

# RIGHT VENTRICULAR VS LEFT BUNDLE BRANCH PACING-INDUCED CHANGES IN ECG DEPOLARIZATION AND REPOLARIZATION

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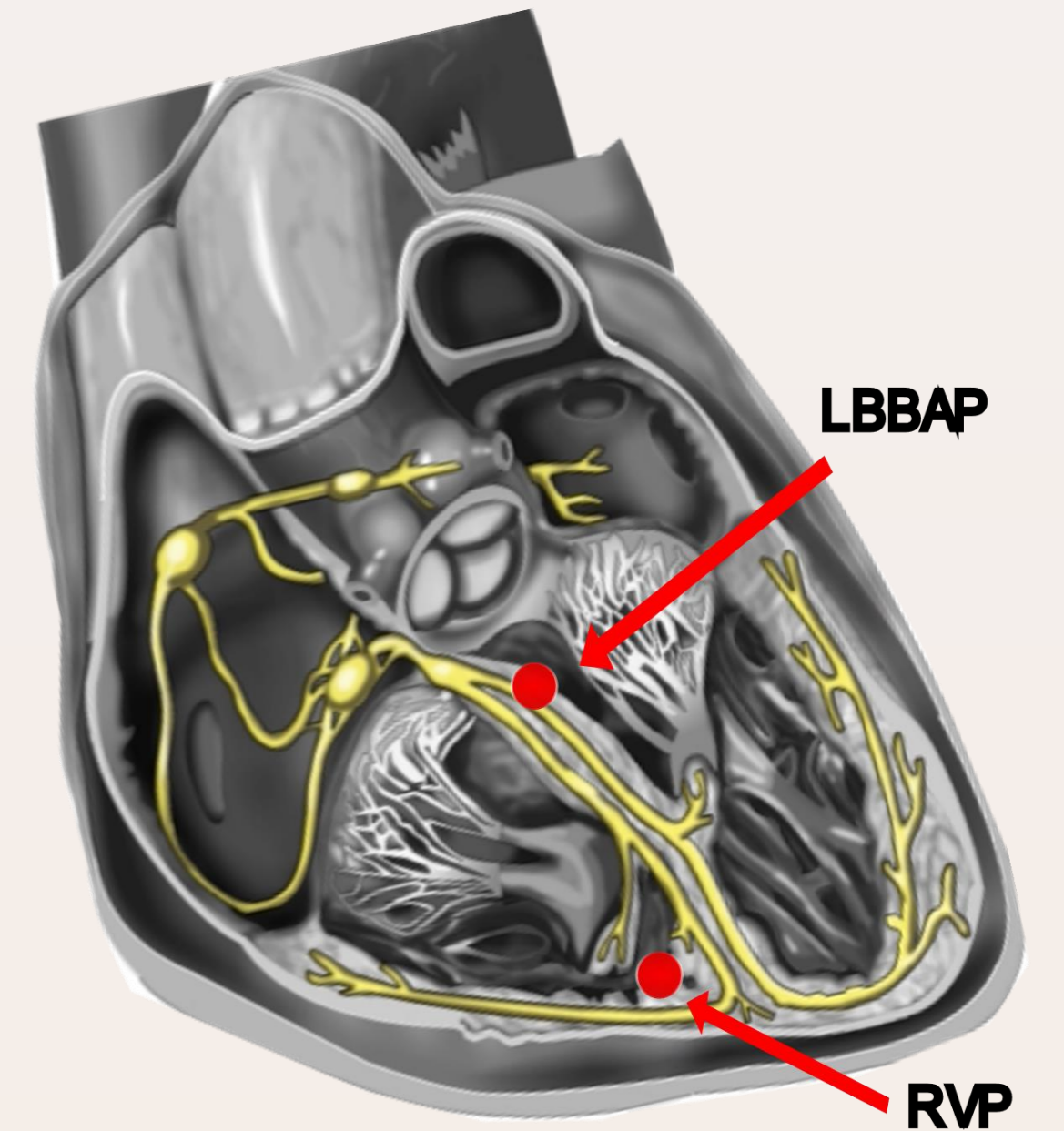
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## INTRODUCTION

- Right ventricular pacing (RVP) has been conventionally used in patients with indication for cardiac pacemaker implantation as anti-bradycardia therapy. However, RVP can cause ventricular dyssynchrony and lead to increased risk of heart failure and atrial fibrillation<sup>1</sup>.
- Left bundle branch area pacing (LBBAP) has come up as a novel and more physiological pacing form with improved feasibility and safety<sup>2</sup>.

**OBJECTIVE:** Evaluate ECG depolarization and repolarization indexes in RVP and LBBAP, and compare the changes in those ECG indexes induced by RVP and LBBAP.

