Cardiovascular Guidelines for DOT Physical Exams
By
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The Federal Motor Carrier Safety Administration (FMCSA) administers the Federal Motor Carrier Safety Regulations (FMCSRs) concerning the medical qualifications of commercial drivers in interstate commerce. The Department of Transportation (DOT) examination is an essential part of assuring a healthy commercial motor vehicle (CMV) driver workforce. The guidelines assist medical examiners in the evaluation and certification of each person on whom they perform a DOT examination. The last major review of the cardiovascular guidance materials, was held in October, 1986 and the final report was published in December, 1987, and is the basis for the FMCSA’s current guidelines on cardiovascular disease and commercial drivers(1). In fall, 2001, the FMCSA convened a Cardiovascular Medical Advisory Panel to develop new guidelines to reflect the medical advances that have occurred over the last 15 years.

The intent of this article is to review some of the guidelines for commonly encountered findings related to ischemic heart disease: including, myocardial infarction (MI), coronary artery bypass graft surgery (CABG), percutaneous coronary intervention (PCI), and implantable cardioverter-defibrillators (ICDs). A case study follows that will provide application of these guidelines.

Although the medical and surgical treatment of ischemic heart disease may lead to alleviation of symptoms and improves life expectancy, coronary arteriosclerosis tends to be progressive and the risk of heart attack and sudden death is greater than in healthy populations (2). For these reasons, evaluation of ischemic heart disease in commercial drivers must be given great consideration.

Because the commercial license does not provide the opportunity for the examiner to restrict work activity, the commercial driver must be able to perform heavy and very heavy work in order to be certified. Completion of Exercise Treadmill Stage II (>6METS) based on the standard Bruce Protocol is sufficient to demonstrate a driver’s capacity to perform job-related tasks. (3)

**Acute Myocardial Infarction**

The first six to eighteen months is the period of highest risk for cardiac death following an initial myocardial infarction (MI). Mortality rates of 10% to 12% have been reported within the first three weeks and of 8% to 10% over the remainder of the year (4-6).

The Panel recommends the following when certifying a driver at least two months after an MI:

1. Examination and approval by a cardiologist for fitness to drive.
2. Annual qualifying examination.
3. Asymptomatic at examination.
4. Echocardiographic assessment obtained prior to work resumption (an in-hospital post-MI Echo is sufficient) demonstrating an ejection fraction (EF) 40%.
5. Exercise tolerance test four to six weeks post MI and repeated as clinically indicated, but at least every two years. The driver should exercise to a
workload capacity >6METS (through Bruce Stage II or equivalent), attain a heart rate 85% of predicted maximum (unless on beta blockers), a rise in systolic blood pressure (SBP) 20mmHg without angina, and have no significant ST segment depression.

6. Tolerance to anti-angina and antihypertensive medications and no orthostatic symptoms. (7)

**Coronary Artery Bypass Graft**

Commercial drivers should abstain from work for at least three months after Coronary Artery Bypass Graft (CABG) surgery to minimize the risk of improper sternal wound healing from upper body manual labor. (7)

The Panel recommends the following criteria apply to re-qualification of the commercial driver who has recently undergone CABG:

1. Qualifying examination at least 3 months after CABG
2. Examination and approval by a cardiologist before resuming commercial driving.
3. Asymptomatic.
4. Annual medical qualification examination.
5. The appropriate frequency for Exercise treadmill test (ETT) after CABG is uncertain (89). However, after five years, yearly ETT because of accelerated graft closure. An acceptable exercise capacity is one in which the maximal heart rate achieved is 85% of the age-predicted maximum (unless the patient is on beta blockers), no ischemic signs or symptoms, a workload of at least six METS, and appropriate systolic blood pressure and heart rate responses and no ventricular dysrhythmias.
6. Radionuclide stress testing or echocardiographic myocardial imaging is indicated if the driver is not able to achieve a satisfactory ETT result, has a dysrhythmia, or has an abnormal resting EKG.
7. Resting echocardiogram at the time of the first qualifying examination after CABG (a documented report of an echo performed in-hospital after CABG is equally sufficient). Disqualification occurs in the presence of left ventricular dysfunction (ejection fraction < 40%).
8. Tolerance to all cardiovascular medications with no orthostatic symptoms. (7)

**Percutaneous Coronary Intervention**

Percutaneous coronary intervention (PCI) procedures include a number of catheter-based techniques aimed at relieving coronary obstructions. The intracoronary stent, with or without balloon angioplasty, has emerged as the dominant interventional procedure to relieve obstruction. In the setting of an uncomplicated, elective PCI to treat stable angina, a commercial driver may return to work as soon as one week after the procedure. Criteria for return to work after PCI include:

1. Examination and approval by the treating cardiologist.
2. Asymptomatic.
3. No injury to the vascular access site.
4. ETT three to six months post PCI. In the commercial driver this requires exercising to a workload capacity of at least six METS (through Bruce Stage II or equivalent), attaining a heart rate 85% of predicted maximum (unless on...
beta blockers), a rise in SBP 20mmHg without angina, and having no significant ST segment depression or elevation. Stress radionuclide or echocardiographic imaging should be performed for symptomatic individuals, individuals with an abnormal resting EKG, or those drivers who fail to obtain the minimal standards required from the standard ETT.

