

CARDIOVASCULAR DISEASES

NOTE: This section is based primarily on the 2003 report of the Canadian Cardiovascular Society Consensus Conference on Assessment of the Cardiac Patient for Fitness to Drive.

4.1.0 Cardiovascular Diseases and Driving – Preamble:

There is little conclusive statistical data about the importance of cardiovascular disease as a causative factor in motor vehicle accidents. However, a physician should be able to offer, based on clinical findings and the results of noninvasive testing, an opinion on the probability of sudden incapacitation significant enough to cause loss of control of a vehicle. As with other conditions, the drivers of Class 1, 2, 3 or 4 vehicles are expected to meet higher standards because of the extra demands made of them, increased time behind the wheel, and the higher likelihood of a devastating accident with a large and/or passenger-carrying vehicle.

4.1.1 When considering an individual for a particular class of licence, reference should be made to the following NYHA functional classification:

The **New York Heart Association (NYHA) Functional Classification** places patients in one of four categories based on how much they are limited during physical activity:

- I. No symptoms and no limitation in ordinary physical activity.
- II. Mild symptoms and slight limitation during ordinary activity. Comfortable at rest.
- III. Marked limitation in activity due to symptoms, even during less-than-ordinary activity. Comfortable only at rest.
- IV. Severe limitations. Experiences symptoms even while at rest.

4.1.2 Note that in the previous edition of these guidelines, the CCS Functional classification was used and stress testing was required. This is no longer the case and a simple statement of functional class using the above definitions will suffice *unless, in the physician's opinion, a treadmill test is necessary to determine functional class or is otherwise indicated.*

4.1.3 Where two or more conditions co-exist, the more restrictive recommendation will prevail *and the physician should consider the possibility of cumulative effect.*

4.1.4 These guidelines are intended to assist decision makers regarding the fitness of cardiac patients to drive, and are not intended to diminish the role of the physician's clinical judgment in individual cases.

4.1.5 DEFINITIONS

Waiting period: the time interval following onset of a disqualifying cardiac condition, initiation of a stable program of medical therapy, or performance of a therapeutic procedure (whichever is applicable) during which driving should generally be disallowed for medical reasons.

- Recurrence of the disqualifying condition or circumstance during this time resets the waiting period.
- If more than one waiting period would apply, the longer one should be used, except where stated otherwise.

Satisfactory control (for SVT, AF, or AFL which are associated with cerebral ischemia):

- Of SVT: successful radiofrequency ablation of the substrate, plus an appropriate waiting period (see Section II(8)); or a 3 month waiting period on medical therapy with no recurrence of SVT associated with cerebral ischemia during this time.
- Of AF/AFL: a 3 month waiting period after appropriate treatment during which there have been no recurrences of symptoms associated with cerebral ischemia. If AF is treated with AV node ablation and pacemaker implantation, or if AFL is treated successfully with an isthmus ablation (with proven establishment of bidirectional isthmus block), then the appropriate waiting periods in Section II(8) apply.
- Of sustained VT with an LVEF greater than or equal to 40% and no associated cerebral ischemia: successful ablation of the substrate plus a one week waiting period, or pharmacologic treatment plus the appropriate waiting period defined in Section II(1).

Sustained ventricular tachycardia: Ventricular tachycardia having a cycle length of 500 msec or less and lasting 30 seconds or more or causing hemodynamic collapse

Nonsustained ventricular tachycardia: Ventricular tachycardia \geq 3 beats; having a cycle length of 500 msec or less and lasting less than 30 seconds; without hemodynamic collapse.

4.1.6 Follow-up: The following recommendations apply to follow-up of all drivers with cardiac conditions.

- As per specific guideline where extant, otherwise-
- New condition – one year.
- Unstable condition – annually until stable.
- Stable* condition – by recommendation of the driver’s physician or the licencing authority.
- Professional drivers at least every 5 years to age 45, every 3 years to age 65, then annually. (Current NSC requirement for medical review of all professional drivers.)
- Reassessment should provide evidence that the driver meets the requirements set out in the guidelines.

* Stable for this purpose means, “present for at least one year with negligible change and small likelihood of sudden deterioration.”

Standards for Specific Cardiac Conditions

4.2 Cardiac Inflammation and Infections

Individuals with acute pericarditis or myocarditis should not drive any type of motor vehicle until fully recovered. Applicants with subacute bacterial endocarditis should not drive any type of motor vehicle until completely well, because of the danger of embolism.

4.3 Congenital Heart Defects

Individual assessment is required with the decision to licence based on functional capacity and the presence or absence of myocardial ischemia, cardiomyopathy, valvular heart disease and disturbance of cardiac rhythm. The relevant standards in the following sections should be applied.