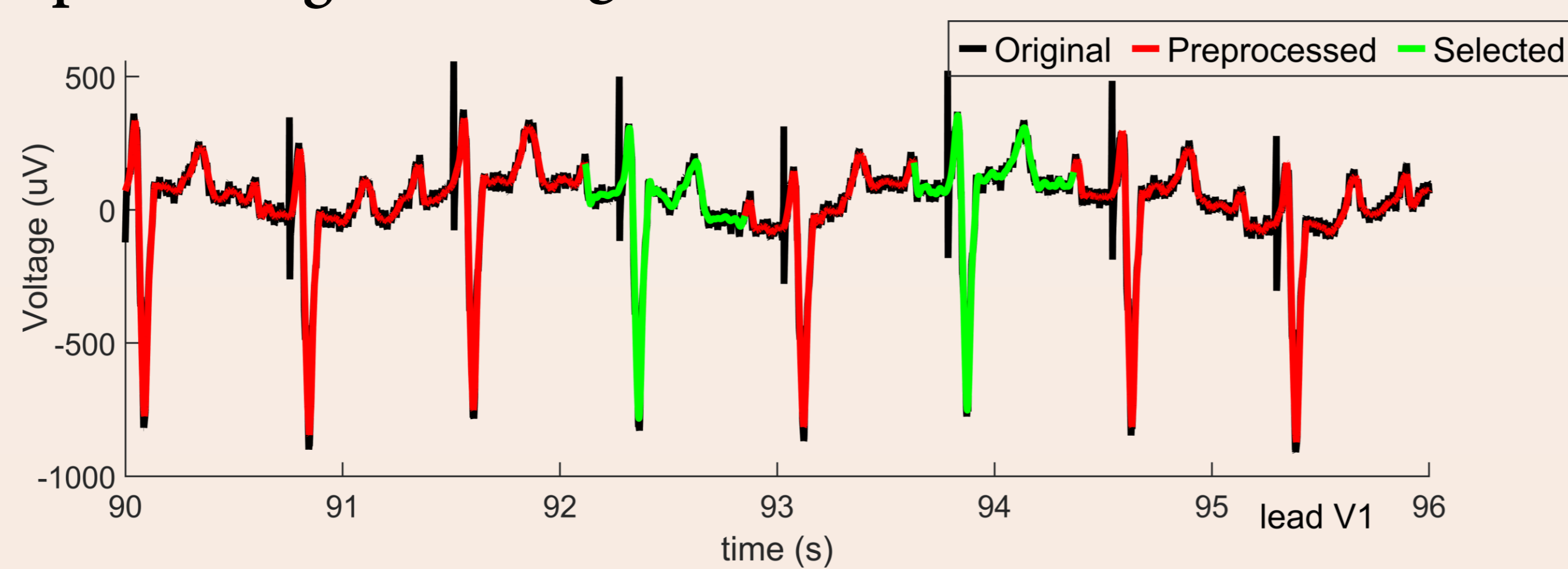


## METHODS

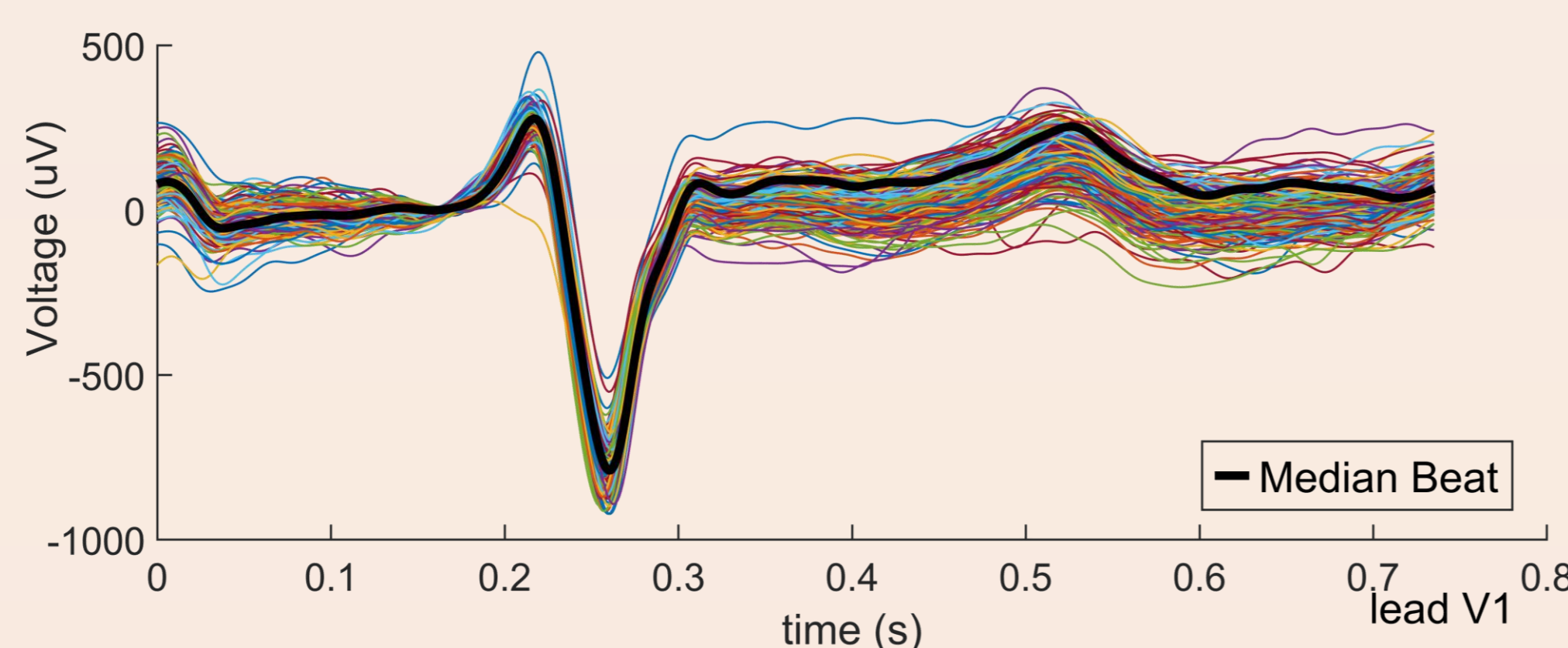
### Data

- 55 patients (33 LBBAP, 22 RVP)
- Standard 12-lead ECG recordings: at baseline (10 min) and after 24 hours of continuous RVP or LBBAP (1 hour)

- 1 Signal preprocessing
- 2 Beat segmentation
- 3 Heart rate-based beats selection

