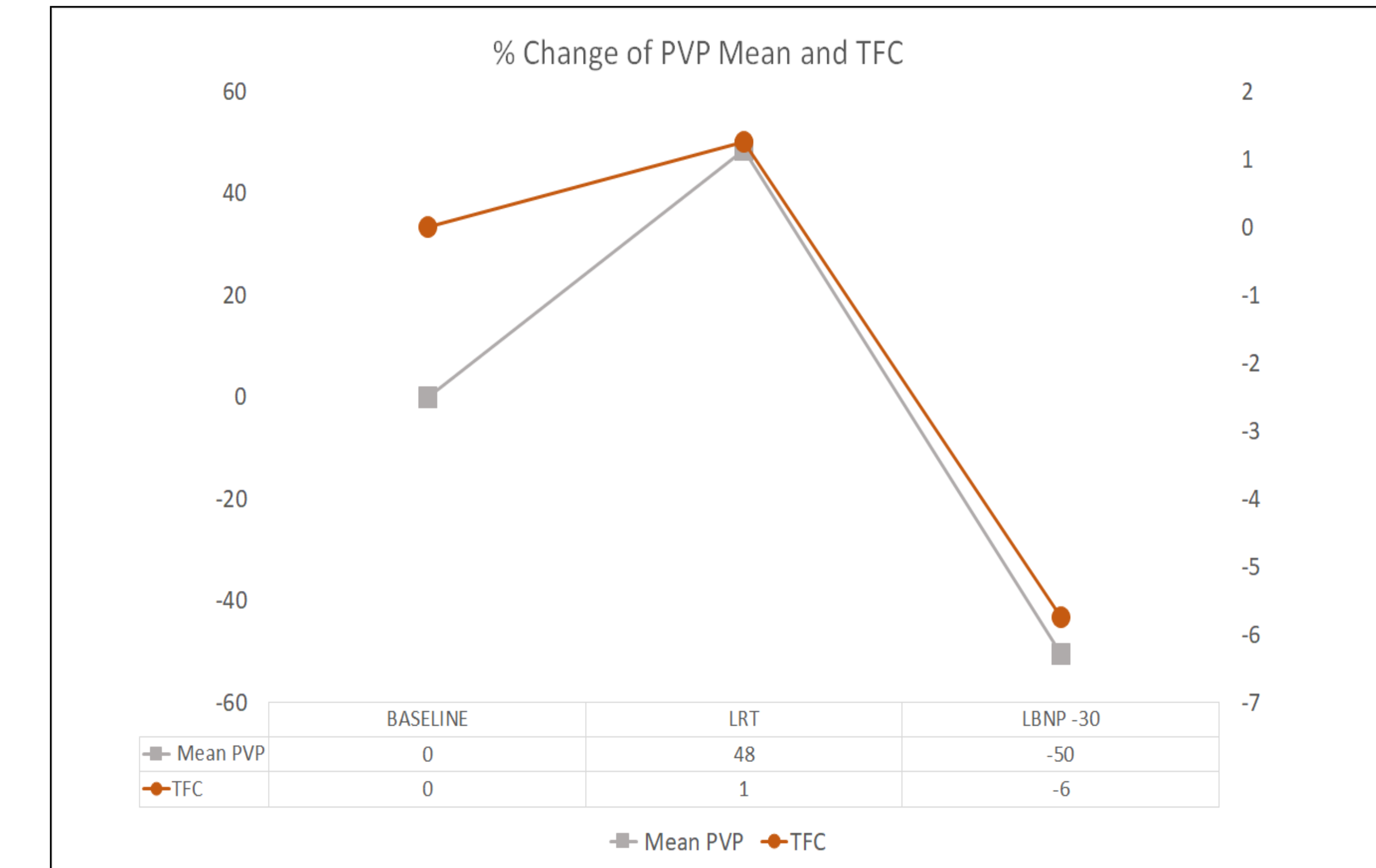


Fig 3: %Change of mean PVP and TFC

### Conclusion

- Transient PLR testing resulted in increased preload, which led to an increase in total fluid content and was reflected as an increase in Mean PVP at the peripheral and a reduction in the PVP DC%.
- During mild hypovolemia, then PVP DC% increased, while mean PVP and TFC decreased. These results have demonstrated the potential of using the PVP waveform as a clinical tool for monitoring changes in blood volume.

### References

- Duus, N., et al. Journal of Critical Care, 30(1). 2014