4.4 Coronary Artery Disease

4.4.1 General

All drivers with coronary artery disease should meet the following standards:

	Private Driving	Commercial Driving
NYHA Class I	No restriction	EF \geq 35%
NYHA Class II		
NYHA Class III		Disqualified
* NYHA Class IV * Receiving intermittent outpatient or home inotropes * Left ventricular assist device	Disqualified	

4.4.2 Waiting times:

	Private Driving	Commercial Driving
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1. Acute coronary syndromes

ST elevation MI	1 month after discharge	3 months after discharge
Non-ST elevation MI with significant LV damage*	1 month after discharge	3 months after discharge
Non-ST elevation MI with minor LV damage*		
- If PCI performed during initial hospital stay	48 hours after PCI	7 days after PCI
- If PCI not performed during initial hospital stay	7 days after discharge	30 days after discharge
Acute coronary syndrome without MI (Unstable angina)		
- If PCI performed during initial hospital stay	48 hours after PCI	7 days after PCI
- If PCI not performed during initial hospital stay	7 days after discharge	30 days after discharge

2. Stable coronary artery disease

Stable angina Asymptomatic coronary artery disease	No restrictions	
PCI	48 hours after PCI	7 days after PCI

3. Cardiac surgery for coronary artery disease

CABG surgery	1 month after discharge	3 months after discharge
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NOTES:

* Minor LV damage is classified as an MI defined only by elevated troponin \pm ECG changes and in the absence of a new wall motion abnormality. Significant LV damage is defined as any MI that is not classified as minor.

Notwithstanding any of the foregoing recommendations, angiographic demonstration of 50% or greater reduction in the diameter of the left main coronary artery should disqualify the patient from commercial driving, and 70% or greater should disqualify the patient for private driving, unless treated with revascularization.

CAD: coronary artery disease; LV: left ventricle; MI: myocardial infarction; PCI: percutaneous coronary intervention; CABG: coronary artery bypass graft

4.5 Disturbances of Cardiac Rhythm

In general, a decision to licence an individual with a history of rhythm disorder will depend on the type of disorder, its frequency (if paroxysmal), whether or not the arrhythmia is associated with impairment (i.e. symptoms of cerebral ischemia) and whether or not satisfactory control (see “Definitions” above) has been achieved.

4.5.1 Premature Atrial or Ventricular Contractions

ELIGIBLE FOR ANY CLASS OF LICENCE PROVIDED THERE ARE NO SYMPTOMS OF CEREBRAL ISCHEMIA AND NO OTHER DISQUALIFYING CARDIAC CONDITION.

4.5.2. VENTRICULAR ARRHYTHMIAS

	Private Driving	Commercial Driving
VF (no reversible cause) Hemodynamically unstable VT	6 months after event	Disqualified
VT or VF due to a reversible cause*	No driving until/unless successful treatment of underlying condition	
Sustained VT with no associated impairment of consciousness; LVEF < 30%	3 months after event	Disqualified
Sustained VT with no impairment of consciousness; LVEF \geq 30%; ICD has not been recommended	4 weeks after event Satisfactory control	3 months after event Satisfactory control
Nonsustained VT with no associated impairment of consciousness	No restriction	

VF: ventricular fibrillation; VT: ventricular tachycardia; LVEF: left ventricular ejection fraction

*Examples include, but are not limited to, VF within 24 hours of myocardial infarction, VF during coronary angiography, VF with electrocution, VF secondary to drug toxicity. Reversible cause VF recommendations overrule the VF recommendations if the reversible cause is treated successfully and the VF does not recur

4.5.3 PAROXYSMAL SVT, AF or AFL

	Private Driving	Commercial Driving
With impaired level of consciousness	Satisfactory control	
Without impaired level of consciousness	No restriction	

Drivers should receive chronic anticoagulation if clinically indicated (AF/AFL)
SVT: supraventricular tachycardia; AF: atrial fibrillation; AFL: atrial flutter

4.5.4. PERSISTENT or PERMANENT AF or AFL

	Private Driving	Commercial Driving
Adequate ventricular rate control; no impaired level of consciousness	No restriction	

Drivers should receive chronic anticoagulation if clinically indicated (AF/AFL)
AF: atrial fibrillation; AFL: atrial flutter

4.5.5. SINUS NODE DYSFUNCTION

	Private Driving	Commercial Driving
No associated symptoms	No restriction	
Associated symptoms (sick sinus syndrome)	Disqualified until successful treatment	

4.5.6 ATRIOVENTRICULAR (AV) and INTRAVENTRICULAR BLOCK

	Private Driving	Commercial Driving
Isolated first degree AV block	No restriction	
Isolated right bundle branch block (RBBB)		
Isolated left anterior fascicular block		
Isolated left posterior fascicular block		

