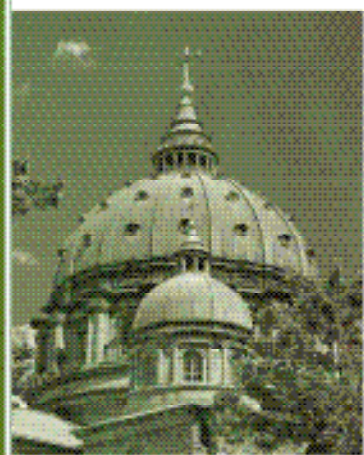
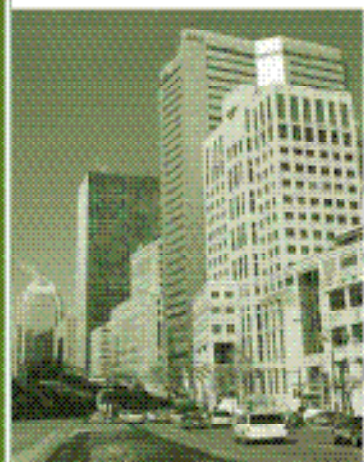



Les arythmies : Quoi de neuf?

Symposium organisé par le Centre canadien de recherche en cardiologie



Vendredi 21 avril 2006
Le Centre Sheraton Montréal Hôtel
Montréal, Québec

Université 
de Montréal

Pour le médecin de famille, ce programme est reconnu pour 7 heures 15 crédits de catégorie 1 en P.M.C. La reconnaissance de ses unités vous permettra aussi d'obtenir un certificat officiel en cardiologie de l'université (cf. pages adhés) pour chaque participant. De plus, ce programme est admissible pour chaque employé(e) de la Province de Québec au remboursement de remboursement subé à l'entente avec le Ministère de la santé (décret 2001). Pour ce faire, l'activité doit avoir lieu sur territoire et comporter au moins 3 heures d'apprentissage par demi-journée de formation.

Pour le médecin spécialiste, cette activité est reconnue pour 1 crédit par heure de participation de la section 1 du Programme de Médecin du Collège du Collège Royal des médecins et chirurgiens du Canada pour un maximum de 7,2 crédits. Le participant doit réclamer ses unités de formation (crédits) proportionnellement à sa participation à l'activité.

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Les arythmies

Quoi de neuf?

Les arythmies

www.chrc.net/am

Conférenciers

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Cardiologue – Médecine préventive
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Chef du département multidisciplinaire
de cardiologie
Institut de cardiologie Hôpital Laval
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Université de Montréal
Professeur titulaire de clinique
Université de Montréal
Cardiologue
Institut de cardiologie de Montréal

Jean-Claude Tardif, M.D.
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Agrégé de clinique
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Les arythmies

Organisation de la conférence

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Cher collègue,

Nous sommes heureux de vous accueillir à l'hôtel Le Centre Sheraton de Montréal pour ce colloque intitulé : « Les arythmies : Quoi de neuf? ».

La sélection des sujets de présentation et des conférenciers a été faite pour assurer un programme interactif, stimulant et pertinent. Le programme de formation s'adresse aux cardiologues, internistes, médecins généralistes et résidents qui s'intéressent aux arythmies cardiaques. Ce colloque est rendu possible grâce à des subventions de nos partenaires de l'industrie du médicament et du dispositif médical. Les conférenciers déclareront à l'audience tout conflit d'intérêts réel ou apparent en relation avec leurs présentations et le programme scientifique sera indépendant et objectif.

Pour le médecin de famille, ce programme est reconnu pour 7 heures 15 créditées de catégorie 1 en FMC. La reconnaissance de ces crédits vous parviendra sous forme d'un certificat officiel en provenance de l'Université (cf pièce jointe) pour chaque participant. De plus, ce programme est admissible pour chaque omnipraticien de la Province de Québec au remboursement de ressourcement suite à l'entente avec le Ministère de la santé (début 2001). Pour ce faire, l'activité doit avoir lieu sur semaine et comporter au moins 3 heures d'apprentissage par demi-journée de formation.

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Le programme comprend une série de conférences suivie d'une période de questions au cours de laquelle on révisera les pratiques les mieux établies ainsi que les plus récents progrès cliniques dans la prise en charge des arythmies cardiaques. On discutera surtout de l'application pratique de ces connaissances dans le traitement des patients qui souffrent d'arythmie cardiaque, que ce soit à l'hôpital ou au bureau.

Nous espérons que votre participation à cette journée s'avèrera une activité de formation profitable. Bien cordialement,

Denis Roy, MD

Paul Dorian, MD

Programme scientifique

Séance plénière 1 : Mort subite et arythmies ventriculaires

Modérateur :

- 08 h 00 Défibrillateur en prévention primaire : les nouvelles recommandations
- 08 h 30 ACLS : quoi de neuf et sur quoi se base-t-on pour modifier les recommandations ?
- 09 h 00 La resynchronisation cardiaque : un traitement révolutionnaire de l'insuffisance cardiaque ?
Point de vue de l'électrophysiologiste
Point de vue du spécialiste en insuffisance cardiaque
- 09 h 45 Le patient avec syncopes récidivantes : comment l'investiguer et le traiter
- 10 h 15 Pause
- 10 h 30 Les ateliers : discussion de cas
Fibrillation auriculaire
ECG difficiles/intéressants
Resynchronisation cardiaque
Permis de conduire /restrictions ?
- 11 h 30 Discussion de groupe
- 12 h 00 Dîner

Salon Drummond centre et est
Denis Roy, M.D.

Denis Roy, M.D.

Paul Dorian, M.D.

Bernard Thibault, M.D.

Michèle de Guise, M.D.

Gilles O'Hara, M.D.

Denis Roy, M.D. / Gilles O'Hara, M.D.

Salon Drummond centre et est

Marc Dubuc, M.D. / Paul Dorian, M.D.

Salon Drummond ouest

Michèle de Guise, M.D. / Bernard Thibault, M.D.

Salon 6

Vidal Essebagn, M.D. / Mario Talajic, M.D.

Salon 7

Salon Drummond ouest

Séance plénière 2 : Un après-midi en FA

Modérateur :

- 13 h 00 Essais cliniques de thérapie antithrombotique pour FA : récents essais cliniques et nouvelles directions
- 13 h 30 Fibrillation auriculaire: choisir entre une stratégie de contrôle du rythme vs contrôle de la fréquence
- 14 h 00 Fibrillation auriculaire : comment mieux contrôler le rythme et/ou la fréquence ?
- 14 h 30 FA et hypertension : comment traiter la FA avec des médicaments non-antiarythmiques
- 15 h 00 Pause
- 15 h 20 Débat : Fibrillation auriculaire idiopathique : doit-on essayer un/plusieurs médicaments antiarythmiques avant de considérer une ablation curative ?
- 16 h 20 Discussion de groupe
- 16 h 50 Clôture

Salon Drummond centre et est
Paul Dorian, M.D.

Stuart Connolly, M.D.

Mario Talajic, M.D.

Marc Dubuc, M.D.

Jeff Healey, M.D.

Foyer du salon Drummond

Peter Guerra, M.D. et

Vidal Essebagn, M.D.

Université 
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Les participants sauront mieux:

- ✓ Instaurer le traitement de première intention approprié pour ceux de leurs patients souffrant d'arythmie cardiaque
- ✓ Identifier les patients souffrant d'une arythmie cardiaque mettant leur vie en danger et justifiant une évaluation et un traitement immédiat
- ✓ Identifier les patients ne souffrant pas d'arythmie cardiaque qui sont en grand danger de développer des arythmies pouvant mettre leur vie en danger et qui, pour cette raison, ont besoin d'un traitement prophylactique
- ✓ Fournir des traitements médicamenteux aux patients souffrant d'arythmie cardiaque
- ✓ Comprendre l'usage des traitements médicamenteux auxiliaires chez les patients dont l'arythmie cardiaque est traitée avec un dispositif implantable
- ✓ Fournir un service initial de dépannage aux patients dont l'arythmie cardiaque est traitée avec un dispositif implantable
- ✓ Utiliser de multiples traitements anti-arythmiques chez les patients dont les cas sont compliqués

Contenu élaboré par le :



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Coordination par :



Séance plénière 1 : Mort subite et arythmies ventriculaires

Modérateur : Denis Roy, M.D.

Défibrillateur en prévention primaire :
les nouvelles recommandations

Denis Roy, M.D. p 1-2

ACLS : quoi de neuf et sur quoi se base-t-on pour modifier
les recommandations ?

Paul Dorian, M.D. p 3-6

La resynchronisation cardiaque : un traitement révolutionnaire
de l'insuffisance cardiaque?

Point de vue de l'électrophysiologiste

Bernard Thibault, M.D.

Point de vue du spécialiste en insuffisance cardiaque

Michèle de Guise, M.D. p 7-9

Le patient avec syncopes récidivantes :
comment l'investiguer et le traiter

Gilles O'Hara, M.D. p 10-14

Les ateliers : discussion de cas
Fibrillation auriculaire

*Denis Roy, M.D. /
Gilles O'Hara, M.D.*

ECG difficiles/intéressants

*Marc Dubuc, M.D. /
Paul Dorian, M.D.*

Resynchronisation cardiaque

*Michèle de Guise, M.D. /
Bernard Thibault, M.D.*

Permis de conduire/restrictions ?

*Vidal Essebag, M.D. /
Mario Talajic, M.D. p 15-26*

Séance plénière 2 : Un après-midi en FA

Modérateur : Paul Dorian, M.D.

Essais cliniques de thérapie antithrombolisante pour FA :
récents essais cliniques et nouvelles directions

Stuart Connolly, M.D. p 27-28

Fibrillation auriculaire: choisir entre une stratégie de contrôle
du rythme vs contrôle de la fréquence

Mario Talajic, M.D. p 29

Fibrillation auriculaire : comment mieux contrôler
le rythme et/ou la fréquence ?

Marc Dubuc, M.D. p 30-31

FA et hypertension : comment traiter la FA avec
des médicaments non-antiarythmiques

Jeff Healey, M.D. p 32-33

Débat : Fibrillation auriculaire idiopathique :
doit-on essayer un/plusieurs médicaments
antiarythmiques avant de considérer une ablation curative ?

*Peter Guerra, M.D. et
Vidal Essebag, M.D. p 34*

DENIS ROY, M.D.

Biographie

Dr. Roy a obtenu son diplôme de MD de l'Université de Montréal en 1976. Il a été interne à l'Hôpital Royal Victoria et a, par la suite, complété une résidence en médecine interne et en cardiologie dans le réseau des hôpitaux affiliés à la Faculté de médecine de l'Université de Montréal. Il a poursuivi un entraînement en électrophysiologie cardiaque à l'Université de Limbourg, Maastricht, Pays Bas, et à l'Hôpital de l'Université de Pennsylvanie, Philadelphie.

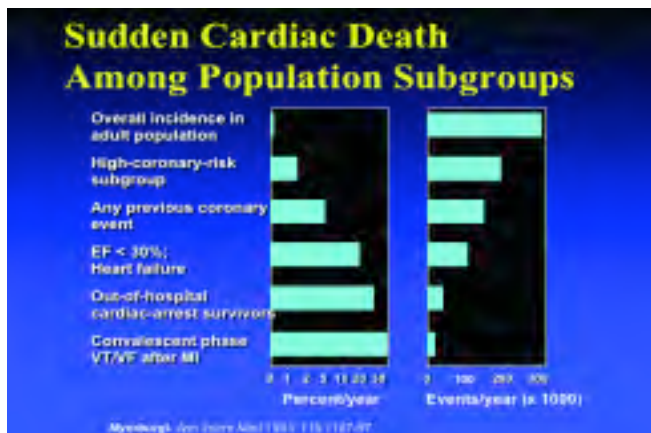
Dr. Roy est cardiologue à l'Institut de Cardiologie de Montréal depuis 1982 où il a été chef du Service d'électrophysiologie et chef du Département de médecine. Dr. Roy est professeur titulaire et directeur du Département de médecine à l'Université de Montréal. Il a été l'investigateur principal de l'étude multicentrique canadienne sur la fibrillation auriculaire (CTAF, NEJM 2000;342 :913). Il dirige actuellement une étude internationale sur le traitement de la fibrillation auriculaire chez les insuffisants cardiaques (AF-CHF.) Dr. Roy est président de la Société canadienne de cardiologie.

DENIS ROY, M.D.

