

# Epilepsy and motor vehicle driving – A Symposium held in Québec City, November 1998

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**ABSTRACT: Background:** This report summarizes an invitational symposium on epilepsy and Canadian laws governing motor vehicle driving held in Québec City in November 1998. **Methods:** Invited neurological experts from Canada, the USA, and Europe; and representatives of provincial and territorial licensing bodies, the Canadian Council of Motor Transport Administrators, the Canadian Medical Protective Association, and the Canadian Medical Association participated. An edited version of transcribed audiotapes was prepared. Specific issues discussed were whether or not a physician should be required to report a patient with epilepsy to the licensing authority (mandatory reporting), the nature and quantification of the risks posed by epileptic drivers, and what would be a reasonable law regulating driving by people with epilepsy in Canada. **Results:** The consensus among medical experts was that mandatory reporting should be abolished in Canada and that a 6-12 month seizure-free period was appropriate before most patients could return to driving private cars. Experts also believed that these standards should be uniform across Canada. There was strong disagreement with the recommendation of the Canadian Medical Association that all such drivers be reported to provincial licensing authorities even in provinces without mandatory reporting rules. **Conclusions:** Physicians should be familiar with and follow the rules regarding epilepsy and driving in the provinces where they practice. Nevertheless, current evidence is against mandatory physician reporting of drivers with epilepsy and the neurologists recommended that this be abolished throughout Canada. Shorter seizure-free intervals should also be considered before resuming driving of private cars.

**RÉSUMÉ: Épilepsie et conduite de véhicule moteur – Symposium tenu à Québec en novembre 1998. Introduction:** Ce rapport constitue le sommaire d'un symposium sur invitation, portant sur l'épilepsie et les lois Canadiennes concernant la conduite de véhicules motorisés, tenu à Québec en novembre 1998. **Méthodes:** Des experts canadiens, américains et européens en neurologie, des représentants provinciaux et territoriaux des organismes délivrant les permis de conduire, le Conseil canadien des administrateurs en transport motorisé, l'Association canadienne de protection médicale et l'Association médicale canadienne y ont participé. Une version éditée des bandes sonores transcrites a été rédigée. Les questions discutées ont été les suivantes: doit-on demander au médecin de rapporter un patient épileptique aux autorités (déclaration obligatoire); quelle est la nature des risques encourus par les conducteurs épileptiques et comment peut-on les quantifier; quelle serait une loi raisonnable régissant la conduite routière des épileptiques au Canada. **Résultats:** Le consensus parmi les experts médicaux était que la déclaration obligatoire devrait être abolie au Canada et qu'une période de 6 à 12 mois sans crise était appropriée avant que la plupart des patients ne puissent conduire une automobile. Les experts croient également que ces standards devraient être uniformes à travers le Canada. Il existait un profond désaccord concernant la recommandation de l'Association médicale canadienne stipulant que tous ces conducteurs doivent être rapportés aux autorités provinciales délivrant les permis de conduire, même dans les provinces n'ayant pas de règles concernant la déclaration obligatoire. **Conclusions:** Les médecins devraient être familiers avec les règlements concernant l'épilepsie et la conduite d'un véhicule motorisé dans les provinces où ils pratiquent et respecter ces règlements. Néanmoins, les données actuelles ne supportent pas la déclaration obligatoire des conducteurs épileptiques par les médecins et les neurologues ont recommandé que ce règlement soit aboli partout au Canada. On devrait également envisager de raccourcir la période sans crise avant d'autoriser la conduite d'une automobile.

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This invitational symposium considered regulation of motor vehicle driving by people with epilepsy and was convened by the Association Québécoise de l'Épilepsie in November 1998. Speakers participated from Canada, the USA, and Europe, including representatives of provincial and territorial licensing bodies, the Canadian Council of Motor Transport Administrators (CCMTA), the Canadian Medical Protective Association (CMPA), and the Canadian Medical Association (CMA). The meeting did not explicitly address the medical treatment of the epileptic driver: specific issues discussed were whether or not a physician should be required to report a patient with epilepsy to

the licensing authority (mandatory reporting), the nature and quantification of the risks posed by epileptic drivers, and what

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would be a reasonable law regulating driving by people with epilepsy. The consensus among medical experts was that mandatory reporting should be abolished in Canada and that a 6-12 month seizure-free period was appropriate before most patients could return to driving private cars. Experts also believed that these standards should be uniform across Canada. It is hoped that this effort and others like it will lead to well-supported regulations governing driving by patients with epilepsy. Physicians must, however, know and follow the regulations for the province in which they practice. This article was prepared by three participants, using audio tapes of the symposium.