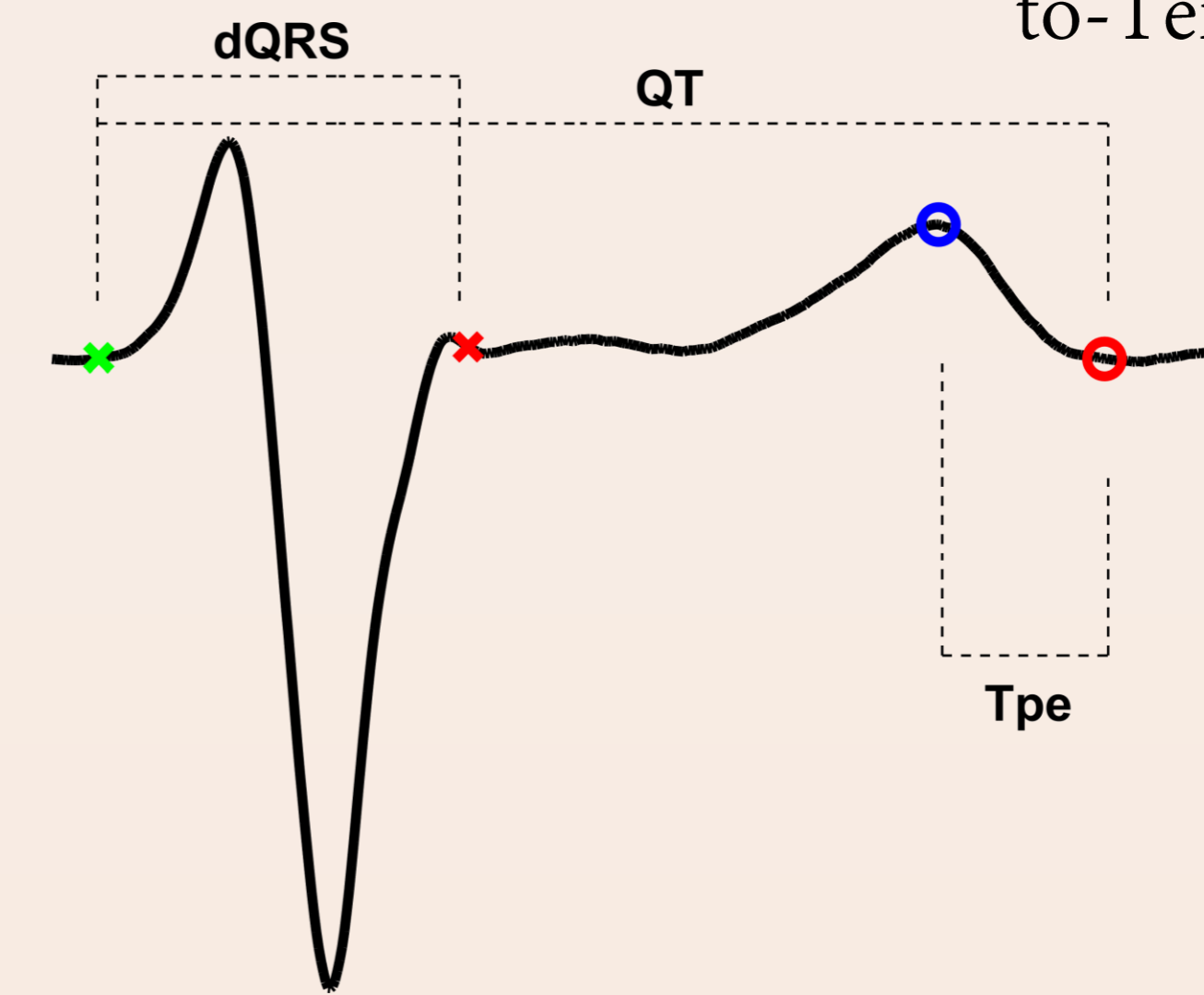


### 4 Median beat calculation



### 5 ECG indexes calculation

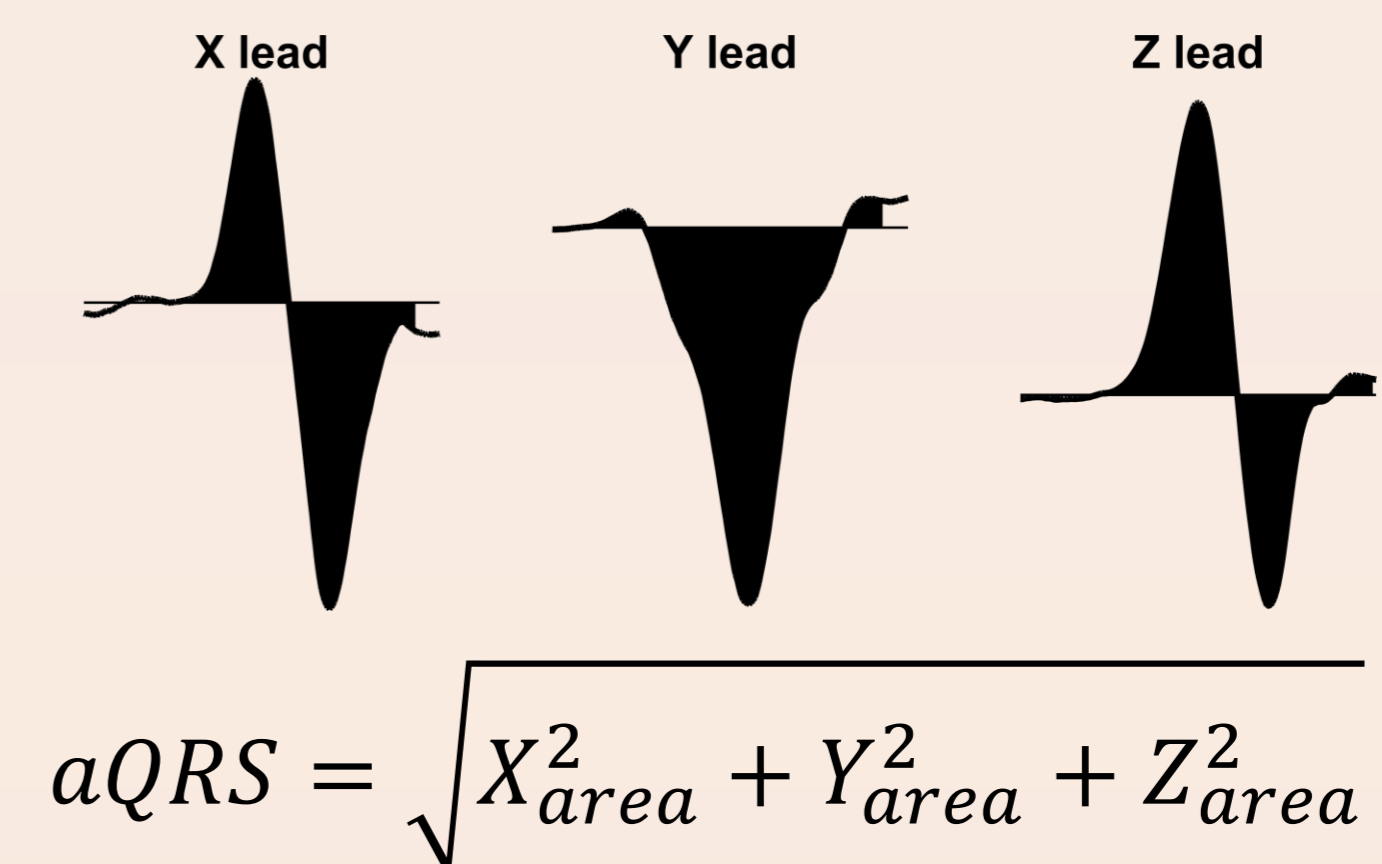
- RR: heart rhythm (ms)
- dQRS: QRS duration (ms)
- aQRS: area QRS (uVs)
- QTc: heart-rate corrected QT interval (ms)
- Tpec: heart-rate corrected Tpeak-to-Tend interval (ms)



