MEDICAL POLICY

SUBJECT: MICROVOLT T-WAVE ALTERNANS	**EFFECTIVE DATE: 07/20/06** **REVISED DATE: 08/16/07, 07/17/08, 06/18/09, 05/27/10** **ARCHIVED DATE: 04/21/11** **EDITED DATE: 04/19/12, 04/18/13, 04/17/14, 03/19/15, 03/17/16, 03/16/17, 03/15/18**
POLICY NUMBER: 2.01.45 **CATEGORY: Technology Assessment**	**PAGE: 1 OF: 6**

- ***If a product excludes coverage for a service, it is not covered, and medical policy criteria do not apply.***
- ***If a commercial product, including an Essential Plan product, covers a specific service, medical policy criteria apply to the benefit.***
- ***If a Medicare product covers a specific service, and there is no national or local Medicare coverage decision for the service, medical policy criteria apply to the benefit.***

POLICY STATEMENT:

Based on our criteria and review of the peer-reviewed literature, T-Wave Alternans testing has not been proven to be medically effective and is considered **investigational** for all indications including, but not limited to, risk stratification for ventricular arrhythmias or identifying candidates for electrophysiologic testing or ICD implantation.

Refer to Corporate Medical Policy #2.01.02 regarding Signal Averaged Electrocardiogram (SAECG).

Refer to Corporate Medical Policy #11.01.03 Experimental and Investigational Services.

POLICY GUIDELINES:

The Federal Employee Health Benefit Program (FEHBP/FEP) requires that procedures, devices or laboratory tests approved by the U.S. Food and Drug Administration (FDA) may not be considered investigational and thus these procedures, devices or laboratory tests may be assessed only on the basis of their medical necessity.

DESCRIPTION:

Microvolt T-wave alternans (TWA) refers to a beat-to-beat variability in the amplitude and morphology of the ECG measurement of repolarization in the ST segment and T-wave. A routine electrocardiogram (EKG) cannot detect these small fluctuations, and thus this test requires specialized sensors to detect the fluctuations and computer algorithms to evaluate the results. T-wave alternans is a provocative test that requires gradual elevation of the heart rate to above 110 beats per minute. The test can be performed in conjunction with an exercise tolerance stress test. Test results are reported as the number of standard deviations by which the peak signal of the T-wave exceeds the background noise. This number is referred to as the "alternans ratio." An alternans ratio of 3 or greater is typically considered a positive result, an absent alternans ratio is considered a negative result, and anything in between is considered indeterminate.

The presence of T-wave alternans has been investigated as a risk factor-for ventricular arrhythmias or sudden cardiac death in patients with a history of myocardial infarction, congestive heart failure, or cardiomyopathy. Studies of T-wave alternans have focused on the predictive capability of this test for determining which patients are most likely to benefit from invasive electrophysiologic testing, to select patients for implantable cardioverter/defibrillator therapy (ICD), or as a means for adjusting cardiac pharmacotherapy. T-wave alternans has also been investigated as a diagnostic test for patients with syncope of unknown origin.

Recent primary prevention ICD trials (e.g., MADIT-II and SCD-HeFT) have changed the perspective on selection and risk stratification for use of implantable defibrillators. Given the results of these clinical trials, it is proposed that TWA testing could be a useful or efficient maneuver in improving identification of patients who benefit or do not benefit from ICD implantation.

RATIONALE:

The Heartwave™ Alternans Processing System (Cambridge Heart, Inc.) received 510(K) clearances in 2002 as a system to perform microvolt T-wave alternans (MTWA) testing.

Although T-Wave alternans has been studied as a technique of risk stratification for fatal arrhythmias and sudden cardiac death in patients with a history of MI, CHF, cardiomyopathy and other conditions, there are no clinical studies that conclusively demonstrate how this information can be used in the management of the patient. There are no randomized trials of either ICDs or antiarrhythmic therapy that have relied on the results of T-wave alternans as a patient selection criterion.

A June 2005 BCBS Association TEC Assessment evaluated the use of Microvolt T-wave alternans for two patient indications:

I. Patients eligible for ICD placement for primary prevention of sudden death, and
II. Patients who were not eligible for ICD placement.

The 2005 TEC Assessment noted that patients who have experienced a life-threatening arrhythmia are already at high risk and probably would not require T-wave alternans testing for consideration of ICD implantation (secondary prevention). Eighteen studies were identified using T-wave alternans to prospectively stratify the risk of a subsequent event (n=2,931). For patients who would not otherwise be eligible for ICD placement, TEC noted T-wave alternans would be used for its positive predictive value to select patients who might be at increased risk of VTE and possibly benefit from ICD. In nine studies that reported positive predictive value (PPV), values varied widely from 7 to 67%. In conclusion, TEC found the evidence is insufficient to determine whether the use of T-wave alternans improves net health outcome or whether it is as beneficial as any established alternative. Therefore, the use of T-wave alternans testing for risk stratifying patients being considered for ICD therapy for primary prevention of sudden death did not meet the TEC criteria.

A November 2006 BCBSA TEC Assessment reviewed a smaller number of studies directly relevant to the question of whether microvolt T-wave alternans (MTWA) can identify patients who would otherwise meet clinical indications for ICD therapy but whose risk of death is so low that they would not benefit from treatment. The critical piece of data is the absolute risk of arrhythmia or sudden death in those persons who have a negative T-wave alternans test, and whether it can be determined whether this risk is consistent with no potential benefit from ICD therapy. TEC concluded that the evidence is insufficient to establish what level of risk of events precludes benefit from ICD therapy. Although MTWA testing did risk-stratify patients in these studies, this may not translate to clinical utility, those with negative tests still had arrhythmic events and deaths. All-cause mortality for patients testing MTWA negative varied from 3.8% to 12.5% over 2 years, which was lower than for patients testing MTWA non-negative. Various arrhythmic event outcomes also varied between studies. Arrhythmic events varied from 0% to 5.7% over 2 years in MTWA negative patients, depending on the specific outcome studied. Given the lack of randomized clinical trials, the argument for use of MTWA testing to select patients who might not benefit from ICD therapy rests on two types of information - knowledge of the natural history of persons with MTWA-negative tests, and knowledge of the degree of risk that would confer no benefit from ICD therapy. TEC concluded that the knowledge base for both issues is insufficient.