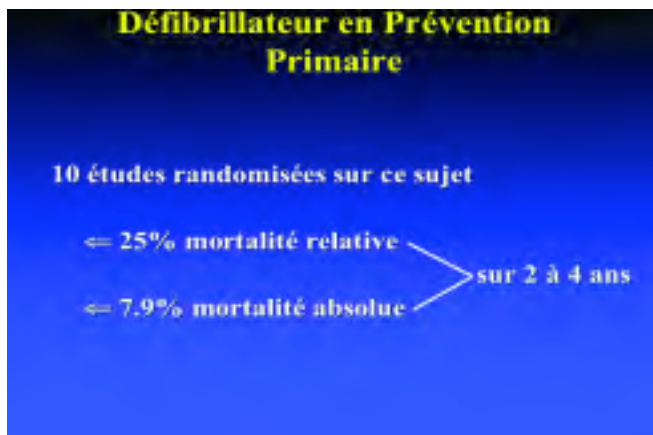
Résumé

Dix études cliniques ont récemment évalué l'efficacité du défibrillateur implantable en prévention primaire chez des patients ayant une dysfonction ventriculaire. Globalement le défibrillateur a réduit la mortalité totale de 7.9% sur une période moyenne de 2 à 4 ans de suivie. Par ailleurs la pose d'un défibrillateur n'est pas sans complication (infection, dysfonctionnement) et le coût de l'appareil est élevé. En 2005 un groupe de travail de la Société Canadienne de Cardiologie a revu et mis à jour les recommandations sur l'utilisation des défibrillateurs au Canada et un délai d'attente maximal a été proposé. Cette présentation résumera et illustrera à l'aide de cas cliniques les recommandations canadiennes et abordera les enjeux économiques de ce traitement.

diapositive 1



diapositive 2



diapositive 3

Défibrillateur en Prévention Primaire: autres éléments d'information

Pts sous représentés dans ces études

Class I et IV

Co-morbidité (ACV – IRC)

> 80 ans

Risques/complications du défibrillateur

Infection 1.9%

Pneumothorax 0.6%

Déplacement d'électrode 2.3%

Coût

"Device recall"

Bénéfice absolu du défibrillateur: 1.5% à 3%/an

diapositive 6

CCS Position Paper: ICD use in Canada Can J Card 2005
Class II b Recommendations

Recommendation	Level of Evidence	Factors to consider when applying recommendations to an individual patient
8. Patients with a chronic heart disease, prior myocardial infarction (MI), LV dysfunction (LVEF < 35 - 50%) with either no inducible VT or a treated VT or a documented history of without an electrophysiology study	C	Subgroup analyses of the primary prevention trials have suggested that implantable and automatic benefits in patients with LVEF in the 35-50% range may be greater. An EP study may help to stratify high risk patients in this group.
9. Patients with myocardial or non-myocardial paroxysmal atrial or supraventricular tachycardia (SVT) with or without a documented history of heart failure	C	The LVEF in most patients in the trials including patients with documented supraventricular tachycardia (average 21-30%) was lower than patients with higher LVEF measures who were underrepresented in the trials (showing benefit).
10. Shared conditions (e.g. a previous infarction) or have a history of arrhythmia both paroxysmal with asymptomatic transient tachycardia	C	An ECG or other monitoring may be required as a "trigger" in some patients. Arrhythmia in this category be reported as in the studies included in both cases.

diapositive 4

CCS Position Paper: ICD use in Canada Can J Card 2005
Class I Recommendations

Recommendation	Level of Evidence	Factors to consider when applying recommendations to an individual patient
1. Carotid artery that is calcified, stenosed (LVT) or aneurysmal, deep veins (VT) due to a stenosis or aneurysmal lesion	A	Subgroup analysis suggest that in the presence of ECG energy in these patients with LVEF < 35%.
2. Significant sustained VT in association with structural heart disease	B	Select patients with LVEF < 35% and/or significant tachycardia may obtain automatic therapy even at implantation.
3. Syncope of paroxysmal origin with clinically relevant, hemodynamically significant sustained VT or VT inducer on electrophysiology study	B	EP studies in patients with syncope (VT) also usually show high risk patients with evidence of structural heart disease.
4. Significant sustained VT in patients who do not have structural heart disease that is not amenable to other treatments	B	EP study in patients with syncope (VT) and usually show high risk patients with evidence of structural heart disease.
5. Patients with chronic heart disease in B or C stage and in patients with chronic symptoms and LV ejection fraction of less than or equal to 35%, presence of one or more past myocardial infarction, presence of heart failure history, prior coronary revascularization procedure (CABG or PCI)	A	Patients with significant comorbidities may not benefit from an ICD.

CCS: Canadian Cardiovascular Society. CCS: Canadian Cardiovascular Society. ICD: Implantable Cardioverter Defibrillator. EP: Electrophysiology.

diapositive 7

CCS Position Paper: ICD use in Canada Can J Card 2005
Class III Recommendations

Recommendation	Level of Evidence	Factors to consider when applying recommendations to an individual patient
12. Syncope of undetermined cause in a patient without structural heart disease	C	ICD may be made to rule out syncope due to structural heart disease particularly in patients with a family history of sudden death.
13. Recurrent VT or VT	C	An ICD may become appropriate if other options of medical VT or VT non-sustained.
14. VT or VT resulting from an arrhythmia due to a transient or reversible condition (e.g. AM, electrolyte imbalance, drugs, or a change of treatment) in a patient with structural heart disease or a prior history of VT, identifiable VT tachycardia.	C	Recognizing the difficulty to identify reversible causes of VT or VT, close monitoring in arrhythmias and other devices may be used to avoid ICD therapy.
15. Significant paroxysmal symptoms that may be reproduced, device implantation or other procedure is not indicated.	C	A formal evaluation assessment may be helpful in cases where the potential impact of an ICD on a structural condition is uncertain.
16. Structural disease is not expected to be responsible for less than one year.	C	Such patients were excluded from all ICD trials.
17. MI or other structural heart failure in patients who are not expected to benefit in any way from therapy and who are not candidates for cardiac rehabilitation.	C	A CRT may be highly useful in patients with structural heart failure may be. In some cases, implantation may be appropriate at the secondary prevention level. CRT may also be useful in the primary prevention.

diapositive 5

CCS Position paper: ICD use in Canada, Can J Card 2005
Class II a Recommendations

Recommendation	Level of Evidence	Factors to consider when applying recommendations to an individual patient
6. Patients with ischemic heart disease and LV dysfunction (LVEF < 35 - 50%), associated or severe and a history of myocardial infarction (MI) and ECG or other paroxysmal arrhythmia or a documented history of without an electrophysiology study	B	Subgroup analyses of the primary prevention trials have suggested that the relative and absolute benefits in patients with LVEF in the 35-50% range may be greater. An EP study may help to stratify high risk patients in this group.
7. Patients with non-ischemic or non-myocardial paroxysmal atrial or supraventricular tachycardia (SVT) with or without a documented history of heart failure	B	The LVEF in most patients in the trials including patients with documented supraventricular tachycardia (average 21-30%) was lower than patients with higher LVEF measures who were underrepresented in the trials (showing benefit).
8. Patients with low risk of structural conditions such as but not limited to long QT syndrome, paroxysmal supraventricular tachycardia, or a history of arrhythmia or a history of arrhythmia with a high risk for life-threatening arrhythmia or a history of arrhythmia.	B	Patients with low risk of structural conditions such as but not limited to long QT syndrome, paroxysmal supraventricular tachycardia, or a history of arrhythmia or a history of arrhythmia with a high risk for life-threatening arrhythmia or a history of arrhythmia.

PAUL DORIAN, M.D.

Biographie

Dr. Paul Dorian is currently the Director of the Cardiac Electrophysiology Program at St. Michael's Hospital in Toronto, Canada. He is Professor of Medicine in the Division of Cardiology and in the Division of Clinical Pharmacology at the University of Toronto.

Dr. Dorian received his medical degree from McGill University in Montreal in 1976. He continued training in Internal Medicine and Cardiology at the University of Toronto, and received certification by the Royal College of Physicians and Surgeons of Canada in Internal Medicine in 1983 and certification in Cardiology in 1984. He completed training in Clinical Pharmacology at the University of Toronto in 1982, and received an MSc in Pharmacology from the University of Toronto in 1982. From 1983 to 1985, he completed a Fellowship in Cardiac Electrophysiology at Stanford University Medical Centre in California.

His research interests include factors related to the induction and maintenance of ventricular fibrillation, defibrillation, and antiarrhythmic drug effects on ventricular fibrillation and defibrillation. His other interests also include quality of life in patients with cardiac arrhythmias, and the clinical pharmacology of antiarrhythmic drugs.

He has recently completed a clinical trial in out of hospital cardiac arrest and continues collaborative trials in prehospital care.

PAUL DORIAN, M.D.

Résumé

In December of 2005, the International Liaison Committee on Resuscitation (ILCOR) published the revised international guidelines on advanced cardiac life support. Major developments in resuscitation science have led to substantial revision to the prior guidelines. The new guidelines rest largely on the following observations:

Successful resuscitation from cardiac arrest is most closely linked to the promptness and effectiveness of chest compressions and basic life support.

Both in and out of hospital, chest compressions during CPR are performed imperfectly, or for not enough time during cardiac arrest (interrupted too many times).

Artificial ventilation is usually excessive, involving too frequent ventilations applied too vigorously.

Although defibrillation is effective for ventricular fibrillation, the ensuing rhythm is frequently asystole or pulseless electrical activity, unless the heart is "primed" to recover contractile function by sufficient chest compressions prior to or between defibrillation shocks.

Summary of New/ Modified ACLS Guidelines:

1. **Push hard and push fast:** For optimum CPR, chest compressions should be done vigorously, at about 100 compressions/min. with complete chest recoil between compressions, and interrupted as little as possible for defibrillation, intubation, etc.
2. **Be careful not to over ventilate:** either using a bag valve mask or endotracheal intubation, ventilation should be kept at about 8/min, and overventilation should be carefully guarded against. For one rescuer CPR, the ratio of compressions to ventilation should be 30:2, and with two rescuers 15:2, but without interrupting chest compression in order to ventilate (adult ACLS)
3. The guidelines de-emphasise pulse checks (since they are time consuming and may be inaccurate) and recommend immediately resuming CPR after every defibrillation shock, rechecking the rhythm only 60 seconds after every shock (as opposed to the previous "stacked" shocks)
4. Drug therapy is de-emphasized, since there is no clear proof from clinical trials that either vasopressors (epinephrine or vasopressine) or antiarrhythmics (eg amiodarone) prolongs survival to hospital discharge. Administration of these drugs can be potentially useful, but basic life support should not be interrupted or delayed in order to administer drug therapy.
5. Randomized clinical trials suggest that prompt institution of therapeutic hypothermia (cooling to 32-34 °C for 12 to 24 hours) as soon as possible after return of spontaneous circulation in cases of ventricular fibrillation cardiac arrest, can substantially improve survival hospital discharge. Protocols to optimize the timing and delivery of therapeutic hypothermia in hospital are encouraged.

Many unanswered questions remain in resuscitation science. The North American Resuscitation Outcomes Consortium (ROC) is a US / Canadian Multi Centre effort to perform very large scale high quality clinical trials in improving survival from out of hospital cardiac arrest. New trials in 2006 will focus on the potential benefits of the Impedance Threshold Device and the strategy immediate defibrillation ("analyze early" vs 2 min of CPR prior to ECG analysis and defibrillation ("analyze late").

diapositive 1

**Resuscitation After Cardiac Arrest:
A 3-Phase Time-Sensitive Model**

The Electrical Phase:
0 - 4 min post VF onset
- if defibrillation achieved, excellent outcomes
- little need for ventilation, drugs

The Circulatory Phase:
4 - 10 min post VF onset
- cardiac, CNS hypoxia
- poor organ function even if defibrillation achieved
- provide circulation to 'prime the pump', ± adjuncts
- reperfusion common – consider antiarrhythmics

The Metabolic Phase:
> 10 min post VF onset
- consider hypothermia
- is epinephrine harmful?

Winkfeld et al. JAMA 2002;288:23

diapositive 4

**ACLS 2006
What is NEW and WHY**

diapositive 2

**Delaying Defibrillation to Give CPR in
Out-of-Hospital VF: A Randomized Study**

Emergency Response Time	Shock first (%)	3 min CPR (%)
< 5 min	~28	~24
> 5 min	~4	~22

Adapted from VRS et al. JAMA 2004; 291:95

diapositive 5

VENTILATION ACLS 2006

PROBLEM	SOLUTION
• Overventilation decreases venous return and cardiac output	• 8-10 ventilations/min
• Pause to ventilate interrupts CPR	• Compression: ventilation 30:2 (one provider)
	• 15:2 two providers (no interruptions in compressions)

diapositive 3

**Are ACLS guidelines being followed?
Are they optimal?**

What is wrong with CPR as usually practiced?