#### DISCUSSION OF MANDATORY PHYSICIAN REPORTING VS DISCRETIONARY REPORTING OF DRIVERS WITH EPILEPSY TO PROVINCIAL AUTHORITIES

##### Mandatory reporting

*Ross Burns, senior counsel, Ministry of Transportation, Province of Ontario*

Alberta, Nova Scotia, Québec and Saskatchewan have discretionary reporting requirements for physicians. The remaining provinces and two territories have mandatory reporting requirements.

Mandatory reporting was enacted in Ontario in 1968: anyone who is or who appears to be over the age of 16 years, who is in the care of a physician and has a condition that would make the operation of a motor vehicle unsafe must be reported to the province. Physicians are protected from liability for such reports. The Ontario Court of Appeal has upheld this law (section 203 of the Highway Traffic Act of Ontario) as being explicit. Reporting of such cases is not discretionary. Your judgement and expertise is nevertheless important: you must report conditions that may make it unsafe to drive. So, for example, you may conclude that it is not necessary to report in the case of a temporary condition. There appears in the case of epilepsy to be four important principles: 1) Does the patient understand the nature of the disorder and are they reporting truthfully to you? 2) If on medication are they following their drug regimen? 3) Is the medication controlling their condition? and 4) Are they in regular contact with their physician?

In Ontario, there are several classes of driving permits and of vehicles. A license may be cancelled or downgraded. The Ministry will notify a driver of the medical report made under Section 203 and further information will be requested. The medical advisory committee will then review the case and assist in recommending what action should be taken under the regulations. If the license is suspended, the driver has a right to appeal to the License Suspension Appeal Board. Either party can then appeal to the Ontario Court, General Division, based on the record. We also have a continuing obligation to review a person's suspended driving privileges at any time. Generally that is based on the physician's expertise, with such information as a seizure-free period or EEG information. In Ontario, we rely very heavily on the CMA and the CCMTA guides. In 1997, we processed 91,479 reports, about 18,000 of them made under S.203. We imposed 10,676 suspensions and 3,898 reinstatements. The Medical Advisory Board reviewed 4,241 of those files. There were only 21 appeals.

##### Discretionary reporting

*Carmen Couture, Société de l'Assurance-Automobile du Québec (SAAQ)*

Le Québec compte aujourd'hui 4 366 000 conducteurs qui détiennent le privilège de conduire un véhicule routier.

En 1981, le gouvernement du Québec a ajouté au mandat de la SAAQ celui de la gestion du code de la sécurité routière. La SAAQ se retrouvait donc dans une situation de privilège parce qu'à ce moment-ci, elle avait l'ensemble des données tant au niveau du bilan routier, par rapport aux accidentés de la route, qu'en regard de la gestion des permis de conduire. Le dépistage des conducteurs à risque repose sur différents moyens, entre autres la déclaration obligatoire du conducteur et la déclaration discrétionnaire du professionnel de la santé (depuis le 1er décembre 97, défini comme un médecin, un optométriste, un ergothérapeute, un psychologue, une infirmière, ou un infirmier).

La SAAQ administre aussi un ensemble de programmes à caractère médical. Il y a un échange d'information autorisé par la Commission d'accès à l'information étant donné que la SAAQ est le dépositaire de tous ces mandats-là.

Avant 1972, il n'existait aucune disposition qui obligeait un professionnel de la santé ou qui lui laissait la discrétion de déclarer aux autorités compétentes un patient inapte à conduire. Il n'en existait pas non plus pour le protéger contre d'éventuelles poursuites s'il faisait une telle déclaration. En 1972, on introduit l'obligation à tout médecin de rapporter tout patient de seize ans ou plus qu'il juge inapte sur le plan médical à conduire un véhicule routier. On introduit en même temps qu'aucun recours en dommages ne puisse être intenté contre ce médecin pour s'être conformé à cette obligation. Il n'y a pas eu de commission parlementaire donc on a trouvé très peu de notes pour expliquer l'introduction de cette obligation. Par ailleurs, elles laissent croire que le gouvernement répondait ainsi à un besoin exprimé par le Collège des médecins du Québec. On comprend que le collège voulait ainsi protéger leurs membres contre d'éventuelles poursuites.

