Every year, more than 400,000 Americans die from sudden cardiac death or SCD. Microvolt T-Wave Alternans technology provides a reliable, noninvasive method for assessing risk and determining who is the best candidate for an internal cardiac defibrillator using a technology that assesses the Microvolt T-Wave at 1.9Mv in amplitude.

The Quest® exercise stress system with Microvolt T-Wave Alternan software offers physicians additional information about a patient’s potential risk of sudden cardiac death. The test offers physicians the opportunity to differentiate practices with innovative and potentially life-saving technology while obtaining higher reimbursements.

According to clinical evidence, presence of Microvolt T-Wave Alternans in patients with known and/or suspected risk of ventricular tachyarrhythmia predicts increased risk of a cardiac event. Studies have shown that the Microvolt T-Wave Alternans test is comparable in predictive accuracy to electrophysiology study and better than other noninvasive markers of arrhythmia risk.

Winning business case
The Microvolt T-Wave Alternans test not only offers a lower cost, noninvasive testing option for patients; it also offers significant revenue opportunities to health care providers. Approved for reimbursement by Medicare in January 2002, tests generate a national average of $426 in Medicare reimbursement. Private pay insurance carriers have paid significantly more for this procedure.

In November of 2001, the AMA established unique ICD 9 codes for the procedure. In 2002, the procedure was permitted to be billed as an incremental charge to a standard exercise stress test by private pay insurance.

Who needs the T-Wave test?
These are just a few examples of possible indications for a T-Wave Alternans test.
• Hypertensive heart disease
• Post myocardial infarction syndrome
• Congestive heart failure, reduced ejection fraction, or prior MI
• Coronary heart disease
• Syncope, pre-syncope, palpitations, or non-sustained VT
• Arrhythmia
• Non-ischemic dilated cardiomyopathy
• Family history of sudden death or familial condition predisposing to ventricular arrhythmias
• Pre-surgical cardiac evaluation

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### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>General Description</th>
<th>Computer-based Cardiac Stress and diagnostic system. Computes Microvolt T-Wave Alternans (TWA) using the Spectral Method and other signal-processing techniques.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECG Amplifier</td>
<td>Leads: 15-lead/14-electrode, high-resolution; includes standard 12-lead analysis; Sample rate: 1000 Hz; Frequency Response: DC to 250 Hz; Common mode rejection: 95 dB min. @ 60 Hz with TWA module; Input impedance: 10 Mohm min. ( (\text{per ANSI/AAMI EC-11 1991}) ); Line filter: Selectable 50/60 Hz adaptive canceller; Pacemaker detection: Detects pacemaker spikes between 0.5 ms to 2.0 ms and 2 mV to 250 mV; Defibrillation protection: Protected to 5000 V and 400 j</td>
</tr>
<tr>
<td>ECG Computations</td>
<td>Heart rate computation: 8-beat average, 30 to 250 bpm, updated every second; ST parameters: Level, slope (12 leads simultaneously); QRS detection channel: Lead II, V2 or V5, user-selectable; Artifact filter: Time domain filter at 40 Hz, independently selectable to screen and print output; Baseline filter: Baseline Stabilization filter reduces wander without distorting ST segment</td>
</tr>
<tr>
<td>Signal Processing</td>
<td>T-Wave Alternans: Computed using the Spectral Method based on (Smith, JM et al. Circulation 1988; 77: 110-21); ST-T computations: Integral, index and T-Wave Alternans computation; Median beat calculation: Incremental update of median beats including “relearn” response to gross changes in morphology and elimination of artifact and ectopic or aberrant beats</td>
</tr>
<tr>
<td>Printed Output</td>
<td>Printer: Inkjet printer; Alternans trend report: Displays alternans level vs. heart rate for entire study</td>
</tr>
</tbody>
</table>

### ORDERING INFORMATION

**92400\1AKPT**   Quest system, treadmill and Microvolt T-Wave Alternans, includes inkjet printer, printer cable, PM-3 patient module, Alternans patient cable, belt with buckle, T-wave manual and Physicians guide. \( (120V, \text{English version}) \)

**040-1219-00**  Microvolt T-Wave Alternans upgrade kit for existing Quest systems, includes inkjet printer, printer cable, microprocessor and memory upgrade. \( \text{Requires service call and 2 hours of installation.} \)

**097014**  BlueMax™ monitoring electrodes, 35 mm dia., foam

**097004**  BlueMax™ monitoring electrodes, 48 mm dia., foam

**015-0635-00**  Microvolt T-Wave Alternans electrodes (20 pouches, 7 electrodes/pouch)

Proprietary Microvolt Alternans Sensors provide the ability to sense microvolt changes while minimizing the effects of artifact on the signal.

**Cardiac Stress and Microvolt T-Wave Alternans on one system**

The Burdick Microvolt T-Wave Alternans system combines the proven Quest Cardiac Exercise Stress system with T-Wave Alternans. The system can be used for traditional stress testing, T-Wave Alternans or both tests simultaneously.

The T-Wave option can be part of a Quest system at time of purchase or added as an enhancement at a later date.