- inadequate compressions (force/depth, frequency)
- inadequate chest recoil
- ***TOO MUCH HANDS-OFF TIME***
- too many ventilations

How can this be improved?

- mechanical compressions
- new techniques for manual compressions
- reducing ventilations
- improving venous return: ITD & ACD-CPR

diapositive 6

CPR – Chest compressions ACLS 2006

PROBLEM	SOLUTION
• Too much hands off time	• Emphasize continuous CPR
• Not deep or fast enough	• Emphasize rate, depth
• Heart not "ready" for shock	• CPR pre shocks for long duration VF
	• CPR (2 min) between shocks

diapositive 7

ACLS 2006

SHOCKS

<u>PROBLEM</u>	<u>SOLUTION</u>
<ul style="list-style-type: none">• Insufficient Shock Energy	<ul style="list-style-type: none">• (Monophasic – 360 J)• Prefer Bi-phasic (120-360 J)

diapositive 8

ACLS 2006

DRUGS

<u>PROBLEM</u>	<u>ACTION</u>
<ul style="list-style-type: none">• No survival data to support any drug	<ul style="list-style-type: none">• Vasopressor after 1 failed shock• Anti-arrhythmic (prefer amiodarone) after 2 unsuccessful shocks (VF)

MICHÈLE DE GUISE, M.D.

Biographie

Formation en médecine puis résidence en médecine interne et cardiologie dans le giron de l'Université de Montréal.

Une année de formation complémentaire en réadaptation cardiaque au Centre Épic, Institut de Cardiologie de Montréal.

Une année de perfectionnement en échographie cardiaque à Londres (Royal Brompton Hospital) puis à Philadelphie (University of Pennsylvania Hospital) avec le Dr Martin St John Sutton.

18 mois de formation complémentaire à la Cleveland Clinic en insuffisance cardiaque réfractaire, support mécanique et transplantation.

Cardiologue depuis 1993 à l'Hôpital Notre-Dame (CHUM).

Création d'une clinique multidisciplinaire de prise en charge des facteurs de risque de maladie coronarienne : Clinique de Cardiologie Préventive.

Responsable de la clinique d'insuffisance cardiaque et de réadaptation cardiaque du CHUM.

Résumé

30 % des patients en insuffisance cardiaque ont un élargissement du QRS à l'électrocardiogramme. Cette observation est corrélée avec un degré de dysfonction systolique plus élevé et est un marqueur de mortalité accrue. Ce délai électrique se traduit par un délai mécanique avec asynchronie de contraction des deux ventricules et des parois du ventricule gauche.

Plus de 4000 patients ont été étudiés dans des essais cliniques randomisés visant à vérifier l'efficacité de la resynchronisation au cours des dernières années. Le but de cette présentation est de :

- Préciser les attentes cliniques qu'on doit avoir à l'égard de cette nouvelle forme de traitement.
- Préciser quels patients risquent d'en bénéficier d'avantage à partir des données probantes de la littérature.
- Discuter brièvement de l'apport de l'échocardiographie pour guider la sélection des candidats.

diapositive 1

Resynchronisation :
Traitement révolutionnaire de l'insuffisance cardiaque?

Michèle de Guise
Cardiologue
Responsable de la clinique de cardiologie préventive et d'insuffisance cardiaque
CHUM

diapositive 4

Critères de sélection des sujets

- CF NYHA III – IV malgré traitement médical optimal (une seule étude d'envergure à inclure des patients en CF II: PATCH-CHF II)
- FEVG < 35%
- QRS > 120 ms
 - Une seule étude avec asynchronie comme critère d'inclusion : CARE HF

diapositive 2

Resynchronisation:
Préambule:

- 30-40% des patients avec IC ont un QRS élargi
- Le plus souvent BBGc
- Corrélation avec la sévérité de la dysfonction systolique
- Prédicteur de mortalité accrue (mort soudaine et IC terminale)

diapositive 5

Bienfaits attendus
Variables mesurées

- Tolérance à l'effort
 - Test de marche de 6 minutes (6MWT)
 - Consommation d'oxygène maximale (VO₂ max)
 - Classe fonctionnelle (NYHA)
- Indices de qualité de vie (QOL)
 - Minnesota Living With Heart Failure Questionnaire
 - European Quality of Life-5 Dimensions (EuroQoL EQ-5D)

diapositive 3

Resynchronisation:
Point de vue d'une clinicienne

- PLAN
 - Sélection des patients
 - Résultats escomptés
 - Prédicteurs de succès ou d'insuccès
 - Perspectives d'avenir...

diapositive 6

Bienfaits cliniques
Tolérance à l'effort et indices de qualité de vie

- Les études sont concordantes
- Chez des patients sous traitement médical optimal (?) ou presque...
- Malgré tout en CF III (IC réfractaire)
- Avec QRS large et FEVG très abaissée
- Impact mesurable et cliniquement significatif sur la tolérance à l'effort et les indices de qualité de vie

diapositive 7

Bienfaits attendus...
Variables mesurées

- Hospitalisations pour insuffisance cardiaque
- Mortalité
 - De toute cause
 - Cardiaque

diapositive 10

Prédicteurs de succès ou d'insuccès
Facteurs techniques

- Anatomie veineuse qui empêche positionnement optimal des électrodes
- Présence de tissu cicatriciel au site de stimulation
- Fibrillation auriculaire (1 seule étude: MUSTIC-AF)

diapositive 8

The Effect of Cardiac Resynchronization on Morbidity and Mortality in Heart Failure CARE HF (514 patients)

Objectif primaire : Décès de toute cause et hospitalisation

Objectif secondaire : Décès de toute cause

H. Ong J. Med 2005;352:1339-46

diapositive 11

Stage C Therapy (Reduced LVEF with Symptoms)

Cardiac Resynchronization

I Bx IIb II

Patients with LVEF less than or equal to 35%, sinus rhythm, and NYHA functional class III or ambulatory class IV symptoms despite recommended, optimal medical therapy and who have cardiac dyssynchrony, which is currently defined as a QRS duration greater than 120 ms, should receive cardiac resynchronization therapy unless contraindicated.

Guidelines ACC/AHA 2005

diapositive 9

Prédicteurs de succès ou d'insuccès
Au-delà de la largeur du QRS...

Présence d'asynchronie intraventriculaire chez 90 patients avec IC sévère, FEVG < 35%:

- < 120ms: 27%
- 120-150ms: 60%
- >150ms: 70%

J. Cardiovasc. Electrophysiol. 2004;15:634-9

diapositive 12

Perspectives d'avenir...

- Bénéfices chez les patients en CF II?
- Bénéfices chez des patients avec QRS plus étroits?
- Raffinement des méthodes échographiques de mesures d'asynchronie
- Doit-on mieux évaluer l'anatomie veineuse avant l'implantation?
- Doit-on mieux évaluer la viabilité du territoire à stimuler?

GILLES O'HARA, M.D.

Biographie

EDUCATION

Médecine	Faculté de Médecine Université de Montréal Montréal (Québec) Canada	1978-1983
Internat	Unidisciplinaire: Médecine Centre Hospitalier Universitaire Sherbrooke (Québec) Canada	1983-1984
Résidence	Médecine Centre Hospitalier Universitaire Sherbrooke (Québec) Canada Cardiologie	1984-1986
	Centre Hospitalier Universitaire Sherbrooke (Québec) Canada	1986-1987
	Cardiologie Institut de Cardiologie de Montréal Montréal (Québec) Canada	1987-1988
Fellowship	Electrophysiologie clinique Directeur : D ^r Hein J.J. Wellens Academic Hospital Université du Limburg Maastricht, Hollande	1988-1989
	Electrophysiologie fondamentale (80 %) Electrophysiologie clinique (20 %) Directeurs : D ^r Stanley Nattel D ^r Denis Roy Institut de Cardiologie de Montréal Montréal (Québec) Canada	1989-1990

POSTES UNIVERSITAIRES ET ADMINISTRATIFS :

Professeur adjoint de clinique Service de Cardiologie Département de Médecine Université de Sherbrooke	1990-1992
Directeur Service d'arythmie et d'électrophysiologie Département de Médecine Université de Sherbrooke	1990-1993

Membre Comité de Pharmacologie Faculté de Médecine Université de Sherbrooke	1991-1993
Directeur Laboratoire non-invasif Département de Médecine Université de Sherbrooke	1991-1993
Professeur adjoint Service de Cardiologie Département de Médecine Université de Sherbrooke	1992-1993
Membre Comité interne FRSQ Programme de bourse 2 ^e et 3 ^e cycle	1992-1995
Professeur subventionnel Cardiologue et électrophysiologiste Service de cardiologie, Hôpital Laval Université Laval, Québec	1993-1997
Membre Comité de réanimation Hôpital Laval	1993-2003
Membre Jury examen cardiologie Collège des médecins du Québec	1994-2003
Président Société des cardiologues de Laval Hôpital Laval	1995-...
Membre Conseil d'administration Société de cardiologie de Québec	1996-2002
Membre Comité de formation médicale continue Association des cardiologues du Québec	1999-...
Chef Secteur d'électrophysiologie Institut de cardiologie Hôpital Laval	2001-...
Président Société de cardiologie de Québec	2002-2004

Membre 2003-...
Conseil d'administration
APODIQ - Association des Porteurs de défibrillateurs
Implantables du Québec

Vice président 2003-...
Jury examen cardiologie
Collège des médecins du Québec

DIPLOMES :

M.D. Faculté de Médecine 1983
Université de Montréal
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L.M.C.C. 1983
Licence du Conseil Médical du Canada
Université de Montréal
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C.S.P.Q. Certificat des Spécialistes de la 1987
Province de Québec - Médecine Interne

F.R.C.P.(C) Fellow du Collège Royal des Médecins 1987
(Canada) - Médecine Interne

C.S.P.Q. Certificat des Spécialistes de la 1988
Province de Québec - Cardiologie

F.A.C.C. Fellow of American College of Cardiology 1992

ASSOCIATIONS MEDICALES :

Membre Fédération des Médecins Résidents 1983-1988
et Internes du Québec

Membre Association des Médecins de Langue 1978-....
Française du Canada

Membre Canadian Medical Protective Association 1986-....

Membre Collège des Médecins du Québec 1978-....

Associé American College of Physicians 1983-1986

Membre Fédération des Médecins Spécialistes 1987-....
du Québec

Associé Collège Royal des Médecins et 1987-....
Chirurgiens du Canada

Membre Société Canadienne de Cardiologie 1991-....

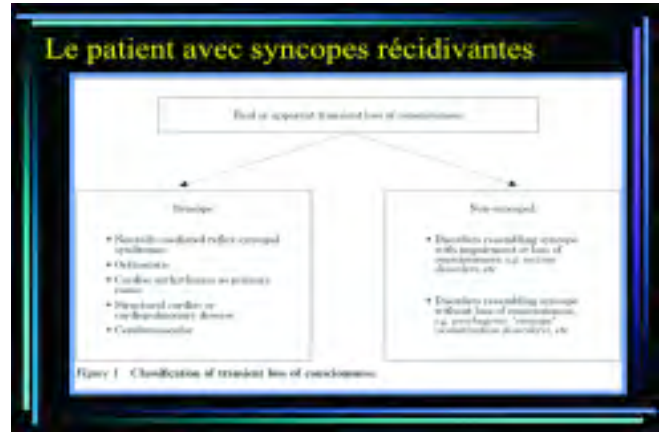
Associé American College of Cardiology 1992-....

diapositive 1

Le patient avec syncopes récidivantes : comment l'investiguer et le traiter

Gilles O'Hara MD
21 avril 2006
Centre Sheraton, Montréal

diapositive 4



diapositive 2

Le patient avec syncopes récidivantes

- Plan
 - Définition et pathophysiologie de la syncope
 - Étiologie de la syncope
 - L'investigation de la syncope
 - Le questionnaire et l'examen physique
 - L'ECG et le Holter
 - L'échographie cardiaque
 - Le massage du sinus carotidien
 - La table basculante
 - Le moniteur sous-cutané (Reveal)
 - L'étude électrophysiologique
 - Quelques mots sur le traitement

diapositive 5

Table 1. Causes of syncope

1. Neuro-cardiogenic reflex syncope	• Vasovagal
2. Orthostatic	• Postural hypotension
3. Cardiac arrhythmias as primary cause	• Sinus bradycardia
4. Structural cardiac or cardiovascular disease	• Aortic stenosis
5. Cardiovascular	• Coronary artery disease
6. Disorders resembling syncope with impairment of flow of consciousness	• Epilepsy
7. Disorders resembling syncope without loss of consciousness	• Post-epileptic 'coma'
8. Metabolic derangements	• Hypoglycaemia
9. Seizure disorders	• Epilepsy
10. Post-epileptic 'coma'	• Epilepsy
11. Metabolic derangements	• Hypoglycaemia
12. Hypotension	• Postural hypotension
13. Hypovolaemia	• Dehydration
14. Anemia	• Iron deficiency
15. Hypoxia	• Hypoxemia
16. Hyperventilation	• Hyperventilation
17. Hypertension	• Hypertension
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diapositive 3