5. Annual medical qualification examination.
6. Negative ETT at least every other year (criteria above).
7. Tolerance of all cardiovascular medications. The driver should not experience orthostatic symptoms, including symptomatic light-headedness, a resting SBP<95mmHg systolic or a systolic blood pressure decline > 20mmHg upon standing. (7)

**Implantable Cardioverter-Defibrillators**

The Implantable Cardioverter-Defibrillators (ICDs) are electronic devices that treat abnormal rhythms (ventricular tachycardia/ventricular fibrillation) by the delivery of rapid pacing stimuli or shock therapy. These devices do not prevent the arrhythmias, but they do treat them when they occur. Thus, patients remain at risk for syncope. Whether the ICD is used for primary prevention (deemed at risk for SCD by EPS testing or other evaluation) or for secondary prevention (have demonstrated an arrest or hemodynamically significant ventricular tachycardia), the person is not qualified to drive commercially. (7)

**Case Study**

Mr. A.C. is a 75 yr. old Caucasian male, school bus driver, who presents for an annual DOT physical exam. During the review of the health history, the medical examiner confirms the following information. He had a heart attack in 1984, coronary artery bypass surgery in 1996, and ICD implanted two months ago. Current medications include: Lopressor, Lisinopril, Lasix, Spironolactone, Allopurinol, Zocor, Niaspan, Nitropatch. The client was not clear why he had the ICD device, claiming his doctor wanted it more for preventative measures. He was not currently symptomatic with any cardiac or respiratory symptoms. Vital signs were within normal limits. All other components of the DOT test and exam fell within normal limits. When questioned, the client thought he had had a stress test 1-2 years ago.

The medical examiner requested cardiology records and stress test results to review. The cardiology medical record review showed a Cardiolite stress test was performed two and one-half years ago. The client completed a workload of 7 METS, the study was clinically negative for angina pectoris, but the abnormal resting EKG made it unreliable for diagnosing ischemia. The Cardiolite perfusion scan showed evidence of septal, apical, and inferior wall infarct; but there was also an element of inferior wall ischemic changes. Left ventricular ejection fraction was 19%, with global hypokinesia of the left ventricle.

Medical records indicated he had a history of a syncopal episode, four months prior to the DOT exam. A Holter Monitor test result showed asymptomatic episodes of non-sustained ventricular tachycardia. The record reflected that the client was felt to be at high risk for malignant ventricular arrhythmia and sudden death. He was referred for electrophysiology study and subsequent implantation of the ICD device. The medical
findings correlated with a congestive cardiomyopathy. The client had not had any further syncopal episodes and was currently asymptomatic.

Based on the medical history of previous MI and CABG (more than 5 years ago), Mr. A.C. would require an annual stress test. He would require a more recent test as his last one was over two years ago. The results of his previous stress test showed he reached a workload of 7 METS, however he had ST-T wave changes a little more prominent during exercise and the perfusion scan showed LV hypokinesis with inferior wall ischemic changes and an EF = 19%. In addition, he had history of syncopal episode with Holter verification of asymptomatic nonsustained ventricular tachycardia. The low EF and increased risk for SCD resulted in the ICD implantation for primary prevention. Based on these multiple criteria, the client was not qualified for certification.

The medical examiner may wish to expand on questions when cardiovascular disease is identified or suspected. Decision for certification needs to be postponed until additional information is received in situations where an examiner is uncertain about a driver’s condition or prognosis. Additional records review by the treating providers may produce key elements to the total health picture as demonstrated in the case study.