A modeling study by Chan and colleagues (2006) assumed a 2.7% annual sudden death rate among MTWA-negative patients, and calculated that patients would still benefit from ICD therapy. Although modeling studies are not definitive, this study suggests that even the lower risk of arrhythmia in MTWA-negative patients is not low enough to preclude some benefit from ICD therapy.

The ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death give MTWA a Class IIA recommendation: "It is reasonable to use T-wave alternans for improving the diagnosis and risk stratification of patients with ventricular arrhythmias or who are at risk for developing life-threatening ventricular arrhythmias". However, a category II recommendation indicates conflicting or divergent evidence, and the "A" qualifier indicates that the weight of opinion is in favor of usefulness or efficacy. The document provides no further description of patients who are at risk. Patients with known ventricular arrhythmias are not really appropriate candidates for MTWA, as they are at sufficiently high risk for sudden death that no further risk assessment is necessary.

Between June 2001 and July 2004, the T-Wave Alternans in Patients with Heart Failure (ALPHA) Registry enrolled 446 patients with NYHA class II and III heart failure and LVEF less than or equal to 40% from nine centers across Italy. Heart failure etiologies included idiopathic dilated cardiomyopathy (n=326), hypertensive cardiomyopathy (n=72), valvular causes (n=9), and others (n=39). The primary endpoint was a composite of cardiac death and life-threatening ventricular arrhythmias. MTWA results were negative in 34.6% and non-negative in 65.4% (44.8% positive, 20.6% indeterminate). The primary endpoint occurred in 29 of 292 (9.9%) with non-negative results, compared to four of 154 (2.6%) in the negative group. A survival model attempting to adjust for between-group differences in prognostic factors

yielded a relative hazard of 4.0 (95% CI: 1.2 to 13.3). The test's negative predictive value through 18 months follow-up was 97.3% (95% CI: 95.4 to 99.8). Thirty-three patients with non-negative and six with negative results received ICDs. In sensitivity analyses accounting for the impact of ICD implantation on differential event occurrence found similar results; those with ICDs had more events recorded. These findings are consistent with most prior observational research finding negative MTWA results associated with fewer arrhythmic outcomes in nonischemic cardiomyopathy (the unpublished ScD-HEFT data being an exception). Limitations of the study include lack of a randomized comparison or using MTWA results to direct ICD placement, and QRS duration. Although the investigators attempted to control for imbalances, the number of events (n=33) was insufficient to obtain valid estimates while accounting for more than a single prognostic factor or variable reflected in the wide confidence intervals. For these reasons, few conclusions can be drawn from the results.

While results from observational studies such as Bloomfield, et al (2006) are suggestive (with its high negative predictive value), the question is whether patients with normal (MTWA-negative) results can safely have an ICD withheld. A definitive answer requires either: 1) a controlled trial in which participants are stratified by MTWA result and the low-risk group randomized to ICD or no ICD or, 2) a well-designed prospective cohort study of patients undergoing ICD placement having MTWA testing conducted prior to placement. Whether MTWA testing can be used to effectively risk-stratify prior to ICD placement should await results of appropriately conducted observational studies and/or clinical trials currently underway. The available studies do not demonstrate that MTWA testing can improve health outcomes.

CODES: Number Description

Eligibility for reimbursement is based upon the benefits set forth in the member's subscriber contract.

CODES MAY NOT BE COVERED UNDER ALL CIRCUMSTANCES. PLEASE READ THE POLICY AND GUIDELINES STATEMENTS CAREFULLY.

Codes may not be all inclusive as the AMA and CMS code updates may occur more frequently than policy updates.

Code Key: Experimental/Investigational = (E/I), Not medically necessary/ appropriate = (NMN).

CPT:	93025 **(E/I)**	Microvolt T-wave alternans for assessment of ventricular arrhythmias

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HCPCS:	No specific codes	
	Investigational for all codes	
ICD10:	I21.3-I22.9	Acute myocardial infarction (code range)
	I25.2	Old myocardial infarction
	I25.10-I25.119	Coronary atherosclerosis (code range)
	I42.0-I43	Cardiomyopathy (code range)

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* Key article

KEY WORDS:

MTWA, Risk stratification.

CMS COVERAGE FOR MEDICARE PRODUCT MEMBERS

There is currently a National Coverage Determination (NCD) for Microvolt T-Wave Alternans (MTWA)**.** Please refer to the following NCD website for Medicare Members: http://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCDId=310&ncdver=2&CoverageSelection=Both&ArticleType=All&PolicyType=Final&s=New+York+-+Upstate&CptHcpcsCode=36514&bc=gAAAABAAAAAA&.

There is also a recently published decision memo (1/13/15) addressing MTWA using the modified moving average (MMA) method. The Centers for Medicare & Medicaid Services has decided that no National Coverage Determination (NCD) is appropriate at this time for microvolt T-wave alternans (MTWA) testing using the modified moving average (MMA) method for the evaluation of patients at risk for sudden cardiac death (SCD). National non-coverage will be removed. Medicare coverage of MTWA using the MMA method will be determined by the local contractors. http://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=275.