En 1981, le gouvernement confirme l'obligation du médecin de déclarer un patient inapte et maintient la protection en cas d'éventuelles poursuites. Ces modifications ont été précédées d'un long débat en commission parlementaire en 1979, surtout autour de la protection du secret professionnel et de la vie privée des personnes. Mais entre la commission parlementaire et l'adoption des modifications, la Cour supérieure a indiqué clairement que la réglementation était discriminatoire parce qu'elle fixait des normes que l'on appliquait intégralement. On a donc profité des modifications au code pour ajouter certaines modifications qui, tout en préservant les normes telles qu'elles étaient établies, laissaient maintenant à la SAAQ un pouvoir discrétionnaire d'évaluer de façon particulière un conducteur qui voulait nous démontrer qu'il pouvait être apte à conduire. D'une soixantaine de déclarations par année avant 1972, l'obligation fait en sorte qu'au début des années 80, le nombre de déclarations est passé à 500 par année et au milieu des années 80, atteignait les 700 par année.

En 1986, on retient toujours la déclaration obligatoire mais on ajoute à l'article que «tout médecin est autorisé à divulguer à la Société les renseignements confidentiels qui lui ont été révélés en raison de sa profession.»

En l'absence d'audiences publiques, les débats à l'Assemblée nationale nous révèlent que ses membres ont toujours les mêmes préoccupations qu'en 1981 : protection du secret professionnel, protection de la vie privée des personnes, confidentialité de l'information transmise à la SAAQ. Les membres parvenant difficilement à s'entendre, le ministre des transports alors responsable du dossier propose de rendre la déclaration discrétionnaire plutôt qu'obligatoire. L'article est adopté rapidement et le motif de ce revirement n'est pas exprimé clairement. En 1997, on confirme l'immunité contre d'éventuelles poursuites et à la fin de 1997, le nombre de déclarations a augmenté à 1 000 par année.

Il existe actuellement dans le fichier central de la SAAQ 13014 conducteurs connus épileptiques. Ceci représente 0,30% des conducteurs. Seulement 291 déclarations obligatoires ou discrétionnaires de médecin ont contribué à identifier ces conducteurs épileptiques. La déclaration du médecin n'est donc pas le moyen le plus efficace pour dépister les conducteurs épileptiques au Québec. Si à une certaine époque, notre société québécoise voulait obliger les médecins et autres professionnels de la santé à déclarer un patient jugé inapte à conduire, notre société québécoise d'aujourd'hui est davantage préoccupée par la protection de la vie privée. Par ailleurs, consciente des dangers que peut représenter un conducteur dont l'état de santé est incompatible avec la conduite d'un véhicule routier, elle a opté de laisser aux professionnels de la santé la liberté d'exercer leur jugement pour protéger tous les usagers de la route.

*(Translated by Benjamin Zifkin)*

Approximately 4,366,000 people have the privilege of holding a Québec driving permit. In 1981, the Government of Québec turned over responsibility for the highway code to the SAAQ. The SAAQ thus found itself in the advantageous position of already holding files on those involved in traffic accidents as well as the data needed to manage the driving permit system.

Several methods are used to find drivers at risk, among them the mandatory reports of the drivers themselves and the discretionary reports of health professionals (defined since December 1, 1997 as a physician, an optometrist, an occupational therapist, a psychologist, or a nurse). The SAAQ also administers certain medical and paramedical programmes in its role as insurance provider for those injured in traffic accidents and because the SAAQ has been given all these various responsibilities, the Commission d'accès à l'information has authorized exchange of information among them.

Before 1972, no regulation either required or authorized a health care professional to report patients judged unfit to drive. There was also no immunity from prosecution for any such declaration. In 1972, Québec introduced mandatory physician reporting of any patient 16 years old or over judged medically unfit to drive and physician immunity from prosecution for reports made. There was apparently no parliamentary committee debate and thus little documentation to explain the introduction of these regulations, but it appears that the government was responding to the Collège des médecins du Québec which thus wished to protect its members from prosecution.