Fridericia correction:

$$QT_c = QT / \sqrt[3]{RR}$$

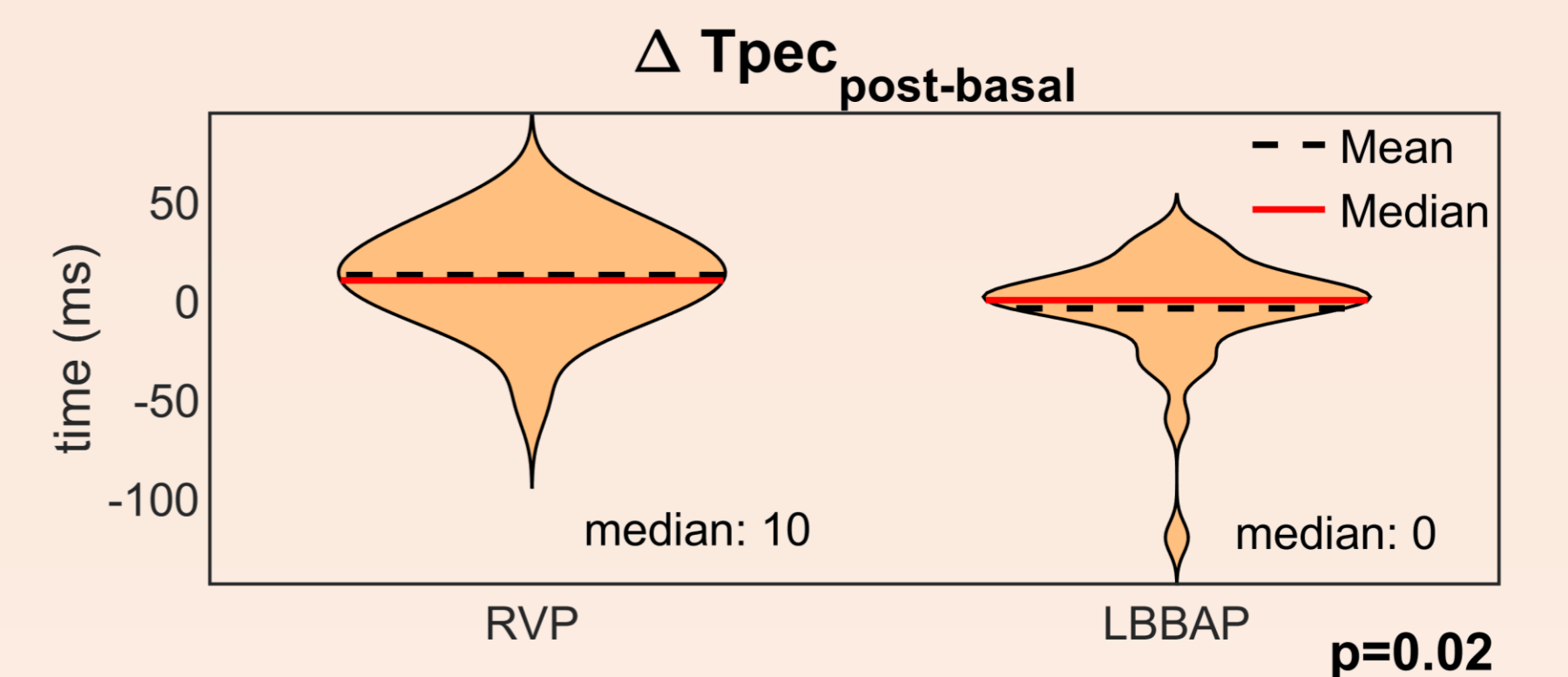
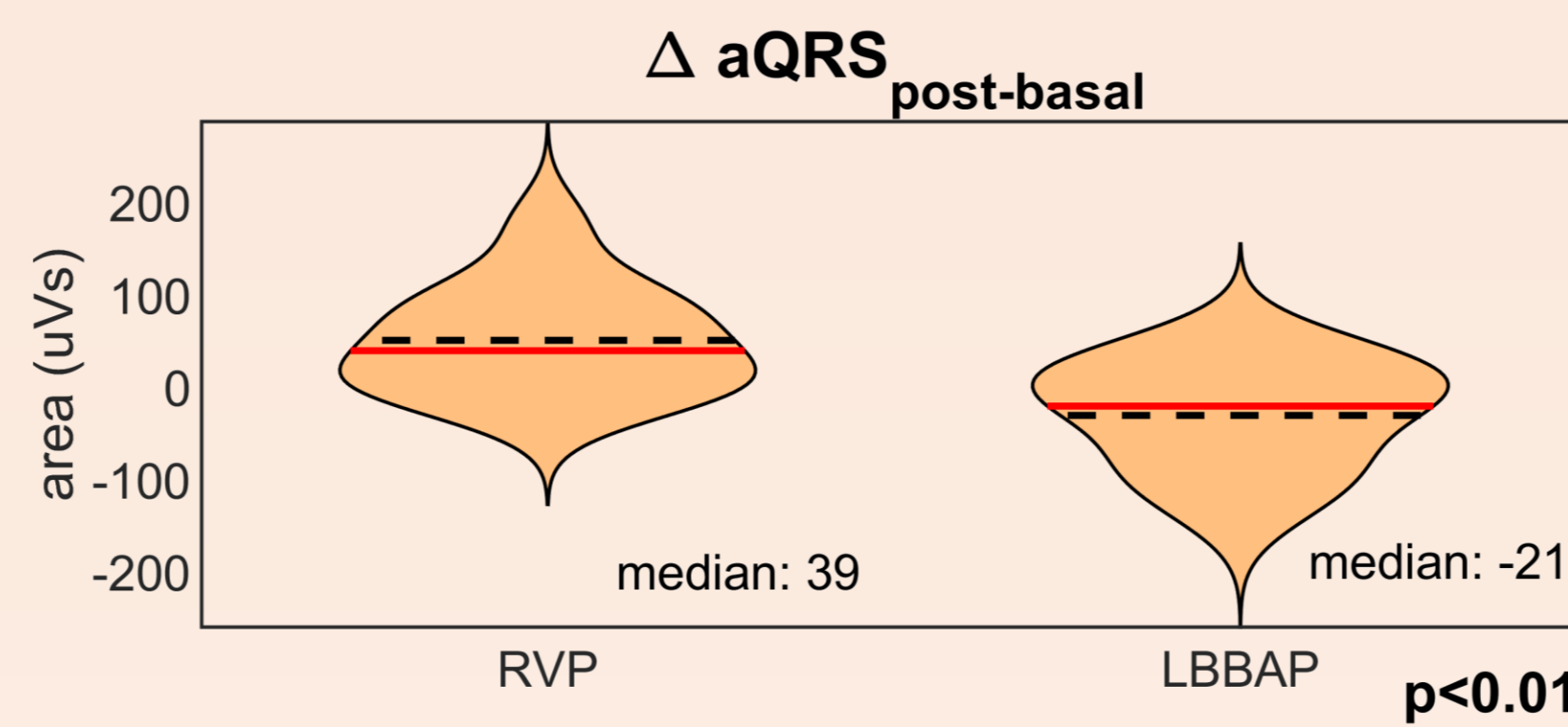
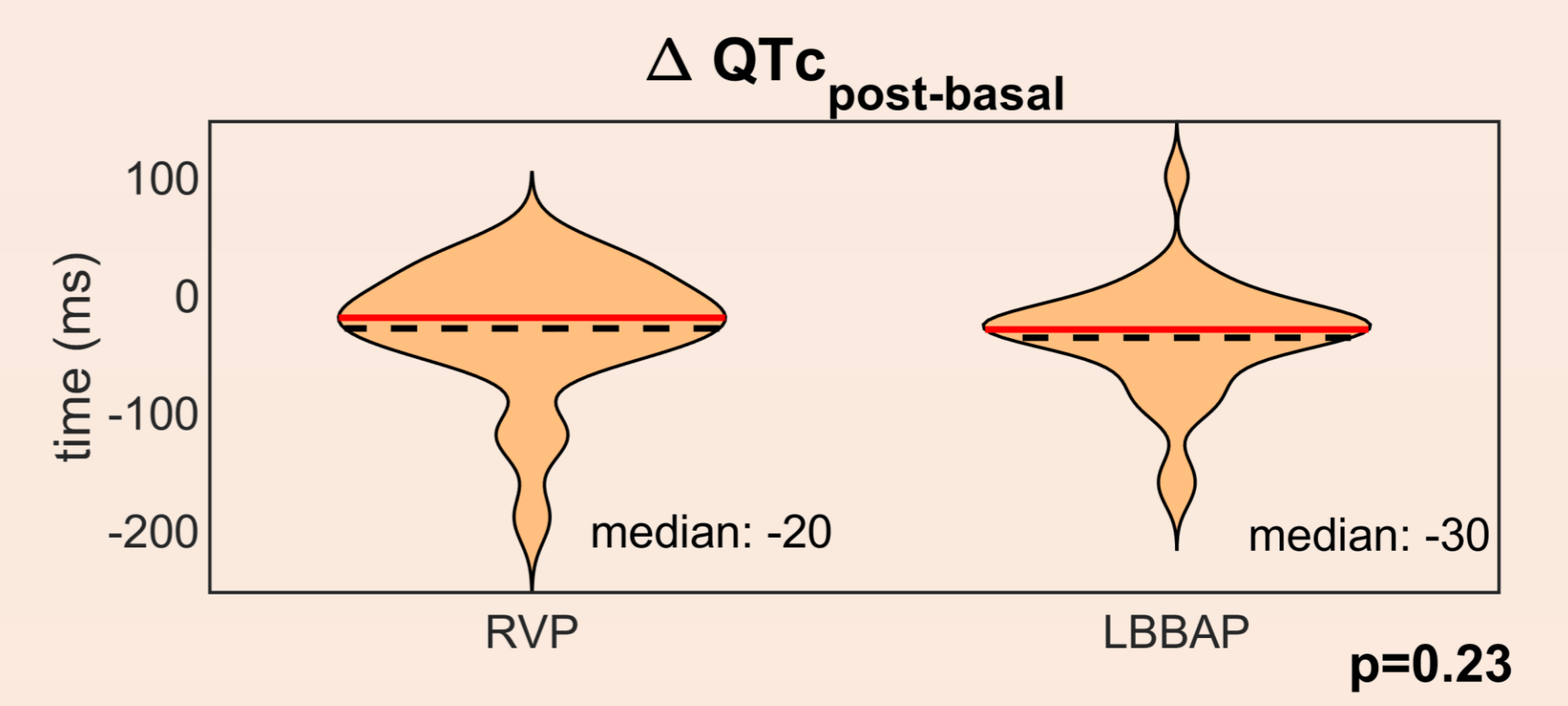
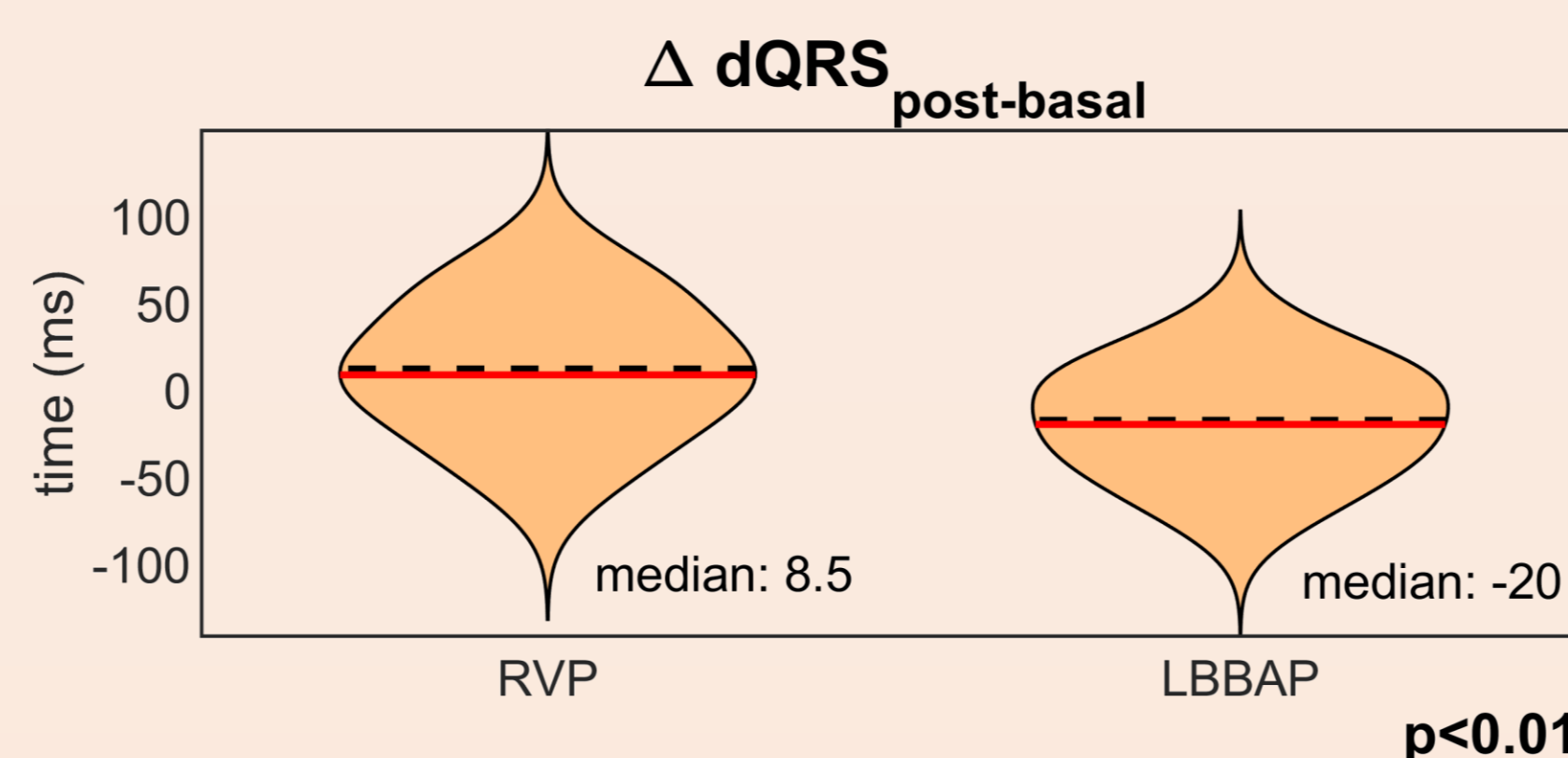