Le patient avec syncopes récidivantes

- Définition: Perte de conscience subite et temporaire avec perte du tonus postural et qui récupère spontanément
- Pathophysiologie: Réduction transitoire du flot sanguin cérébral

diapositive 6

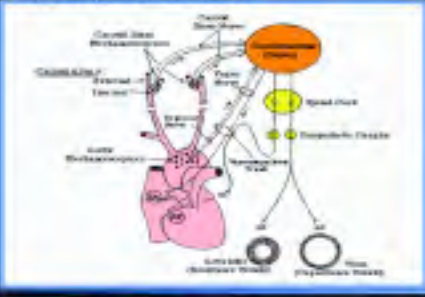
Le patient avec syncopes récidivantes

- Les syncopes réflexes
 - Neuro-cardiogénique (vaso-vagale)
 - À la toux
 - Mictionnelle
 - Situationnelle
 - De déglutition

diapositive 7

Le patient avec syncopes récidivantes

- Les syncopes réflexes



diapositive 10

Le patient avec syncopes récidivantes

- Les arythmies cardiaques
 - La maladie du sinus
 - Les blocs AV
 - Les TSVP et les TV
 - Les syndromes héréditaires (Long QT, Brugada, etc.)
 - Dysfonction de cardiostimulateur ou CDI
 - Pro-arythmie

diapositive 8

Le patient avec syncopes récidivantes

- L'hypotension orthostatique
 - Chute de 20 mmHg de systolique ou 10 mmHg de diastolique en < de 3 min après s'être levé
 - Souvent pire au lever le AM ou postprandial

diapositive 9

Le patient avec syncopes récidivantes

- L'hypotension orthostatique
 - Causes:
 - Médicaments
 - Hypovolémie
 - Dysautonomies
 - Immobilisation prolongée
 - Idiopathique

VIDAL ESSEBAG, M.D.

Biographie

Vidal Essebag a gradué de la faculté de médecine de l'Université McGill en 1997. Il a depuis complété sa formation en médecine interne et cardiologie au Centre Universitaire de Santé McGill (CUSM), ainsi qu'une maîtrise et un doctorat en épidémiologie et biostatistiques à l'Université McGill. Ensuite, il a complété une formation en électrophysiologie interventionnelle ainsi que de la recherche en fibrillation auriculaire à l'Université Harvard. Sa recherche a été supporté par les Fonds de Recherche en Santé du Québec (FRSQ), la Fondation des maladies du Coeur du Canada, et les Instituts de Recherche en Santé du Canada (IRSC). Actuellement, il est professeur adjoint à l'Université McGill et électrophysiologiste au CUSM et à l'Hôpital du Sacre-Coeur de Montréal.

CCS Consensus Conference 2003: Assessment of the cardiac patient for fitness to drive and fly – Executive summary

Primary Panel

Chris Simpson MD (Co-Chair), Kingston, Ontario;
David Ross MD (Co-Chair), Edmonton, Alberta;
Paul Dorian MD, Toronto, Ontario;
Vidal Essebag MD, Montreal, Quebec;
Anil Gupta MD, Brampton, Ontario;
Robert Hamilton MD, Toronto, Ontario;
Stephen Hart MD, Fredericton, New Brunswick;
Barry Hoffmaster PhD, London, Ontario;
George Klein MD, London, Ontario;
Andrew Krahn MD, London, Ontario;
Peter Kryworuk LLB, London, Ontario;
L Brent Mitchell MD, Calgary, Alberta;
Paul Poirier MD, Quebec, Quebec;
Heather Ross MD, Toronto, Ontario;
Magdi Sami MD, Montreal, Quebec;
Francois Sestier MD, Montreal, Quebec;

Robert Sheldon MD PhD, Calgary, Alberta;
Chris Soder MD, Halifax, Nova Scotia;
Jim Stone MD, Calgary, Alberta;
Jan Surkes MD, Langley, British Columbia;
Claude Thibeault MD, Montreal, Quebec;
Michael Tyrrell MD, Saskatoon, Saskatchewan;
Andreas Wielgosz MD, Ottawa, Ontario

Secondary Panel

Jawed Akhtar, David Borts, Joanne Braithwaite
(for the Saskatchewan Government Insurance
Medical Review Unit);
Eric Cohen, Louise Costa (Driver Improvement
Office, Ontario Ministry of Transportation);
Jack Hirsh, Henryk Kafka, Joel Niznick, Neil Swirsky,
Mario Talajic, Daniel Tessier (VP Public Affairs,
Canadian Automobile Association);
Guy Tremblay

C Simpson, D Ross, P Dorian, et al. CCS Consensus Conference 2003: Assessment of the cardiac patient for fitness to drive and fly – Executive summary. *Can J Cardiol* 2004;20(13):1313-1323.

Nearly every Canadian physician is called on from time to time to assess the fitness of a patient to either drive a motor vehicle or fly in an aircraft. Cardiac patients comprise a distinct group of patients who frequently require such an evaluation. In fact, many Canadian jurisdictions have legislated mandatory physician reporting requirements for drivers who may be unfit to drive for medical reasons. These guidelines aim to serve both physicians and policy-makers who must assess the fitness of cardiac patients to drive and fly. As much as possible, they are derived from scientific principles and objective assessments of risk. Summary tables of recommendations, organized by disease or condition, are presented.

Key Words: Arrhythmias; Cardiac disease; Heart failure; Motor vehicle accidents; Public policy; Syncope

MESSAGE FROM THE CO-CHAIRS

Every year, the Canadian Cardiovascular Society sponsors a consensus conference. These conferences have traditionally produced documents that have served to provide guidance to the profession regarding topical or controversial issues.

This year's conference, "Assessment of the Cardiac Patient for Fitness to Drive and Fly", first convened in October 2002. Our primary panel was divided into two subgroups, the "Drive" subgroup and the "Fly" subgroup, which met separately and developed two sets of recommendations. This executive summary document is similarly organized into two major sections:

"Assessment of the cardiac patient for fitness to drive", and "Assessment of the cardiac patient for fitness to fly".

This year's consensus conference has been a collaborative effort involving both physicians and nonphysician stakeholders from across Canada. We are grateful to the volunteer members of the primary and secondary panels who have worked diligently toward the creation of this document. Our hope is that these guidelines will serve as a practical aid to those involved in the assessment of cardiac patients' fitness to drive and fly.

David Ross MD
Chris Simpson MD

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IV. VALVULAR HEART DISEASE

1. Medically treated valvular heart disease

	Private driving	Commercial driving
Aortic stenosis	NYHA class I or II No episodes of impaired level of consciousness	Asymptomatic NYHA class I AVA ≥ 1.0 cm ² EF $\geq 35\%$
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 $\geq 35\%$

2. Surgically treated valvular heart disease

	Private driving	Commercial driving
Mechanical prostheses Mitral bioprostheses with nonsinus rhythm Mitral valve repair with nonsinus 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 $\geq 35\%$

AVA Aortic valve area; EF Ejection fraction; NYHA New York Heart Association

V. CONGESTIVE HEART FAILURE, LEFT VENTRICLE DYSFUNCTION, CARDIOMYOPATHY AND TRANSPLANTATION

	Private driving	Commercial driving
NYHA class I	No restriction	EF $\geq 35\%$
NYHA class II	No restriction	EF $\geq 35\%$
NYHA class III	No restriction	Disqualified
NYHA class IV	Disqualified	Disqualified
Receiving intermittent outpatient or home inotropes	Disqualified	Disqualified
Left ventricular assist device	Disqualified	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 Annual noninvasive test of ischemic burden showing no evidence of active ischemia

EF Ejection fraction; NYHA New York Heart Association

VI. 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

Despite that specific legislation obliges physicians to report at-risk drivers, many physicians have misgivings about doing so. Reported reasons for this reluctance include the following:

- The physician's role as patient advocate: Mandatory reporting may be interpreted as not being in the patient's best interests.
- The consequences of reporting relative to future health care: Mandatory reporting may cause patients to withhold information vital to their care to regain or maintain their driving privileges.
- Perceived deficiencies of the compulsory reporting mechanism:
 - No way to 'temporarily suspend' driving privileges: There appears to be no mechanism in many jurisdictions to 'temporarily suspend' driving privileges for medical conditions that increase

SUMMARY TABLE OF RECOMMENDATIONS

- Where more than one set of circumstances or conditions coexist, the more restrictive recommendation prevails, unless stated otherwise.
- 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.

I. CORONARY ARTERY DISEASE

	Private driving	Commercial driving
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 h 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 h 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	No restrictions
PCI	48 h after PCI	7 days after PCI
3. Cardiac surgery for coronary artery disease		
CABG surgery	1 month after discharge	3 months after discharge

*Minor left ventricle (LV) damage is classified as a myocardial infarction (MI) defined only by elevated troponin with or without electrocardiogram 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. CABG Coronary artery bypass graft; PCI Percutaneous coronary intervention

II. DISTURBANCES OF CARDIAC RHYTHM, ARRHYTHMIA DEVICES AND PROCEDURES

1. Ventricular arrhythmias

	Private driving	Commercial driving
VF (no reversible cause)	6 months after event	Disqualified
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, satisfactory control	Disqualified
Sustained VT with no impairment of consciousness; LVEF ≥30%; ICD has not been recommended	4 weeks after event, satisfactory control	3 months after event
Nonsustained VT with no associated impairment of consciousness	No restriction	No restriction

*Examples include, but are not limited to, ventricular fibrillation (VF) within 24 h of myocardial infarction; VF during coronary angiography; VF with electrocution and 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. ICD Implantable cardioverter defibrillator; LVEF Left ventricular ejection fraction; VT Ventricular tachycardia

2. Paroxysmal supraventricular tachycardia, atrial fibrillation or atrial flutter

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

Drivers should receive chronic anticoagulation if clinically indicated (atrial fibrillation/atrial flutter)

3. Persistent or permanent atrial fibrillation or atrial flutter

	Private driving	Commercial driving
Adequate ventricular rate control, no impaired level of consciousness	No restriction; chronic anticoagulation if clinically indicated	

4. Sinus node dysfunction

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

Continued on next page

Continued from previous page

5. Atrioventricular (AV) and Intra-ventricular block

	Private driving	Commercial driving
Isolated first-degree AV block	No restriction	No restriction
Isolated right bundle branch block (RBBB)	No restriction	No restriction
Isolated left anterior fascicular block	No restriction	No restriction
Isolated left posterior fascicular block	No restriction	No restriction
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 h Holter
Bifascicular block Second-degree AV block; Mobitz I First-degree AV block + bifascicular block	} Disqualified	} Disqualified
Second-degree AV block; Mobitz II (distal AV block)		
Alternating LBBB and RBBB		
Acquired third-degree AV block	Disqualified	Disqualified
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 ms; and no documented pauses ≥ 3 s on an annual 24 h Holter

If a permanent pacemaker is implanted, the recommendations in section 6 (below) prevail

6. Permanent pacemakers

	Private driving	Commercial driving
All patients	Waiting period 1 week after implant No impaired level of consciousness after implant Normal sensing and capture on electrocardiogram No evidence of pacemaker malfunction at regular pacemaker clinic checks	Waiting period 1 month after implant No impaired level of consciousness after implant Normal sensing and capture on electrocardiogram No evidence of pacemaker malfunction at regular pacemaker clinic checks

7. Implantable cardioverter defibrillators (ICDs)

	Private driving	Commercial driving
Primary prophylaxis; NYHA class I to III	4 weeks after implant	Disqualified†
A primary prophylaxis ICD has been recommended but declined by the patient	No restriction	Disqualified†
Secondary prophylaxis for VF or VT with decreased level of consciousness; NYHA class I to III	6 months after event*	Disqualified†
Secondary prophylaxis for sustained VT with no accompanying decreased level of consciousness; NYHA class I to III	1 week post-implant, in addition to the appropriate waiting period for the VT (see section II [1])	Disqualified†
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	Disqualified†

*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 ventricular tachycardia (VT), or syncope judged to be likely due to VT or cardiac arrest. For patients who have a bradycardia indication for pacing as well, the additional criteria under section II (B) 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 believed to be 1% or less. ATP: Antitachycardia pacing; NYHA: New York Heart Association; VF: Ventricular fibrillation

B. Other

	Private driving	Commercial driving
Brugada's syndrome; long QT syndrome; arrhythmogenic right ventricular cardiomyopathy	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 h after discharge	1 week after discharge

*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 driving despite the diagnosis of one of these diseases, provided the annual risk of sudden incapacitation is believed to be 1% or less

III. SYNCOPE

	Private driving	Commercial driving
Single episode of typical vasovagal syncope*	No restriction	No restriction
Diagnosed and treated cause (eg, permanent pacemaker for bradycardia)	Wait 1 week after treatment	Wait 1 month after treatment
Reversible cause (eg, hemorrhage, dehydration)	Successful treatment of underlying condition	
Situational syncope with avoidable trigger (eg, micturition syncope, defecation syncope)	Wait 1 week	Wait 1 week
Single episode of unexplained syncope	Wait 1 week	Wait 12 months
Recurrent (within 12 months) vasovagal syncope	Wait 1 week	Wait 12 months
Recurrent episode of unexplained syncope (within 12 months)	Wait 3 months	Wait 12 months
Syncope due to documented tachyarrhythmia, or inducible tachyarrhythmias at EPS	Refer to section II	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 proclivity to pick the vehicle to the road side to a stop before losing consciousness. If vasovagal syncope is atypical, the restrictions for "unexplained" syncope apply. EPS: Electrophysiology study

Assessment of the cardiac patient for fitness to drive: Drive subgroup executive summary

"Drive" subgroup:

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In 1992, the Canadian Cardiovascular Society (CCS) Consensus Conference document, "Assessment of the cardiac patient for fitness to drive", was published (1). As a result of significant advances in the investigation and management of patients with arrhythmias and syncope, an update of that consensus document was published in 1996 (2). Now, seven years after that 1996 update document, the time has come once again to re-examine this very important issue.