After lengthy debate in parliamentary committee in 1979 over issues of professional secrecy and personal privacy, the government confirmed these rules in 1981. Before these regulations could be adopted, however, the Superior Court ruled that they were discriminatory because they were inflexible norms. The government then added modifications giving

the SAAQ discretionary power to evaluate individually a driver who wished to demonstrate his or her fitness to drive. There were only about 60 declarations yearly before 1972 but under mandatory reporting we received about 500 per year in the early 1980s, and about 700 per year in the mid-1980s.

In 1986, mandatory reporting was retained with the proposed addition of an article authorizing any physician to divulge to the SAAQ the confidential information received in the course of medical practice. There were no public hearings but the parliamentary record shows that members had the same concerns as in 1981: safeguarding professional confidentiality, the privacy of patients, and the confidentiality of information sent to the SAAQ. They could not agree on how to proceed, and the Minister of Transport responsible proposed making reporting discretionary instead of mandatory. The National Assembly then quickly passed the article but the underlying reasons for the change were never clearly stated. In 1997, physician immunity from prosecution was reconfirmed and by the end of 1997 the number of physician reports had increased to about 1000 per year.

We now have records for 13,014 known drivers with epilepsy. This is 0.3% of drivers. Only 291 physician declarations, mandatory or discretionary, were made for drivers with epilepsy. Thus physician reporting is clearly not the most effective method to identify drivers with epilepsy in Québec. If, in the past, our Québécois society wished to force physicians and other health professionals to declare a patient unfit to drive, today's society is more concerned with the protection of privacy. It is, nevertheless, aware of the risks caused by medically unfit drivers and has thus chosen to allow health professionals the freedom to use their judgement in order to protect all of us on the road.

#### **Mandatory reporting – discussion**

*Richard McLachlan, Faculty of Medicine, University of Western Ontario*

We have shown that in discretionary reporting provinces, most neurologists seldom, if ever, reported patients with epilepsy to the licensing board. In mandatory reporting provinces, neurologists reported their patients almost always, or most of the time. They were much more likely to report patients with epilepsy than those with a history of stroke, transient ischemic attack, dementia, or Parkinson's Disease, although epilepsy is not demonstrably riskier for driving.<sup>1</sup> We know now<sup>2,3</sup> that the demented patient is very risky at the wheel, but at that time, epilepsy seems to have been singled out among the neurologic disorders and the large majority of patients before the review board had seizures.

A small majority of neurologists was against mandatory reporting but more of those in mandatory reporting provinces were in favour of it. We then studied whether or not the accident risk was greater in patients with epilepsy than in the population, and also whether it was greater in Alberta, a discretionary reporting province, than in Ontario, using self-reported accidents. We found that the accident rate was the same for those with and without epilepsy, similar to the finding of Taylor et al.<sup>4</sup>

We also found that the accident rate was not significantly different in the two provinces. About the same proportion had had a seizure while driving. It was much more likely in Ontario that the Ministry was aware that the patient had epilepsy, but of greater interest although not statistically significant, twice as many patients in Ontario admitted that they would withhold information from their doctor about their seizures. Thus, there

was no benefit to the public from mandatory reporting but there may well be a risk, as also noted by Salinsky et al.<sup>5</sup>

Mandatory reporting is not a bad law: it's a terrible law. An argument could be made that every patient I see has a condition that may make it dangerous for them to drive. That includes migraine, severe headaches, and peripheral neuropathy. The reality is that under mandatory reporting, doctors will protect themselves and report a patient if there is any question, not because it is in the best interest of the patient or in the best interest of society, but so that they don't end up in court. The main impact of mandatory reporting is on patients, however, as has already been discussed. A common problem is the patient, for example, with as yet undiagnosed nocturnal episodes with normal EEGs and imaging. He may or may not have epilepsy. He will likely be reported and lose his permit.

The Ontario law was enacted in response to doctor's concerns in 1967 that they could be sued for reporting patients with medical conditions. In response to the Ontario Medical Association's concerns, Section 143 of the Highway Traffic Act, Subsection 2, conferred immunity from lawsuits, but the government added Subsection 1, reasoning that if doctors thought that some people should be reported, then everyone should be reported. In practice, physicians rarely reported patients before a highly published lawsuit in the mid-1980s caused them to take the law quite seriously and this has led to a host of problems. Even patients without driving licenses must be reported to the government, raising further ethical issues. The evidence is that these laws do not protect patients or society but that they can do a lot of harm.