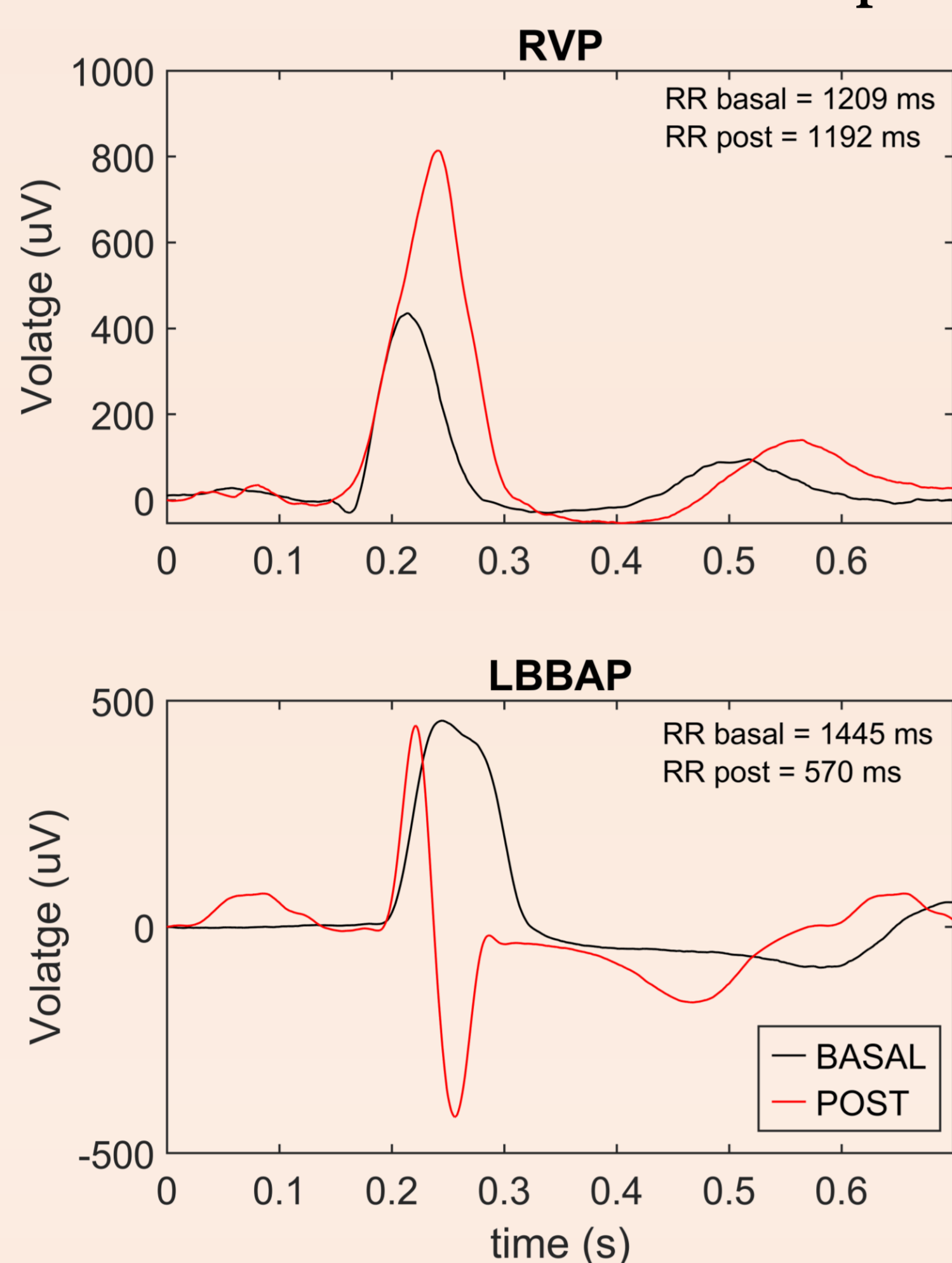
$$Tpe_c = Tpe / \sqrt[3]{RR}$$



$$aQRS = \sqrt{X_{area}^2 + Y_{area}^2 + Z_{area}^2}$$

## RESULTS

### Patient median beat examples



• dQRS and aQRS are significantly reduced by LBBAP while they increase with RVP.

• QTc is reduced by both RVP and LBBAP.  
• Tpec is increased by RVP but reduced by LBBAP.

## CONCLUSIONS

- dQRS, aQRS and Tpec are significantly reduced when using LBBAP instead of RVP.
- LBBAP leads to more synchronized ventricular depolarization and shorter heart rate-corrected repolarization intervals than RVP.

## REFERENCES

1. Lamas GA, Lee KL, Sweeney MO, et al. DOI:2002;346:1854–1862.
2. Chen K, Li Y, Dai Y, et al. DOI: 2019;21:673–680.