RISK OF HARM FORMULA

The Panel acknowledges, with gratitude, the work of the previous task force that produced the 1992 and 1996 documents. Under the leadership of Dr Jim Brennan, the Panel developed the groundbreaking "Risk of Harm" formula (Appendix A), which, for the first time, allowed the assignment of a quantitative level of risk to drivers with cardiac disease. The development of this quantitative approach included a definition of the risk that society had previously considered to be acceptable. This standard of acceptable risk served as the benchmark against which all other drivers with cardiac disease could be measured.

The reader is encouraged to refer to Appendix A for the derivation of the Risk of Harm formula. Based on the available literature, it was determined that a commercial driver (eg, a tractor-trailer operator) who faces a 1% risk of sudden cardiac incapacitation (SCI) in the next year poses a one in 20,000 risk of death or serious injury to other road users or bystanders. Set as the standard, this annual one in 20,000 risk can be applied in turn to a private driver to determine the annual risk of SCI that would pose the same overall risk to society. Because private drivers spend much less time on the road, and because they drive vehicles that are less likely to cause harm in the event that an accident actually does occur, it can be calculated that a private driver with a 22% annual risk of SCI also poses a risk to society of one in 20,000. Therefore, a private driver with a 22% chance of having a sudden incapacitating event in the next year poses no greater risk to society than does a tractor-trailer driver with a 1% chance of having a sudden incapacitating cardiac event over the same time period.

The current Panel has chosen to build on the solid foundation established by the previous task force. The updated recommendations reflect new information that has become available in the literature over the past seven years, but the Risk of Harm formula remains the major assessment tool.

TABLE OF RECOMMENDATIONS

Like the previous task force, the current Panel has chosen to present the recommendations in a tabular format to facilitate easy reference. The sections in the Summary Table of

Recommendations that have undergone the most change and clarification are disturbances of cardiac rhythm, syncope, congestive heart failure and hypertrophic cardiomyopathy. Other sections have undergone less extensive change. The reader is directed to the full report (available on the CCS Web site at <www.ccs.ca>) for more in-depth detail regarding these and other recommendations.

Specific recommendations for cardiac patients' fitness to drive are found in the Summary Table of Recommendations.

LEVEL OF EVIDENCE

There are no prospective, controlled studies where patients have been randomly assigned to permit or to proscribe the driving privilege, or where patients have been randomly assigned to receive or not to receive a physician's advice not to drive. Furthermore, the defined standard of risk used in this document, while sensibly derived, is arbitrary and was not based on any evidence other than what had been acceptable historically. Given that all recommendations for driving eligibility are based on a comparison with this arbitrary standard, they are based on expert opinion only. Wherever possible, best evidence was used to calculate the risks of driving, but it should be noted that the evidence itself does not support or deny driving license restrictions for cardiac patients or the mandatory reporting of such patients by their physicians.

The Panel has made an effort to consider the inherently subjective nature of society's tolerance for risk, while also applying a scientifically based risk assessment mechanism in an effort to make the recommendations not just acceptable to society, but also consistent and justifiable.

PHYSICIAN REPORTING OF CARDIAC PATIENTS WHO ARE POTENTIALLY UNFIT TO DRIVE

The Panel acknowledges that the use of these guidelines to identify drivers who may pose a risk to others is only one part of the physician's role in protecting patients and the public. Physicians are obliged to disclose this risk to their high-risk patients and to advise them not to drive. Seven Canadian provinces and all three territories have mandatory physician-reporting legislation, which requires physicians to report to the appropriate regulatory authorities all patients who may be at an increased risk when operating a motor vehicle because of a medical condition. The remaining three provinces have a discretionary reporting system, although one province (British Columbia) mandates that physicians must report patients who have been warned not to drive but continue to do so. Refer to Appendix B for a review of legislation in Canadian jurisdictions.

the risk to drive for a prespecified and finite time period. Drivers may even receive notification of license suspension after the period of high risk has passed.

- o Difficulties with reinstatement of driving privileges: There is a perception that the process is slow and cumbersome for both patients and physicians, leading to suspension periods that are longer than had been intended.

As a result, it is acknowledged that there is widespread physician noncompliance with mandatory reporting legislation. Physicians often make personal contracts with their high-risk patients not to drive, or they simply advise their patients not to drive.

EFFICACY OF MANDATORY REPORTING LEGISLATION

The quest to make the roads and highways safer for all of us is laudable. However, although removing high-risk drivers intuitively makes sense, there is surprisingly little evidence that supports mandatory physician reporting as an effective means to increase road safety. As with any intervention, all benefits, risks and costs must be considered to make a rational judgment regarding the efficacy of the intervention. Unfortunately, there remain many unanswered questions with respect to mandatory reporting, including the following:

- How many motor vehicle accidents are caused by patients with cardiac disease who have had a sudden incapacitating event? That is, what is the scope of the problem?
- Of the patients who do have a sudden incapacitating event behind the wheel, how many had been previously diagnosed with a disqualifying condition? That is, how many would have been identified by a physician-reporting scheme?
- Of patients with license suspensions, how many continue to drive anyway? That is, what is the efficacy of the intervention?
- How many patients with cardiac disease need to be removed from driving to prevent one accident? Save one life? That is, what is the 'number needed to treat'?
- What are the consequences to the physician-patient relationship and the subsequent quality of care when physicians report their patients to the Ministry or other regulatory authority? That is, what are the costs of the intervention to the physician-patient relationship?
- What are the economic, social and health (including psychological) impacts on patients whose licenses are suspended for medical reasons? That is, what are the costs of the intervention to the patient?
- How much do provinces with mandatory reporting legislation spend annually on the identification, suspension and evaluation of medically unfit drivers? That is, what are the costs of the intervention to society?

- Does a mandatory reporting system remove more unfit drivers from the roads than simple physician advice to the patient to not drive? That is, what is the incremental benefit of the intervention?
- Do drivers with cardiac disease impose limitations on themselves? That is, do they change their driving behaviour instinctively to reduce overall risk?
- How does the risk posed by drivers with cardiac illness compare with that posed by other definable groups? That is, do drivers with cardiac illness pose a greater risk than other, apparently acceptable drivers, including young and elderly drivers, drivers who work shift work, drivers who eat or drink while driving, and drivers who use cellphones?

The evidence addressing these questions is sparse. Indeed, many people believe that mandatory reporting may be doing more overall harm than good. However, the Panel recognizes that there is a societal expectation that drivers prone to sudden incapacitation, including those with cardiac disease, must have their driving privileges restricted to a level compatible with public safety. Accordingly, in the absence of more compelling evidence, our recommendations must err on the side of public safety. However, uncertainty about the efficacy of mandatory physician reporting compels the Panel to call for investigations to address these questions. The Panel also suggests that the regulatory agencies in Canadian jurisdictions that require physician reporting minimize the negative impact on patients and physicians by creating and maintaining open, transparent, accountable and timely driver evaluation mechanisms.

General recommendation 1

The Panel recommends further research to examine the efficacy and cost-effectiveness of mandatory and discretionary physician-reporting systems, as well as the economic, social, health and quality of life impact of such systems on drivers with cardiac disease and other potentially disqualifying medical conditions.

General recommendation 2

The Panel recommends that regulatory agencies in jurisdictions where physician reporting is compulsory should work toward an open, transparent, accountable and timely driver evaluation process to minimize the negative impact on drivers whose licenses are under review or suspension.

General recommendation 3

The Panel recommends that physicians practising in mandatory reporting jurisdictions recognize that current legislation indicates that the physicians' duty to report patients who may be unsafe drivers supersedes the physician's duty to an individual patient. Physicians are encouraged to err on the side of caution when considering the fitness of cardiac patients to drive.

IMPLEMENTATION

With the proliferation of practice guidelines for many diseases and conditions, it is becoming increasingly difficult for physicians to stay abreast of the current body of medical knowledge.

In an effort to reach as many physicians as possible, members of the Panel will actively execute an implementation strategy over the coming year and beyond to disseminate this report, to foster and encourage research, and to create an environment in which the recommendations can be easily accessed. The implementation strategy includes the following:

1. Presentation of the Executive Summary and Main Document at the 2003 Canadian Cardiovascular Congress.
2. Incorporation of feedback and approval of the Executive Summary and Main Document by the CCS membership and Council.
3. Completion of the full manuscript and submission for peer-reviewed publication.
4. Distribution of the Executive Summary and Main Document to provincial and territorial regulatory authorities and to the Canadian Council of Motor Transport Administrators (CCMTA).
5. Distribution of the Executive Summary and Main Document to the Canadian Medical Association (CMA) to allow for integration into the CMA guidelines.

6. Development of a PowerPoint (Microsoft Corporation, USA) presentation for use by educators.
7. Distribution of a printed handbook for distribution to the CCS membership and provincial and territorial regulatory authorities, and posting of the final version of PowerPoint slides and PDFs in a downloadable format on the CCS Web site.
8. Establishment of contact with the Family Medicine and Internal Medicine communities to facilitate distribution of guidelines.
9. Engagement of stakeholders to facilitate research initiatives.

General recommendation 4

The Panel recommends the development of a longitudinal strategy to maximize the dissemination and implementation of these guidelines and to foster research in this area.

REFERENCES

1. Assessment of the cardiac patient for fitness to drive. *Can J Cardiol* 1992;8:406-19.
2. Assessment of the cardiac patient for fitness to drive: 1996 update. *Can J Cardiol* 1996;12:1164-70,1175-82.

DEFINITIONS

MET (metabolic equivalent): One MET is the resting oxygen consumption in the seated position and is equivalent to 3.5 mL/kg/min.

Private driver: A driver who drives fewer than 36,000 km/year or spends fewer than 720 h/year behind the wheel, drives a vehicle weighing less than 11,000 kg and does not earn a living by driving.

Commercial driver: Any licensed driver who does not fulfill the above definition of a private driver.

Waiting period: The time interval following the 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 applies, the longer one should be used, except where stated otherwise.

Satisfactory control (for supraventricular tachycardia [SVT], atrial fibrillation [AF] or atrial flutter [AFL] that is associated with cerebral ischemia):

- Of SVT: Successful radiofrequency ablation of the substrate, plus an appropriate waiting period (see section II [8]), or a three-month waiting

period on medical therapy with no recurrence of SVT associated with cerebral ischemia during this time.

- Of AF/AFL: A three-month waiting period after appropriate treatment during which there have been no recurrences of symptoms associated with cerebral ischemia. If AF is treated with atrioventricular 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 ventricular tachycardia (VT) with a left ventricular ejection fraction greater than or equal to 40% and no associated cerebral ischemia: Successful ablation of the substrate plus a one-week waiting period, or pharmacological treatment plus the appropriate waiting period defined in section II (1).

Sustained VE VT having a cycle length of 500 ms or less, and lasting 30 s or more or causing hemodynamic collapse.

