

QRS 3D VOLTAGE TIME INTEGRAL (3D QRS AREA) IN HEALTHY SUBJECTS



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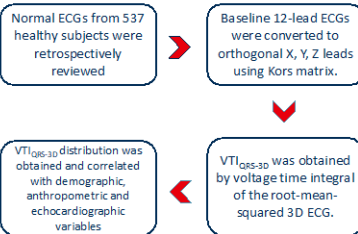
Background

- VTI_{QRS-3D} is a novel marker of left ventricular electrical dyssynchrony.
- It is the instantaneous absolute 3D ECG voltage integrated over the duration of QRS, also measured as 3D QRS area.
- Recent literature has evaluated 3D QRS area in context of heart failure and cardiac resynchronization therapy, where it performs superiorly to either QRS duration or voltage⁽¹⁻⁴⁾.

Research Question

The distribution of VTI_{QRS-3D} in healthy subjects is unknown.

Methods and Materials



Main Findings

1. Mean VTI_{QRS-3D} in healthy subjects was **$39 \pm 9 \mu V s$** .
2. VTI_{QRS-3D} was **lower** in women ($36 \pm 9 \mu V s$ vs. $43 \pm 9 \mu V s$ in men)
3. VTI_{QRS-3D} **decreased** with increasing age ($0.14 \mu V s$ per year)
4. VTI_{QRS-3D} **decreased** with increasing BMI ($0.19 \mu V s$ per kg/m^2) and increased with increasing left ventricular internal dimensions (Table).

Conclusion

We describe for the first time the distribution of VTI_{QRS-3D} in healthy subjects with normal ECG. It remains to be seen if automated calculation of VTI_{QRS-3D} can add value to routine ECG.

Table

Table. Study population and distribution of 3D QRS voltage time integral

Variable	n	Mean \pm SD or %	VTI_{QRS-3D} $\mu V s$ Mean \pm SD or β -coefficient	p-value
Overall	537		39 ± 9	
Age, years		40 ± 19	-0.14	<0.0001
0-18	83		42 ± 9	
19-65	401		38 ± 9	
>65	52		35 ± 9	
Sex				<0.0001
Male	203	38%	43 ± 9	
Female	334	62%	36 ± 9	
Race				0.09
White	334	62%	38 ± 9	
Black	84	16%	39 ± 9	
Asian	21	4%	37 ± 9	
Other/unknown	98	18%	40 ± 10	
Body surface area, m²	537	1.72 ± 0.45	-0.33	0.72
Body mass index, kg/m²	534	25.1 ± 6.1	-0.19	0.004
Echocardiography				
LVIDd, cm	133	4.4 ± 0.6	4.6	0.0009
LVIDs, cm	133	2.8 ± 0.5	5.7	0.001
LVEF, %	130	60 ± 3	-0.41	0.08

LVEF, left ventricular ejection fraction; LVIDd, left ventricular internal dimension in diastole; LVIDs, left ventricular internal dimension in systole; VTI, voltage time integral

References



Disclosures

Nothing to disclose