The following tables summarize the guidelines discussed. (7)

**RECOMMENDATION TABLES**

Commercial Drivers With Known CHD

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Physiologic/ Functional</th>
<th>Certification</th>
<th>Re-certification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post MI</strong></td>
<td>Risk of recurrent major cardiac event highest within the first months post-MI; Drivers in a rehabilitation program can receive comprehensive secondary prevention therapy.</td>
<td>No if: Recurrent angina symptoms; Post-MI ejection fraction &lt;40% (by echocardiogram or ventriculogram); Abnormal ETT</td>
<td></td>
</tr>
<tr>
<td>Conditions</td>
<td>Yes if:</td>
<td>No if:</td>
<td></td>
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<tr>
<td>Angina Pectoris</td>
<td>Lower end of spectrum among CHD patients for risk of adverse clinical outcomes. Condition usually implies at least one coronary artery has hemodynamically significant narrowing.</td>
<td>Yes, if asymptomatic.</td>
<td></td>
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<tr>
<td></td>
<td>Tolerance to current cardiovascular medications.</td>
<td>Biennial ETT at minimum (If test positive or inconclusive, imaging stress test may be indicated); Cardiologist examination recommended.</td>
<td></td>
</tr>
<tr>
<td>Demonstrated prior to planned work return; Ischemic changes on rest ECG; Poor tolerance to current cardiovascular medications.</td>
<td>At least 2 months post-MI; Cleared by cardiologist; No angina; Post-MI ejection fraction ≥40% (by echocardiogram or ventriculogram);</td>
<td>Rest angina or change in angina pattern within 3 months of examination;</td>
<td></td>
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</tbody>
</table>

**Angina Pectoris**

Lower end of spectrum among CHD patients for risk of adverse clinical outcomes. Condition usually implies at least one coronary artery has hemodynamically significant narrowing.

Yes, if asymptomatic.

Annual

Yes if:

- At least 2 months post-MI;
- Cleared by cardiologist;
- No angina;
- Post-MI ejection fraction ≥40% (by echocardiogram or ventriculogram);
- Tolerance to current cardiovascular medications.

No if:

- Rest angina or change in angina pattern within 3 months of examination;
- Biennial ETT at minimum (If test positive or inconclusive, imaging stress test may be indicated);
- Cardiologist examination recommended.
Abnormal ETT; Ischemic changes on rest ECG; Intolerance to cardiovascular therapy.

**RECOMMENDATION TABLES**

**COMMERCIAL DRIVERS WITH KNOWN CHD**

(Continued)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Physiologic/ Functional</th>
<th>Certification</th>
<th>Re-certification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Post PCI</strong></td>
<td>Rapid recovery for elective PCIs for stable angina; Delayed re-stenosis is the major PCI limitation and requires intensive secondary prevention.</td>
<td>Yes if: At least 1 week after procedure; Cardiologists approval; and Tolerance to medications. ETT 3 to 6 months after PCI.</td>
<td>Annual Recommend Cardiologist examination. Biennial ETT at minimum (If test positive or inconclusive, imaging stress test may be indicated).</td>
</tr>
<tr>
<td><strong>Post Coronary Artery Bypass Surgery</strong></td>
<td>Delay in return to work to allow sternal incision healing. Because of</td>
<td>Yes if: At least 3 months after</td>
<td>Annual After 5 years: Annual</td>
</tr>
</tbody>
</table>
increasing risk of graft closure over time, ETT is obtained.

CABG; LVEF > 40% post CABG; Approval by cardiologist; Asymptomatic; and tolerance to medications.

ETT. Imaging stress test may be indicated.

RECOMMENDATION TABLES

Implantable Defibrillators

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Physiology/ functional</th>
<th>Certification</th>
<th>Re-certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary prevention</td>
<td>Patient has high risk for death and sudden incapacitation.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Secondary prevention</td>
<td>Patient demonstrated to have high risk for death and sudden incapacitation.</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

Ventricular Arrhythmias

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>Physiology/ Functional</th>
<th>Certification</th>
<th>Re-certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Heart Disease</td>
<td>Sustained VT: Poor prognosis and high risk.</td>
<td>No</td>
<td></td>
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<tr>
<td></td>
<td>NSVT, LVEF &lt; 0.40: Unfavorable prognosis.</td>
<td>No</td>
<td></td>
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<tr>
<td>Condition</td>
<td>NSVT, LVEF &gt;0.40: Generally considered to have good prognosis.</td>
<td>No, if symptomatic.</td>
<td>Yes if:</td>
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<td></td>
<td>Asymptomatic.</td>
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<td></td>
<td>At least 1 month after drug or other therapy is successful;</td>
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<td></td>
<td>Cleared by cardiologist.</td>
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<tr>
<td>Dilated Cardiomyopathy</td>
<td>NSVT (LVEF ≤ 0.40).</td>
<td>No</td>
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<tr>
<td>Sustained VT, any LVEF.</td>
<td>No</td>
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<tr>
<td>Syncope/near syncope, any LVEF:</td>
<td>No</td>
<td></td>
<td></td>
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<tr>
<td>High risk.</td>
<td>Hypertrophic Cardiomyopathy</td>
<td>Yes</td>
<td>Variable but uncertain prognosis.</td>
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