Nonsustained VT: VT of three beats or more, having a cycle length of 500 ms or less, and lasting less than 30 s without hemodynamic collapse.

APPENDIX A

Risk of Harm Formula Derivation

The risk of harm (RH) to other road users posed by the driver with heart disease is assumed to be directly proportional to the following:

- time spent behind the wheel or distance driven in a given time period (TD);

- type of vehicle driven (V);
- risk of sudden cardiac incapacitation (SCI); and
- the probability that such an event will result in a fatal or injury-producing accident (AC).

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Expressing this statement as Formula 1:

$$RH = TD \times V \times SCI \times Ac$$

Fewer than 2% of reported incidents of driver sudden death or loss of consciousness have resulted in injury or death to other road users or bystanders (1-4). In Formula 1, therefore, $Ac=0.02$ for all drivers.

There is evidence that loss of control of a heavy truck or passenger-carrying vehicle results in a more devastating accident than loss of control of a private automobile (5). Truckers are involved in only approximately 2% of all road accidents but in approximately 7.2% of all fatal accidents (3). In Formula 1, if $V=1$ for a commercial driver, then $V=0.28$ for a private driver.

There is no published standard or definition of what level of risk is considered to be acceptable in Canada even though this is crucial in the formulation of guidelines based on the probability of some event occurring in a defined time period. It was necessary, therefore, to develop such a standard.

For several years, the guidelines of the Canadian Cardiovascular Society, the Canadian Medical Association, and the Canadian Council of Motor Transport Administrators have permitted the driver of a heavy truck to return to that occupation following an acute myocardial infarction provided that he or she is functional class I with a negative exercise stress test at seven metabolic equivalents, has no disqualifying ventricular arrhythmias and is at least three months post-infarct. On the basis of available data, however, such a person cannot be assigned a risk lower than 1% of cardiac death in the next year. The risk of sudden death would be lower than this but would be at least partially offset by the risk of other suddenly disabling events such as syncope or stroke. For such a person, SCI is estimated to be equal to 0.01 in Formula 1.

It may be assumed that the average commercial driver spends 25% of his or her time behind the wheel (3). Thus, in Formula 1, $TD=0.25$. As indicated above, V may be assigned a value of 1 for commercial drivers and $Ac=0.02$ for all drivers.

Substituting into Formula 1:

$$\begin{aligned} RH &= TD \times V \times SCI \times Ac \\ &= 0.25 \times 1 \times 0.01 \times 0.02 \\ &= 0.00005 \end{aligned}$$

Allowing such a driver on the road is associated with an annual risk of death or injury to others of approximately one in 20,000 (0.00005). This level of risk appears to be generally acceptable in Canada.

A similar standard may be applied to the driver of a private automobile. The average private driver spends approximately 4% of his or her time behind the wheel ($TD=0.04$) (6). As indicated above, for such a driver, $V=0.28$ and $Ac=0.02$. The acceptable yearly risk of sudden death or cardiac incapacitation for such a person would be calculated as follows:

$$\begin{aligned} RH &= TD \times V \times SCI \times Ac \\ 0.00005 &= 0.04 \times 0.28 \times SCI \times 0.02 \\ SCI &= 0.223 \end{aligned}$$

Thus, the private automobile driver with a 22% risk of sustaining an SCI in the next year poses no greater threat to public safety than the heavy truck driver with a 1% risk.

Finally, for the commercial driver who drives a light vehicle, such as a taxicab or delivery truck, $V=0.28$ and $TD=0.25$, placing them at a risk between that of the private driver and that of the tractor-trailer driver.

Adapted with permission from the Canadian Journal of Cardiology.

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4. Antecol DH, Roberts WC. Sudden death behind the wheel from natural disease in drivers of four wheeled motor vehicles. *Am J Cardiol* 1980;65:1329-35.
5. Ontario Ministry of Transportation. 1987 Ontario Road Safety Annual Report. Toronto: Ontario Ministry of Transportation, 1987.
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APPENDIX B

Regulations governing reporting of medically unfit drivers and protection for physicians

Jurisdiction	Reporting	Medical doctor protection for reporting	Legislation
Alberta	Discretionary	Protected	Motor Vehicle Administration Act, R.S.A. 1980, c. M-22
British Columbia	Mandatory if the unfit driver has been warned not to drive but continues to do so	Not protected	Motor Vehicle Act, R.S.B.C. 1986, c. 318
Manitoba	Mandatory	Protected	Highway Traffic Act, S.M. 1965-1966, c3-Cap.H60 (consolidated to February 1996)
New Brunswick	Mandatory	Protected	Motor Vehicle Act, R.S.N.B., c. M-17, 1973 as amended by S.N.B. 1994, c. 4, s. 6
Newfoundland and Labrador	Mandatory	Protected	Highway Traffic Act, R.S.N. 1990, cH-3 as amended by S.N. 1992, c. 26, s.1
Northwest Territories (NWT)	Mandatory	Protected, unless acting maliciously or without reasonable grounds	Motor Vehicles Act, R.S. N.W.T. 1988, c. M-16
Nunavut (currently applying NWT legislation)	Mandatory	Protected, unless acting maliciously or without reasonable grounds	Motor Vehicles Act, R.S. N.W.T. 1988, c. M-16
Nova Scotia	Discretionary	Protected	Motor Vehicle Act, R.S.N.S. 1989, c. 293
Ontario	Mandatory	Protected	Highway Traffic Act, R.S.O. 1980, c. H.8
Prince Edward Island	Mandatory	Protected	Highway Traffic Act, R.S.P.E.I. 1988, cH-3
Quebec	Discretionary	Protected	Highway Safety Code, C-24.2
Saskatchewan	Mandatory	Protected	Vehicle Administration Act, S.S. 1986, c. V-2.1 as amended by the Highway and Vehicle Statutes Amendment Act 1986, c. 29, s. 35
Yukon	Mandatory	Protected	Motor Vehicle Act, R.S.Y. 1986, c. 118

Source: CMA Guidelines for Fitness to Drive, 2000

Assessment of the cardiac patient for fitness to fly: Flying subgroup executive summary

"Fly" subgroup:

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Clinicians are increasingly called on to advise patients with cardiovascular disease of their fitness to fly commercially, both for the patient's own personal enjoyment and in the context of interfacility transfers for medical care.

This section of the report deals with the fitness of people with cardiovascular disease to fly on commercial airlines and some related topics, including recommendations for deep venous thrombosis prophylaxis during flight and the effects of airport screening devices on defibrillators and pacemakers. It specifically does not deal with the fitness of aviation personnel to perform their duties, which is subject to recently revised Transport Canada guidelines. Those interested can view the Transport Canada guidelines at <<http://www.tcc.gc.ca/CivilAviation/Cans/TP13312-2/cardiovascular/menu.htm>>.

In most instances, the recommendations that follow are based on expert opinion rather than data because there are limited data available (1-6). They are derived, largely, from a consensus document developed by a working group from the Canadian Cardiovascular Society and published in 1998 (1).

Additional guidelines for ill passenger travel may be found at the Aerospace Medical Association Web site at <www.asma.org>.

AIR TRAVEL AND CARDIOVASCULAR PATIENTS

Air travel imposes on cardiac patients both general stresses (eg, travelling through crowded airports, transporting luggage) and specific stresses related to the aircraft environment. Stresses specific to the aircraft environment include lowered humidity, relative confinement in a cramped space and, most important, reduced barometric pressure while in flight. In addition, medical care is relatively inaccessible to patients for the duration of the flight. Where feasible, exercise testing to determine functional capacity should be performed before determining whether a patient with cardiovascular disease is fit to fly.

Physicians should be aware that all Canadian registered aircraft with more than 100 passenger seats carry an emergency medical kit. Some airlines carry automatic external defibrillators and, as of April 2004, all American airlines are required to have one on board all aircraft with at least one flight attendant. At present, there are no plans to make defibrillators mandatory on Canadian registered aircraft. Some airlines only permit trained flight attendants to operate the defibrillators because volunteering physicians may be unfamiliar with the equipment.

SUMMARY TABLE OF RECOMMENDATIONS

I. INDICATIONS FOR OXYGEN DURING COMMERCIAL AIRLINE FLIGHTS

Partial pressure of arterial oxygen less than 70 mmHg at sea level	Cyanotic congenital heart disease
Angina functional class II symptoms	Pulmonary hypertension/right heart failure
Heart failure functional class III symptoms	

II. RECOMMENDATIONS FOR SPECIFIC CARDIOVASCULAR CONDITIONS

Condition	NYHA functional class	Travel by commercial airline
Angina pectoris	I and II	Nonrestriction
	III	Supplemental oxygen required
	IV	Only if medically necessary and accompanied ^f
Post-MI	I	1 to 2 weeks for repatriation if uncomplicated and successfully revascularized or low risk on angiography/ noninvasive studies
	II to IV	6 to 8 weeks for elective travel
Heart failure	I and II	Only if medically necessary and accompanied ^f
	III	Unrestricted
Valvular disease	I and II	Supplemental oxygen required
	III	Unrestricted. Supplemental oxygen suggested if pulmonary hypertensive
	IV	Supplemental oxygen required
Congenital	I to II	Only if medically necessary and accompanied ^f
	III	Unrestricted. Supplemental oxygen if partial pressure of arterial oxygen <70 mmHg
	IV	Supplemental oxygen required
Post-CABG/ valve surgery	I to II	Only if medically necessary and accompanied ^f
	III to IV	4 days postsurgery and hemoglobin ≥90 g/L if flight <2 h ^f 7 days postsurgery and hemoglobin ≥90 g/L if flight ≥2h
Therapeutic intervention – PCI/ASD closure	I to II	1 day postprocedure
	III to IV	If PCI following MI, follow post-MI guidelines prevail

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Arrhythmia/post-arrhythmia procedure	I to II	Well-controlled supraventricular arrhythmias – unrestricted
	I to II	1 day postprocedure for supraventricular arrhythmias
	I to II	2 days postprocedure for ventricular arrhythmias
	III to IV	Uncontrolled hemodynamically significant ventricular arrhythmias should not fly by commercial aircraft
Post-pacemaker/ICD [†] loop recorder implant	I to II	1 day postimplant if no pneumothorax, and device functions normally and is programmed appropriately
ICD patients	I to II	1 month following last intervention from device associated with severe presyncope/syncope

[†]Accompanied by a physician equipped with an attached electrocardiogram monitor/defibrillator, oxygen and appropriate medication; [‡]If hemoglobin <90 g/L and wishes to avoid transfusion, then supplemental oxygen required. ASD: Atrial septal defect; CABG: Coronary artery bypass graft; ICD: Implantable cardioverter defibrillator; MI: Myocardial infarction; NYHA: New York Heart Association; PCI: Percutaneous coronary intervention

III. AIR MEDICAL TRANSPORT OF CARDIAC PATIENTS

Air medical transport of cardiac patients is increasingly performed for a combination of medical, social and economic reasons. Patients are transported by helicopter (for short distances) or by fixed-wing aircraft (for longer distances) for emergent or elective indications. Previous guidelines have only addressed unescorted commercial airline travel (3-5). While the data on air medical transport of cardiac patients are limited and mostly observational, the results of a recently published study (6) are considered in these recommendations.

Emergency helicopter transport of patients early in the course of acute myocardial infarction (MI) is considered safe, and a recent randomized trial suggested an outcome benefit (7). There are also data suggesting that long-distance emergent air transport is safe and reasonable when local care is inadequate (8). In general, provided that the air ambulance (helicopter or jet) is well staffed and equipped, it is reasonable to emergently transport a patient from a location where the level

of care is less than or equal to that available on board the air ambulance.

For elective long-distance transport (eg, repatriation for economic and/or social reasons), it is important to consider the risks and benefits when deciding the timing and type (eg, medical escort aboard commercial airline versus private air ambulance) of transport. Patients who are post-MI may be transported by commercial airline earlier than the guideline recommendations for air travel if accompanied by a physician equipped with a monitor, defibrillator, medications and oxygen. Data from a few studies suggest that air medical transport by commercial airline is safe for stable patients two weeks post-MI (8-10). In cases where earlier transport is desired, air ambulances with intensive care capabilities may be used. As suggested by another study (11), it is reasonable to electively transport post-MI patients by air ambulance once they are chest pain-free for two to three days.