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4.5.6 ATRIOVENTRICULAR (AV) and INTRAVENTRICULAR BLOCK (cont'd)

	Private Driving	Commercial Driving
Left bundle branch block (LBBB)	Fit to drive if no associated impairment of level of consciousness	Fit to drive if no associated impairment of level of consciousness; and no higher grade AV block on an annual 24 hour Holter
Bifascicular block		
Second degree AV block; Mobitz I		
First degree AV block + bifascicular block		
Second degree AV block; Mobitz II (distal AV block)	Disqualified	
Alternating LBBB and RBBB		
Acquired third degree AV block		
Congenital third degree AV block	Fit to drive if no associated impairment of level of consciousness	Fit to drive if no associated impairment of level of consciousness; QRS duration ≤ 110 msec; and no documented pauses ≥ 3 seconds on an annual 24 hour Holter

If a permanent pacemaker is implanted, the recommendations in Section 4.5.7 (below) prevail

4.5.7 PERMANENT PACEMAKERS

	Private Driving	Commercial Driving
All patients	<ul style="list-style-type: none"> * Waiting period 1 week after implant * No impaired level of consciousness after implant * Normal sensing and capture on ECG * No evidence of pacemaker malfunction at regular pacemaker clinic checks 	<ul style="list-style-type: none"> * Waiting period 1 month after implant * No impaired level of consciousness after implant * Normal sensing and capture on ECG * No evidence of pacemaker malfunction at regular pacemaker clinic checks

4.5.8. IMPLANTABLE CARDIOVERTER DEFIBRILLATORS (ICDs)

	Private Driving	Commercial Driving
Primary prophylaxis, NYHA Class I-III	4 weeks after implant	Disqualified†
A primary prophylaxis ICD has been recommended but declined by the patient	No restriction	
Secondary prophylaxis for VF or VT with decreased level of consciousness; NYHA Class I-III	6 months after event*	
Secondary prophylaxis for sustained VT with no associated cerebral ischemia; NYHA Class I - III	1 week post implant, in addition to the appropriate waiting period for the VT (see Section II(1))	
Any event resulting in device therapies being delivered (shock or ATP), in which level of consciousness was impaired, or the therapy(ies) delivered by the device was/were disabling	Additional 6 month restriction	

* The 6 month period begins not at the time of ICD implant, but rather at the time of the last documented episode of sustained symptomatic VT, or syncope judged to be likely due to VT or cardiac arrest.

Note: For patients who have a bradycardia indication for pacing as well, the additional criteria under Section 4.5.7 also apply.

All patients must be followed from a technical standpoint in a device clinic with appropriate expertise.

† ICDs may sometimes be implanted in low risk patients. Individual cases may be made for allowing a commercial driver to continue driving with an ICD provided the annual risk of sudden incapacitation is felt to be 1% or less.

4.5.9 Carotid Sinus Hypersensitivity

An individual with symptoms of cerebral ischemia resulting from carotid sinus stimulation cannot drive any vehicle safely unless the symptoms are controlled medically or with a pacemaker.

4.5.10. OTHER

	Private Driving	Commercial Driving
Brugada's syndrome; Long QT syndrome; Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)	*Appropriate investigation and treatment guided by a cardiologist *6 months after any event causing impaired level of consciousness	Disqualified†
* Catheter ablation procedure * EPS with no inducible sustained ventricular arrhythmias	48 hours after discharge	1 week after discharge

VF: ventricular fibrillation; VT: ventricular tachycardia; EPS: electrophysiology study; SVT: supraventricular tachycardia; AF: atrial fibrillation; AFL: atrial flutter; ECG: electrocardiogram; ATP: antitachycardia pacing

**Inherited heart diseases may sometimes be identified to pose a very low risk to patients. Individual cases can sometimes be made to allow a commercial driver to continue to drive despite the diagnosis of one of these diseases, provided the annual risk of sudden incapacitation is believed to be less than one percent.*

4.6 Valvular Heart Disease

Determination of fitness to drive in individuals with unoperated valvular heart disease must be based on the degree of functional impairment, presence or absence of cerebral ischemia and, for commercial drivers, a favourable detailed cardiologic assessment. Individuals who have undergone valve replacement surgery are subject to a certain irreducible incidence of late complications such as thromboembolism, dehiscence, infection and mechanical malfunction, and therefore must be thoroughly assessed before being permitted to drive Class 1, 2, 3, 4 vehicles.

