

**3D QRS AREA CALCULATION FROM X, Y, Z VECTORCARDIOGRAPHIC LEADS: AREA SUBTENDED BY NEGATIVE DEFLECTIONS SHOULD BE ADDED AND NOT SUBTRACTED**



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**Background**

- 3D QRS area is a novel ECG measure of left ventricular electrical dyssynchrony that has been shown to strongly predict response to cardiac resynchronization therapy<sup>(1-4)</sup>. It is a surrogate for the instantaneous absolute 3D QRS voltage time integral (VTI<sub>QRS-3D</sub>).
- Different groups have calculated the 3D QRS area using two different methods, either taking the sum or the difference of areas subtended by positive and negative deflections in orthogonal ECG leads (Panel A)<sup>(1-5)</sup>.

**Main Findings**

1. The summation method consistently estimated VTI<sub>QRS-3D</sub> ( $\beta$  0.94,  $r^2$  0.99), whereas the difference method was an inconsistent underestimate ( $\beta$  0.76,  $r^2$  0.67).
2. Mean 3D QRS area with the summation method was  $36.5 \pm 13 \mu\text{Vs}$  and with the difference method was  $25.7 \pm 13 \mu\text{Vs}$ .

**Conclusion**

3D QRS area calculation by summation as opposed to difference of areas subtended by positive and negative deflections in X, Y, Z leads is a more reliable surrogate for the absolute 3D voltage time integral.

**References**

**Disclosures**

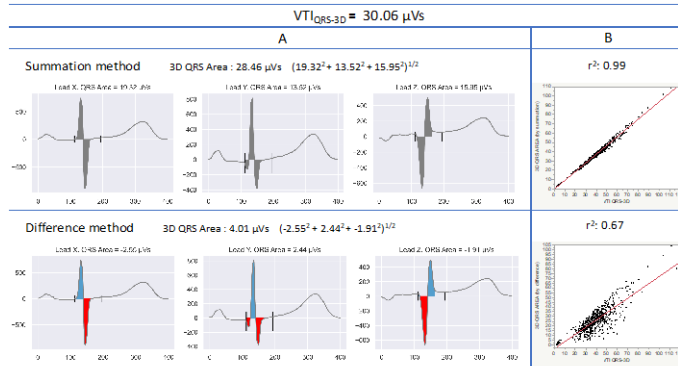
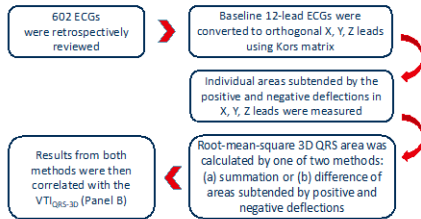


Nothing to disclose.

**Research Question**

It is unknown which calculation method is a more reliable surrogate for the absolute 3D voltage time integral.

**Methods and Materials**



KU is an EO/AA institution.

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