IV. RECOMMENDATIONS FOR DEEP VEIN THROMBOSIS PROPHYLAXIS WITH LONG-DURATION AIR TRAVEL *

Flight <12 h – all travelers	Avoid stasis, move around cabin, isometric calf exercises Avoid dehydration, alcohol and caffeinated drinks
Flight ≥12 h – low risk	Avoid stasis, move around cabin, isometric calf exercises Avoid dehydration, alcohol and caffeinated drinks
Flight ≥12 h – moderate risk Healthy people age >75, women >45 taking estrogen-containing hormone replacement therapy, pregnant and postpartum women, people up to age 45 who are heterozygous carriers of mutations for factor V Leiden and prothrombin gene mutation, those with varicose veins, heart failure, myocardial infarction within previous 6 weeks, recent lower limb trauma within 6 weeks (12,13)	Avoid stasis, move around cabin, isometric calf exercises Avoid dehydration, alcohol and caffeinated drinks Below knee graduated pressure stockings If elastic stockings not used, ASA 160 mg to 325 mg 4 h before flight [†]
Flight ≥12 h – high risk History of previous VTE, recent major surgery (within 6 weeks), active malignancy, gross obesity or marked immobility due to neuromuscular or cardiorespiratory disease, people age >45 with deficiencies of antithrombin, protein C or protein S, or people age >75 with cardiac or pulmonary disease (12,13)	Avoid stasis, move around cabin, isometric calf exercises Avoid dehydration, alcohol and caffeinated drinks Below knee graduated pressure stockings If elastic stockings not used, low molecular weight heparin (4000 to 5000 anti-Xa units subcutaneous) 2 h before flight

*Literature supports 12 h as the threshold for risk of developing thromboembolism, but many would consider 9 h to be the threshold. [†]Data for efficacy of acetylsalicylic acid (ASA) are inconclusive. VTE: venous thromboembolism

V. AIRPORT SECURITY SCREENING, ICDs AND PACEMAKERS

Archway style security metal detectors (those used in airport terminals, courthouses and some schools) detect metal objects by using an electromagnetic field. This type of security system should not affect the operation of implantable cardioverter defibrillators (ICDs) or pacemakers. Metal detectors in compliance with the National Institute of Law Enforcement and Criminal Justice standards generate relatively small amplitude magnetic fields, which are unlikely to affect cardiac rhythm devices.

Independent testing performed on ICDs and pacemakers from various manufacturers showed no device inhibition,

inappropriate detection, or reprogramming by any of the units during a slow walk-through (10 s to 15 s). Remaining in the archway for longer periods should be avoided.

A hand-held detector wand has the potential to temporarily inhibit an ICD or pacemaker's output. Passing the wand over the ICD or pacemaker may result in a brief pause in the patient's heart rhythm. This pause may or may not be felt by the patient, and would be extremely unlikely to be harmful. More frequent movement of the detector wand over the ICD or pacemaker has the potential for causing increased interference with

device operation. If a hand-held detector wand must be used, it should not be passed over the device area more than once every 5 s. This will minimize the potential for interference with device operation.

An ICD or pacemaker patient walking through an archway metal detector may set off its alarm because the device is

enclosed in a metal housing. Because the detector cannot determine the nature of detected metal objects, the patient may need to undergo a hand search for clearance. The patient should inform security personnel that he/she has an implanted cardiac device, present their identification card, and be prepared for alternative search methods.

VI. PHYSICIAN LIABILITY WHEN ADVISING PATIENTS ON THE SAFETY OF FLYING

Three situations are addressed: Good Samaritan, direct patient involvement and remote assistance.

Good Samaritans defined as attending to a passenger in need on a volunteer, ad hoc basis, where no prior patient-physician relationship existed. There may be two concerns, one of liability by acting and the other by not volunteering to act. The former is governed by law while the latter is more likely to be addressed by medical licensing bodies (ie, the respective provincial Colleges).

There is no precedent of a physician who acted in good faith on board an aircraft as a Good Samaritan being successfully sued for malpractice. However, there is one example in case law of a successful suit against a physician, which was not related to air travel. The legal position on Good Samaritan behaviour is that the physician takes the usual measures expected of a licensed physician. If a physician has serious reservations about providing assistance either because of a lack of necessary skills or by being impaired (eg, due to fatigue, drugs or alcohol), that physician has the right to withdraw his or her service. Any mishap while impaired could result in a loss of protection in the courts.

Physicians are expected to respond to a call for assistance. Recognizing such a moral duty, a provincial College may look unfavourably on a physician who refuses assistance, considering such behaviour unprofessional. That such a refusal would find its way into a court of law is unlikely.

Direct patient involvement arises when a patient is advised about medical fitness to fly in a sanctioned doctor-patient

relationship. In such cases, a physician is liable for any related adverse outcome. As long as the advice given was reasonable and reflected customary practice, such a physician can expect to be indemnified by the Canadian Medical Protective Association. Where guidelines exist, they provide a benchmark for the appropriateness of the advice that was offered.

Remote assistance relates to management advice that is offered for a passenger with whom the physician, typically on the ground, is not in direct contact. This can apply either to a patient known to the physician or to a new case. For example, a physician may be asked to provide management advice for a patient being transported to a hospital, or a medical opinion may be offered about the advisability of air evacuating a patient from a remote location, such as a foreign country.

In such cases, the physician assumes some responsibility, usually shared with any other parties that may be involved (eg, those attending to the patient directly). The advice rendered should reflect reasonable practice. Proper documentation, particularly of the information that is made available, is of paramount importance in legal defence. Information should be requested by fax or at least notes of any telephone conversations should be made.

Physicians involved in Telehealth, providing routine medical advice for flying passengers, should check with their respective licensing authorities about the validity of their practice beyond the named jurisdiction.

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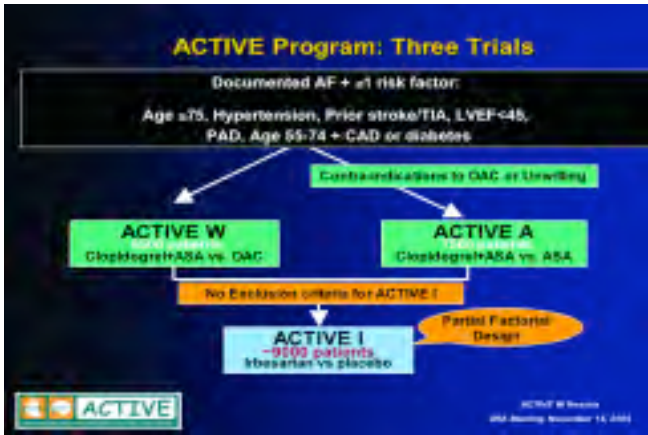
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STUART CONNOLLY, M.D.

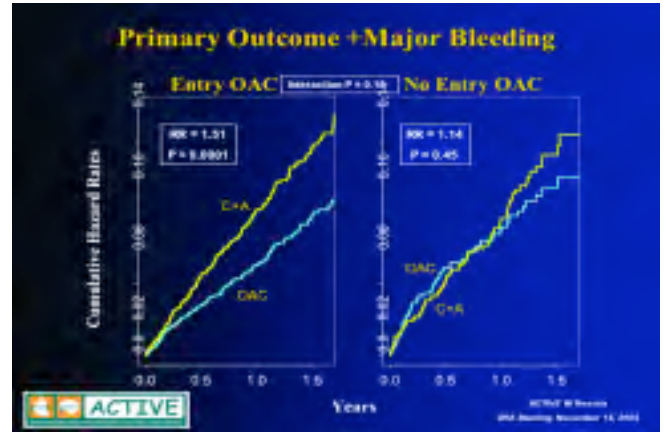
Biographie

Dr. Stuart Connolly was born in Montreal, Canada in 1949. He received his cardiology training at the University of Toronto and received post graduate training in electrophysiology at Stanford University. In 1983 he joined the faculty at McMaster University where he is now a Professor and is the Director of the Arrhythmia Service and the Electrophysiology Lab. His main research interests have been in the area of randomized clinical trials and he has been involved in the design and implementation of a number of studies related to the management of patients with cardiac arrhythmia. Among the studies of which he was the principal investigator are the Canadian Atrial Fibrillation Anticoagulation (CAFA) Study, The Canadian Amiodarone Myocardial Infarction Arrhythmia Trial (CAMIAT), the Canadian Implantable Defibrillator Study (CIDS), The Canadian Trial of Physiologic Pacing (CTOPP) and two Vasovagal Pacemaker Studies (VPS-1 and VPS-2). Dr. Connolly is principal investigator of the Atrial Fibrillation Clopidogrel Trial With Irbesartan For Prevention Of Vascular Events (ACTIVE).

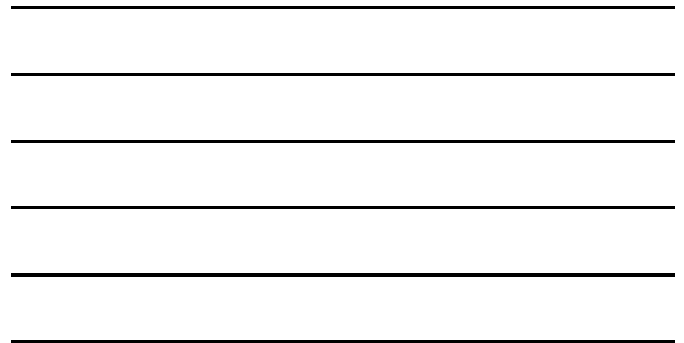
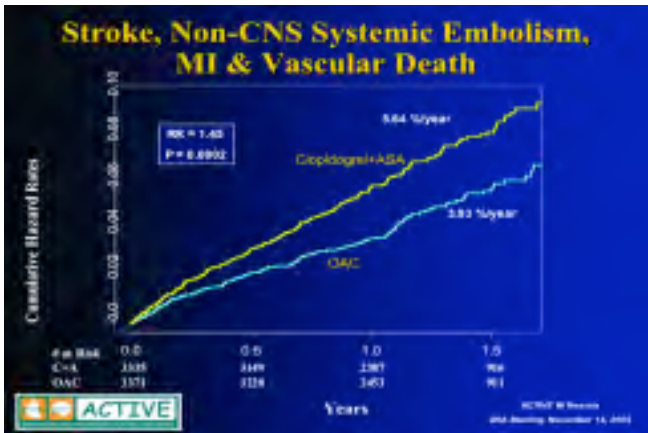
diapositive 1



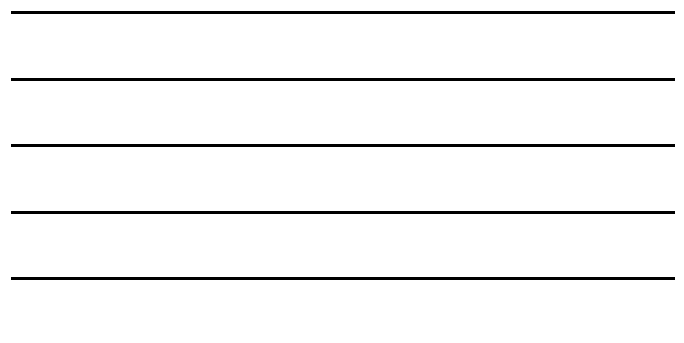
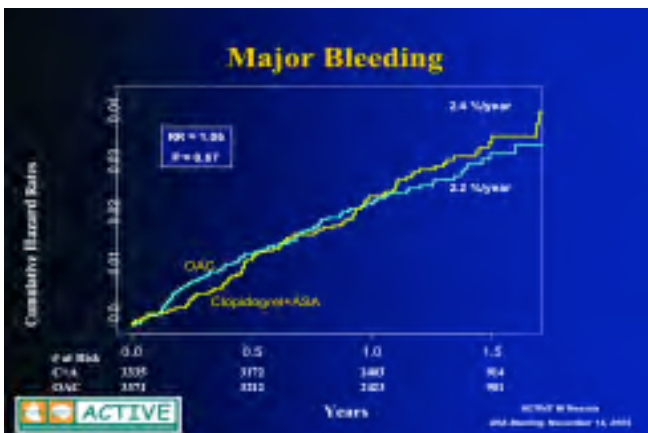
diapositive 4



diapositive 2



diapositive 3



MARIO TALAJIC, M.D.

Biographie

Dr. Talajic graduated from the University of Ottawa in 1980 and completed his Internal Medicine and Cardiology training at McGill University. From 1986-87 he did his Fellowship training with Hein Wellens and Pedro Brugada at the University of Limburg, Maastricht, the Netherlands. From 1987 to present he is a Cardiologist and Electrophysiologist at the Montreal Heart Institute and from 1991 to 1998 he was Chief of Clinical Electrophysiology at the Montreal Heart Institute. Dr. Talajic is a Professor in the Department of Medicine at the University of Montreal and is presently Director, Department of Medicine and Cardiology at the Montreal Heart Institute.

