

Letter to the Editor  
European Journal of Heart Failure

**Title**

**Microvolt T-wave alternans testing should be used to guide arrhythmic therapy in heart failure patients**

**Authors**

Stefan H. Hohnloser, M.D.  
Department of Cardiology  
Division of Electrocardiology  
J.W. Goethe University  
Frankfurt, Germany

Richard J. Cohen, M.D., Ph.D.  
Harvard-MIT Division of Health Sciences and Technology  
Massachusetts Institute of Technology  
Cambridge, Massachusetts  
Email: [rjcohen@mit.edu](mailto:rjcohen@mit.edu)  
Telephone: 617-253-7430  
Fax: 617-253-3019

Jackson et al<sup>1</sup> reported on a cohort of heart failure patients and concluded that microvolt T-wave alternans (MTWA) testing has limited utility in this population. Of note, this assessment was made in the complete absence of any outcomes data. The authors base their assessment on the fact that they deemed 318 of 648 patients to be ineligible for MTWA testing. The ineligibility was primarily attributable to the 38% incidence of atrial fibrillation which they reported while noting that this incidence was substantially higher than the 23% incidence reported in two earlier studies. Seventy-six patients were deemed ineligible for MTWA testing due to inability to exercise or continuous ventricular pacing. The authors ignored the availability of pharmacologic and pacing protocols to test this latter group of patients. Moreover, patients who cannot exercise on a treadmill often are able to elevate their heart rate adequately for MTWA testing (over 105 bpm) by means of isometric exercise or stepping in place.

The authors also reported a 46% indeterminacy rate which is much higher than that reported for similar patients in recent studies (for example 12%<sup>2</sup> and 21%<sup>3</sup>). Of note, Jackson et al<sup>1</sup> did not follow the recommended procedure of repeating the MTWA test in all patients who initially tested indeterminate, but repeated the test only in patients who were indeterminate due to excessive noise. Repeating the MTWA test in all patients who initially test indeterminate has been found to reduce the indeterminacy rate by 59%<sup>2</sup>. Of note, in the LVEF  $\leq$  35% population, a properly conducted MTWA test with an indeterminate result confers at least as high a risk of sudden cardiac death as a positive test (see below).

While MTWA testing is not currently suitable for patients in atrial fibrillation, for the remaining patients with heart failure MTWA testing is a simple highly predictive non-invasive test. Merchant et al<sup>4</sup> reported in a recent pooled analysis that of 1004 patients with ejection fraction  $\leq$  35%, 40% tested positive, 21% indeterminate, and 39% negative. The corresponding annual rates of sudden cardiac death (SCD) were 4.0%, 4.6% and 0.9%. No study has shown a benefit for ICD therapy in a population with an annual SCD rate anywhere close to 0.9%. ICD implantation itself is associated with an in-hospital mortality of 1% and a high rate of subsequent complications<sup>5</sup>. Moreover, ICD therapy confers a mortality benefit only in patients with a non-negative MTWA result and not in patients with a negative result<sup>6</sup>.

MTWA testing can be used as a reliable tool to guide arrhythmic therapy in heart failure patients.

## References

1. Jackson CE, Myles RC, Tsorlalis IK, et al. Profile of microvolt T-wave alternans testing in 1003 patients hospitalized with heart failure. *Eur J Heart Fail* 2012;14:377-86.
2. Chow T, Kereiakes DJ, Onufer J, et al. Does microvolt T-wave alternans testing predict ventricular tachyarrhythmias in patients with ischemic cardiomyopathy and prophylactic defibrillators? The MASTER (Microvolt T Wave Alternans Testing for Risk Stratification of Post-Myocardial Infarction Patients) trial. *J Am Coll Cardiol* 2008;52:1607-15.
3. Salerno-Uriarte JA, Pedretti RF, Tritto M, De Ferrari GM, Klersy C, Sallusti L. The ALPHA study (T-wave alternans in patients with heart failure): rationale, design and endpoints. *Ital Heart J* 2004;5:587-92.

4. Merchant FM, Ikeda T, Pedretti RF, et al. Clinical Utility of Microvolt T-wave Alternans Testing In Identifying Patients at High or Low Risk of Sudden Cardiac Death. *Heart Rhythm*;doi: 10.1016/j.hrthm.2012.03.014. Published online ahead of print 14 March 2012.
5. Reynolds MR, Cohen DJ, Kugelmass AD, et al. The frequency and incremental cost of major complications among medicare beneficiaries receiving implantable cardioverter-defibrillators. *J Am Coll Cardiol* 2006;47:2493-7.
6. Chow T, Saghir S, Bartone C, et al. Usefulness of microvolt T-wave alternans on predicting outcome in patients with ischemic cardiomyopathy with and without defibrillators. *Am J Cardiol* 2007;100:598-604.