4.6.1. Medically treated valvular heart disease

	Private Driving	Commercial Driving
Aortic stenosis and sclerosis	* NYHA Class I or II * No episodes of impaired level of consciousness	* Asymptomatic * NYHA Class I * AVA \geq 1.0 cm(2) * EF \geq 35% * Annual Follow-up
* Aortic regurgitation * Mitral stenosis * Mitral regurgitation	* No episodes of impaired level of consciousness * NYHA Class I or II	* No episodes of impaired level of consciousness * NYHA Class I * EF \geq 35%

4.6.2. Surgically treated valvular heart disease

	Private Driving	Commercial Driving
* Mechanical prostheses * Mitral bioprostheses with non-sinus rhythm * Mitral valve repair with non-sinus rhythm	* 6 weeks after discharge * No thromboembolic complications on anticoagulant therapy	* 3 months after discharge * No thromboembolic complications * Anticoagulant therapy * NYHA Class I * EF \geq 35%
* Aortic bioprostheses * Mitral bioprostheses with sinus rhythm * Mitral valve repair with sinus rhythm	* 6 weeks after discharge * No thromboembolic complications	* 3 months after discharge * No thromboembolic complications * NYHA Class I * EF \geq 35%

NYHA : New York Heart Association; AVA: Aortic valve area; LV: left ventricle; NSVT: nonsustained ventricular

4.6.3 Mitral Valve Prolapse

Individuals who are asymptomatic may be considered for any class of licence. Those who are symptomatic should be assessed for arrhythmia by ambulatory ECG recording before being considered for commercial licences.

4.7 Congestive Heart Failure, Left Ventricular Dysfunction, Cardiomyopathy, Transplantation

	Private Driving	Commercial Driving
NYHA Class I	No restriction	EF \geq 35%
NYHA Class II		Disqualified
NYHA Class III		
* NYHA Class IV * Receiving intermittent outpatient or home inotropes * Left ventricular assist device	Disqualified	
Heart transplant	* 6 weeks after discharge * NYHA Class I or II * On stable immunotherapy * Annual reassessment	* 6 months after discharge * Annual assessment * EF \geq 35% * NYHA Class I

4.7 Congestive Heart Failure, Left Ventricular Dysfunction, Cardiomyopathy, Transplantation (cont'd)

		* Annual non-invasive test of ischemic burden showing no evidence of active ischemia
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LV: Left ventricle; NSVT: nonsustained ventricular tachycardia; EF:ejection fraction

4.8 HYPERTROPHIC CARDIOMYOPATHY

	Private Driving	Commercial Driving
All patients	* No episodes of impaired level of consciousness	* LV wall thickness < 30 mm * No history of syncope * No NSVT on annual Holter * No family history of sudden death at a young age * No BP decrease with exercise

BP: blood pressure; LV: Left ventricle; NSVT: nonsustained ventricular tachycardia

4.9 SYNCOPE

	Private Driving	Commercial Driving
Single episode of typical vasovagal syncope*	No restriction	
Diagnosed and treated cause e.g. permanent pacemaker for bradycardia	1 week	1 month
Reversible cause e.g. hemorrhage, dehydration	Successful treatment of underlying condition	
Situational syncope with avoidable trigger e.g. micturition syncope, defecation syncope	1 week	
- Single episode of unexplained syncope - Recurrent (within 12 months) vasovagal syncope	1 week	12 months
Recurrent episode of unexplained syncope (within 12 months)	3 months	12 months
Syncope due to documented tachyarrhythmia, or inducible tachyarrhythmia at EPS	Refer to Section II	

* No restriction is recommended unless the syncope occurs in the sitting position, or if it is determined that there may be an insufficient prodrome to pilot the vehicle to the roadside to a stop before losing consciousness. If vasovagal syncope is atypical, the restrictions for “unexplained” syncope apply.

EPS: Electrophysiology study

4.10 Hypertension

Hypertension, other than uncontrollable malignant hypertension, is not in itself a contraindication to operating any type of motor vehicle, but associated complications such as damage to heart, eyes, kidneys and brain may well preclude safe driving. Persistent hypertension above 170/110 mm Hg is frequently accompanied by complications that may make driving dangerous: persons with a blood pressure in this range must be examined very carefully. If the eyes are found to be affected, the degree of impairment of driving ability will depend upon the loss of vision.

If the hypertension has caused cardiac damage resulting in congestive failure or cerebral impairment, this should be the principal consideration in evaluating the ability of the applicant to drive safely. If the blood pressure is found to be 170/110 mm Hg or higher in applicants for a Class 1, 2, 3 or 4 licence, evaluation should include fundoscopic examination, electrocardiogram, chest X-ray and serum creatinine measurement, and referral to an internist for an opinion if a marked deviation from normal is found.