Dr. Talajic's research interests are in atrial fibrillation and sudden death.

diapositive 1

Presumed Benefits of Maintaining Sinus Rhythm: AFFIRM Trial

- Fewer symptoms / better exercise tolerance
- Lower risk of stroke
- Long-term anticoagulation may not be needed if sinus rhythm is successfully maintained
- Better quality of life
- Better survival

diapositive 3

Survival in AFFIRM: "Time dependent Analysis"

Covariate	P	HR	HR: 99% CI	
			Lower	Upper
Age at enrollment	< 0.0001	1.06	1.05	1.08
Coronary artery disease	< 0.0001	1.56	1.20	2.04
Congestive heart failure	< 0.0001	1.57	1.16	2.09
Diabetes	< 0.0001	1.56	1.17	2.07
Stroke or TIA	< 0.0001	1.70	1.24	2.33
Smoking	< 0.0001	1.78	1.25	2.53
LV dysfunction	0.0068	1.38	1.02	1.81
Mitral regurgitation	0.0043	1.36	1.03	1.80
Sinus rhythm	< 0.0001	0.53	0.39	0.72
Warfarin use	< 0.001	0.50	0.37	0.69
Digoxin use	0.0007	1.42	1.08	1.86
Rhythm-control drug use	0.0008	1.49	1.11	2.01

Epslein et al. Circulation 2004;110:1903

diapositive 2

Which is better: rhythm control or rate control? Results of PIAF, RACE, STAF, and AFFIRM

Comparing Rate Control vs. Rhythm Control

STUDY	N	FU (YR)	PRIMARY	RHYTHM SINUS	BRISQI	HOSP ADMIT	DEATH
PIAF ¹	252	1.9	no difference	55%	NA	3.7% / 3.8% p = NS	7.8% / 8.5% p = NS
RACE ²	512	2.3	no difference	55%	5.5% / 7.9% p = NS	NA	7.5% / 8.5% p = NS
STAF ³	263	1.8	no difference	55%	2.8% / 3.5% p = NS	30% / 34% p < 0.001	8.8% / 9.5% p = NS
AFFIRM ³	499	3.5	no difference	55%	4.8% / 3.5% p = NS	30% / 34% p < 0.001	13% / 15% p = NS
TOTAL	1024	2.2	no difference	55%	4.8% / 6.9% p = NS	31% / 35% p < 0.001	13% / 15% p = NS

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diapositive 4

Favours Rate Control	Favours Rhythm Control
Persistent Atrial Fibrillation	Paroxysmal Atrial Fibrillation
Recurrent AF	First Episode of AF
Less Symptomatic	More Symptomatic
>65 years of age	< 65 years of age
Hypertension	No Hypertension
No History of CHF	History of CHF
Previous Antiarrhythmic Drug Failure	No Previous Antiarrhythmic Drug Failure
Patient Preference	Patient Preference

MARC DUBUC, M.D.

Biographie

Cardiologue-Électrophysiologiste
Institut de Cardiologie de Montréal
Professeur agrégé de clinique
Département de Médecine
Université de Montréal

Résumé

Lorsqu'un patient présente de la fibrillation auriculaire, 2 stratégies de traitement à long terme s'offrent à nous :
La normalisation du rythme cardiaque (« Rhythm control ») ou la **normalisation de la fréquence en FA** (« Rate control »).

Une fois que la stratégie de traitement de la fibrillation auriculaire est choisie (contrôle du rythme vs fréquence), quels sont les choix thérapeutiques qui s'offrent à nous? Le but de cette présentation est de vous proposer les meilleurs choix thérapeutiques tant pharmacologiques que non-pharmacologiques en fonction des caractéristiques cliniques de chaque patient. La présentation s'inspirera de la « **2004 Canadian Cardiovascular Society Consensus Conference : Atrial Fibrillation** ».

diapositive 1

FAVOURS RATE CONTROL	FAVOURS RHYTHM CONTROL
Persistent AF	Paroxysmal AF
Recurrent AF	First Episode of AF
Less Symptomatic	More Symptomatic
> 65 years of age	< 65 years of age
Hypertension	No Hypertension
No History of Congestive Heart Failure	History of Congestive Heart Failure
Previous Antiarrhythmic Drug Failure	No Previous Antiarrhythmic Drug Failure
Patient Preference	Patient Preference

Wijaya, Simonsen, CCS Consensus Conference 2004

diapositive 4

Fibrillation auriculaire

Contrôle de la fréquence

Avantages

- Possibilité d'éviter les effets pro-arythmiques des médicaments antiarythmiques
- Plus facile à réaliser que le maintien du RS
- Moins de risques ?

diapositive 2

FA

Contrôle du rythme: Antiarythmiques

Avantages potentiels du rythme sinusal

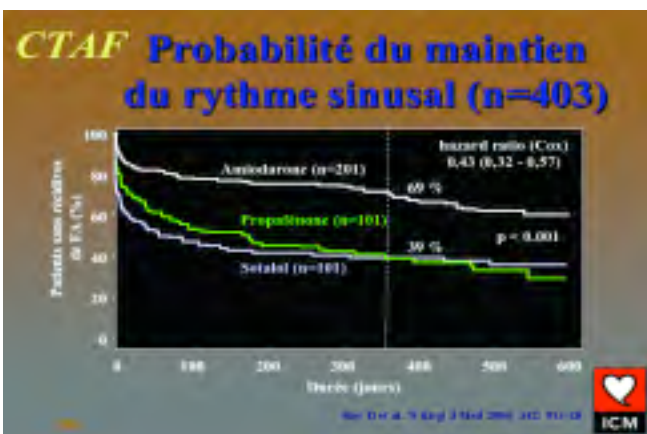
- Moins de symptômes et meilleure qualité de Vie
- Meilleure tolérance à l'effort
- Débit cardiaque plus élevé
- Risque thrombo-embolique réduit

diapositive 5

Adequate rate control

- Poorly defined criteria:
 - Symptoms
 - ECG
- Arbitrary definition:
 - Resting heart rate = 50-80/min
 - Moderate exercise = 100-115/min
- Tools:
 - Holter
 - Exercise testing

diapositive 3



diapositive 6

Canadian Cardiovascular Society Consensus Conference on Atrial Fibrillation 2004

Canadian Cardiovascular Society
Société canadienne de cardiologie

www.ccs.ca

Section Consensus Conference

JEFF HEALEY, M.D.

Biographie

Dr. Healey a reçu son degré en médecine à l'Université d'Ottawa en 1995. Après la fin de sa résidence en cardiologie, il a commencé sa formation en électrophysiologie à l'Institut de Cardiologie d'Ottawa. Il a complété sa formation clinique à l'Université McMaster où il a aussi reçu une maîtrise en épidémiologie et biostatistiques. Présentement, Dr. Healey est assistant professeur à l'Université McMaster, où il travaille comme cardiologue/électrophysiologue. Il est le récipiendaire d'une bourse de l'IRSC pour commencer un programme d'essais contrôlés randomisés.

Résumé

En Nord Amérique, la cause la plus fréquente de la fibrillation auriculaire (FA) est l'élévation de la tension artérielle. Plusieurs essais randomisés ont démontré que certaines classes de médicaments anti-hypertenseurs réduisent la fréquence de FA. D'autres études ont démontré que le traitement de l'inflammation avec les corticostéroïdes et le traitement empirique avec les médicaments anti-lipidiques peut aussi éliminer le FA. Le rôle des nouveaux traitements « anti-arythmiques » n'est pas encore établi. Le but de cette discussion est de démontrer une approche rationnelle.

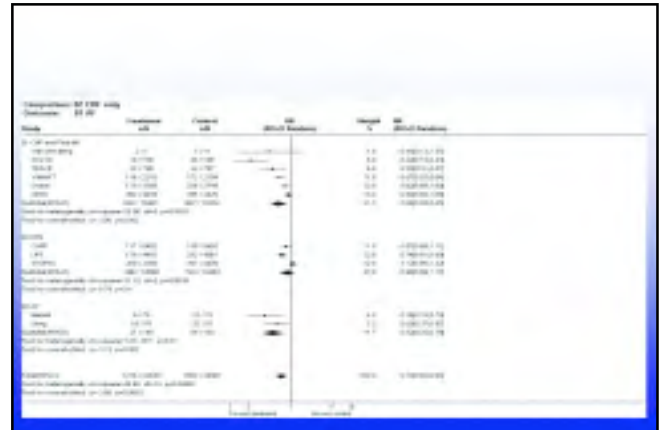
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The Framingham Study: Factors Associated with AF

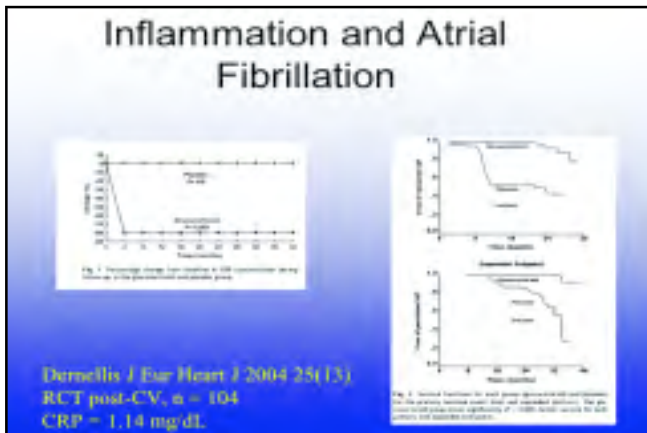
	Prevalence in Men (%)	Risk Ratio for AF
Stroke	2.4	4.2
Coronary Attacks	8.6	2.0
Cardiac Failure	0.8	17.5
Rheumatic Heart Dis.	1.2	8.3
Hypertensive Heart	28.3	2.1

N Engl J Med 1982;306:1018-22

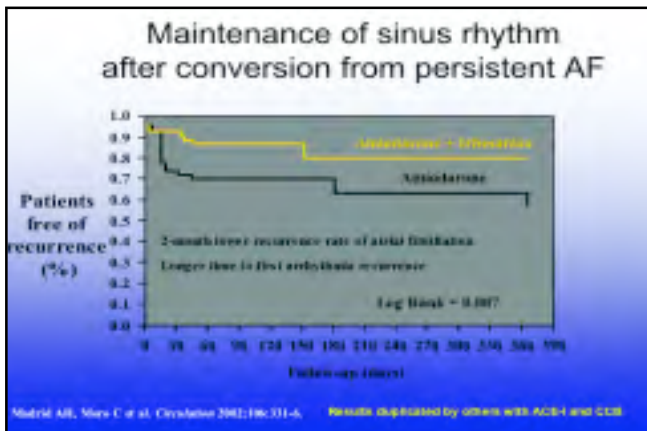
diapositive 4



diapositive 2



diapositive 3



PETER GUERRA, M.D.

Biographie

D^r Guerra est électrophysiologiste à l'Institut de Cardiologie de Montréal et professeur adjoint à la Faculté de médecine à l'Université de Montréal. Il a débuté sa formation à l'Université de Montréal et a complété une spécialisation en ablation de la fibrillation auriculaire à l'Université de la Californie à San Francisco.

L'expertise du D^r Guerra dans le domaine de la fibrillation auriculaire est désormais reconnue à travers le monde. Il a été sollicité pour former des médecins sur les nouveaux traitements pour la fibrillation auriculaire et pour présenter sur ce sujet. De plus, D^r Guerra a publié le « **2004 Canadian Consensus Guidelines**. » Ses intérêts en recherche incluent des nouvelles techniques d'imagerie des veines pulmonaires ainsi que les nouvelles sources d'énergie pour l'ablation.

Les arythmies : Quoi de neuf?

Vendredi 21 avril 2006

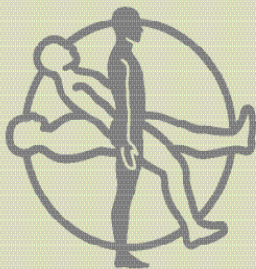
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Le Centre canadien de recherche en cardiologie est un organisme à multiples facettes qui comprend bien les besoins des médecins et de l'industrie. En tant qu'organisme à croissance rapide mettant l'emphase sur la technologie de l'information et sur l'infrastructure des opérations, le Centre canadien de recherche en cardiologie est maintenant à la fine pointe de la recherche et de l'éducation cardiovasculaires.

En sa qualité d'organisme de recherche académique, le Centre canadien de recherche en cardiologie est impliqué dans un vaste champ d'activités, à partir de l'établissement de nouvelles thérapies en essais cliniques jusqu'au développement professionnel, au moyen de l'éducation des médecins et aux registres orientés vers la gestion des patients.

Coordination des essais cliniques, contrôle des études et coordination des données

Formation professionnelle et éducation médicale continue

Coordination de symposium et d'événements éducatifs

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