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| **Data Set name :** | MESAe1a345\_GEH\_ECG\_20200214 |
| **PI Contact :** | Larisa Tereshchenko |
| **PI Contact Information :** | tereshch@ohsu.edu |

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| Variable | Variable Label | Units |
| idno | MESA Participant ID |  |
| seq1 | Sequence |  |
| medianbeattype1 | The type of median beat (see below) |  |
| peakqrstangle1 | Peak QRS-T angle | degrees |
| areaqrstangle1 | Area QRS-T angle | degrees |
| peakqrsazimuth1 | Peak QRS azimuth | degrees |
| areaqrsazimuth1 | Area QRS azimuth | degrees |
| peaktazimuth1 | Peak T azimuth | degrees |
| areatazimuth1 | Area T azimuth | degrees |
| peaksvgazimuth1 | Peak spatial ventricular gradient (SVG) azimuth | degrees |
| areasvgazimuth1 | Area SVG azimuth | degrees |
| peakqrselevation1 | Peak QRS elevation | degrees |
| areaqrselevation1 | Area QRS elevation | degrees |
| peaktelevation1 | peak T Elevation  | degrees |
| areatelevation1 | area T Elevation  | degrees |
| peaksvgelevation1 | peak SVG Elevation  | degrees |
| areasvgelevation1 | area SVG Elevation  | degrees |
| peakqrsmagnitude1 | peak QRS Magnitude | microvolt (µV) |
| areaqrsms1 | QRS-loop area | µV\*ms |
| peaktmagnitude1 | peak T Magnitude on vector magnitude | microvolt (µV) |
| areatms1 | T-loop area | µV\*ms |
| peaksvgmagnitude1 | peak SVG Magnitude | microvolt (µV) |
| aucofqtvectormagnitudems1 | AUC of QTVectorMagnitude (iVMQT) | µV\*ms |
| wilsonsvgms1 | Wilson SVG | µV\*ms |
| rrinterval\_ms1 | RR interval | ms |
| saiqrst1 | Sum Absolute QRST Integral (SAI QRST) |  |
| noofbeats1 | Number of Beats |  |
| noofbeatsinmedian1 | Number of beats included in Median Beat |  |

**Citations:**

Perez-Alday, E.A., Bender, A., German, D., Mukundan, S.V., Hamilton, C., Thomas, J.A., et al. (2019). Dynamic predictive accuracy of electrocardiographic biomarkers of sudden cardiac death within a survival framework: the Atherosclerosis Risk in Communities (ARIC) study. BMC Cardiovasc Disord 19(1), 255. doi: 10.1186/s12872-019-1234-9.

Contact: Larisa Tereshchenko: tereshch@ohsu.edu. [www.tereshchenkolab.org](http://www.tereshchenkolab.org)

Matlab code: <https://github.com/Tereshchenkolab/Global-Electrical-Heterogeneity>

# Type of median beat:

**N**= Normal sinus

**A**= Ectopic Atrial origin (premature atrial complex, PAC)

**J**= Junctional

**S**= Supraventricular (atrial fibrillation/atrial flutter)

**O**= Atrial Paced

**B**= V-paced PAC

**V**= Ectopic Ventricular origin (premature ventricular complex, PVC)

**P**= Ventricular Paced

**R**= both atrial and ventricular paced

**F**= Fusion (ventricular-paced + spontaneously activated QRS)

**I**= Intermittent Bundle Branch Block

**X**= Artifact but identifiable R-peak (noisy Normal sinus)

**Z**= Normal sinus beats before & after pause (AV, SA block)

**W**= Premature Atrial Complex (PAC) with Aberrant ventricular conduction

**NV**= Normal sinus beat after PVC (If there are two letters it means the first letter is the dominant beat.)

**NA=** Normal sinus beat after PAC (If there are two letters it means the first letter is the dominant beat.)

***Spatial peak QRS and T vectors***

Spatial peak QRS and T vectors connected origin point with the furthest points away from the origin point in the QRS-loop and T-loop, respectively.

 (A.1)

 (A.2)

 (A.3)

 (A.4)

Azimuth, elevation, and magnitude of spatial peak T vector were calculated:

 (A.5)

 (A.6)

 (A.7)

 (A.8)

***Spatial area QRS and T vectors***

Spatial area QRS and T vectors were calculated using equations, provided below.

Azimuth, elevation, and magnitude of spatial area QRS vector were calculated:

 (A.9)

 (A.10)

 (A.11)

Azimuth, elevation, and magnitude of spatial area T vector were calculated:

Spatial (A.12)

 (A.13)

 (A.14)

***Spatial ventricular gradient vectors:***

Magnitude and direction of spatial area (Wilson’s) and peak SVG vectors were measured.

 (A.15)

 (A.16)

 (A.17)

 (A.18)

 (A.19)

 (A.20)

Wilson’s SVG was also calculated:

 (A.21)

**The scalar value of SVG**

* Can be calculated as a QT integral on Vector Magnitude signal (iVMQT), as an area under the Vector Magnitude signal curve from the QRS-onset to T-offset.

 (A.22)

* Can be calculated as a sum absolute QRST integral (SAI QRST) on X, Y, and Z leads.

 (A.23)

***Spatial QRS-T angles:***

Spatial peak QRS-T angle was calculated as the 3-dimensional angle between the spatial peak QRS vector and the spatial peak T vector:

 (A.24)

Spatial area QRS-T angle was calculated as the 3-dimensional angle between the spatial area QRS vector and the spatial area T vector:

 (A.25)