LETTERS TO THE EDITOR

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Is the T-wave alternans magnitude in apparently healthy subjects and in different subsets of patients with ischaemic heart disease T-wave amplitude dependent?

It has been established that T-wave alternans (TWA) is heart rate dependent. Also it has been previously hypothesized that TWA magnitude (TWA-MG) may be T-wave amplitude (TW-AMP) dependent.1 Such a speculation is supported by the variation in the TWA-MG in different electrocardiogram (ECG) leads of the same subject, the larger TWA-MG in the ECG precordial among the ECG leads, which are characterized by larger TW-AMP, and the larger TWA-MG in ECGs of patients with bundle branch blocks with large secondary T waves, than in the ones with normal intraventricular conduction. If this hypothesis proves to be valid, adjustment of the different TWA-MG values in a single ECG by the corresponding TW-AMP is in order. Also such adjustment of TWA-MG in serial ECGs or in different parts of ambulatory ECGs in the same subject could be implemented, considering the intra-subject temporal variation of TWA-MG, a common encounter. The contribution by Mollo et al., published ahead of print in the journal on 8 September 2011, may contain data which could shed light on this still unresolved issue.2 The authors measured TWA during exercise stress testing (EST), employing the modified moving average method in 729 consecutive healthy people and patients with ischaemic heart disease (IHD) using either all 12 ECG leads or the 5 ECG precordial leads only and showed that in healthy people, TWA_tot and TWA_prec were ≤75 and ≤65 μV, respectively, in 95% of subjects, and in IHD patients TWA-MG was higher than the one of healthy individuals.

T-wave alternans amplitude varies among ECG leads in both healthy subjects and patients with IHD. The authors employed in their study patients with IHD with different response to the EST, and with and without old and acute myocardial infarction (MI). In such a diverse population one should expect a large spectrum of TW-AMP in both TWA_tot and TWA_prec. This provides the opportunity to evaluate whether there were inter-individual or intra-individual relationships in the TWA-MG and TW-AMP. Of particular interest would be the intra-individual relationships in the TWA-MG and TW-AMP. Variation in the TWA-MG among ECG leads have been previously noted in patients with previous MI and regional myocardial contraction abnormalities, with the ECG leads reflecting infarcted regions or those with hypokinesis/akinesis, showing larger TWA-MG.3 However in patients with IHD, without MI, or regional myocardial contraction abnormalities, or healthy subjects, a true TWA-MG/TW-AMP relationship could be evaluated. Was there such a relationship among ECG leads found in such patients? Since the authors measured TWA over the entire J–T ECG interval, and the TWA value is calculated as the maximal difference between the averages of odd and even beats along one of the J–T-segment sampled points in any lead, an association of TWA-MG and the corresponding T waves could be sought using the amplitude of the larger (positive or negative) point from the J–T interval from where the TWA-MG was calculated, in addition to the crude approach of adjusting by the corresponding TW-AMP. The study population with the inclusion of apparently healthy subjects and four classes of patients with IHD provides a marvelous opportunity for exploring the TWA-MG/TW-AMP relationship. Finally, and to use two statements of the authors verbatim, ‘This second measure was performed because T wave is often better identifiable in the pre-cordial rather than in the peripheral leads’ and ‘Our data show that, when considering in the normal range values below the 95th percentile of the distribution in apparently healthy people, TWA 75 mV and TWA 65 mV can be seen as “abnormal” when all ECG leads or the pre-cordial leads are only taken into account, respectively’, appears as a contradiction. How come when the pre-cordial leads are only taken into account ‘yield lower TWA-MG’?

References

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Is the T-wave alternans magnitude in apparently healthy subjects and in different subsets of patients with ischaemic heart disease T-wave amplitude dependent? Reply to the letter by J.E. Madias

We thank Dr Madias for his interest in our study on the distribution of T-wave alternans (TWA) magnitude in apparently healthy subjects and in patients with ischaemic heart disease.1 In his letter, Dr Madias suggests that TWA magnitude might depend on T-wave amplitude, a very interesting hypothesis that he has been proposing for some years, raising the possibility that adjusting TWA magnitude for T-wave amplitude might result in a TWA index able to improve the diagnostic and prognostic yield of the method.2–4

To address the issue raised by Dr Madias, we have analysed the exercise stress test electrocardiograms (ECGs) of a random sample of 175 subjects enrolled in our study, including 106 apparently healthy individuals and 69 patients with documented ischaemic heart disease (IHD). T-wave amplitude in the lead where maximal TWA magnitude was detected has manually been measured as the amplitude from isoelectric line (PR point) to T-wave peak.

Spearman correlation analyses showed, in fact, an association between T-wave...