### Discretionary reporting-discussion

*Richard Desbiens, Faculté de Médecine, Université Laval, Québec*

When epilepsy is diagnosed, I tell the patient that he/she must report to the SAAQ and that I will likely have to fill in a form. I stress that the decision as to their license is not taken by me, but by the SAAQ, and I hope that this will allow the patient to separate my role in assessing fitness to drive from my role as physician to help them with their epilepsy. I tell them that until the SAAQ decides, they are still allowed to drive but that common sense suggests that they do not. I try to make this transparent for the patient. I document the discussion and tell the patient that I will check at the next visit to see if he has reported his condition. I do declare dangerous or noncompliant drivers, for example a patient who came by car, had a seizure in the waiting room and is planning to drive home.

Patients are often very unhappy about having to notify the SAAQ. They may also be aggressive. I ask the patient to come with a relative or friend. This person may have witnessed the seizures and may help convince the patient if he does not understand common sense, and it may then also be more difficult for the patient to hide the truth about the seizures. Patients may also challenge the diagnosis of epilepsy and refuse medication. In some cases we are convinced of the diagnosis even if we cannot prove it. I may occasionally try to make a deal with such a patient not to drive and to observe him for a few weeks or a month off medications. Most of the time, with recurrent seizures we will then know what is happening. It is then easier to convince the patient to take medication and to comply with the regulations.

The patient can appeal the decision. I find, however, that most of the decisions taken by the SAAQ with the information that we initially provide make sense. The SAAQ has not adopted a punitive approach. This seems fair and favours self-reporting.

### Question

*Krumholz:* If a patient in a province with mandatory reporting sees a physician in a province with discretionary reporting or vice versa, what is the obligation of the physician?

### Answers

*Burns:* I think that if you are practising in Québec you are subject to the law of Québec. I think it would protect you from failing to comply with the statutory requirement of Ontario. If you had acted reasonably in accordance with Québec law in not reporting, you would be somewhat insulated from that aspect.

*Gagnon, Canadian Medical Protective Association:* The CMPA notes that *physicians should fulfil their statutory duties* (emphasis added) in a diligent yet reasonable manner, with respect to those patients whom they believe have a medical condition which might reasonably make it dangerous for the person to drive.

*Jean Nelson, Canadian Medical Association:* The CMA strongly urges physicians to report unfit drivers regardless of whether they are legally bound to do so, particularly if they feel that the patients will continue to drive in defiance of medical advice.

### DEVELOPMENT OF MEDICAL STANDARDS FOR DRIVERS IN CANADA

*David Irving, Chairman of the Medical Advisory Committee of the Canadian Council of Motor Transport Administrators*

The CCMTA is a nonprofit organization comprising representatives of the provincial, territorial, and federal governments of Canada, which acts as a co-ordinating body between jurisdictions in all matters relating to licensing, registration, and control of motor vehicle transportation and highway safety. Our main purpose is to foster uniformity and co-ordination of the laws and regulations that govern the licensing of drivers and vehicles and the transport of passengers and goods by motor vehicle. In the early 1980s it was established that to achieve uniformity in driver licensing among the provinces and territories, a national medical standard was required, so that license transfer upon a change of province or residence should not be complicated by divergent medical requirements. All provinces already had a medical review board, acting in an advisory capacity to the licensing body, to assess medical matters that affected fitness to drive. From each of these provincial medical units a national committee of medical specialists and licensing administrators was created in 1983. As a result, minimal recommended national guidelines were developed and published by the CCMTA in 1988 under the title *Medical Standards for Drivers*. A number of those standards were originally adapted from the CMA's *Physicians Guide for Driver Examination*, although the CCMTA document provides more specific directions to provincial licensing boards in deciding whether a specific license should be issued in the presence of certain medical conditions.

Even so, there is comparatively little scientific evidence available to assess the degree of impairment to driving resulting

from many medical disabilities. Recommended standards are thus mainly empirical and represent mostly collective expert opinion. To quote the British Columbia medical licensing guide, "The standards are intended to impose no more than common sense restrictions on drivers with medical disabilities. The underlying principle in all jurisdictions of course is that professional drivers must be required to meet higher medical fitness standards to reduce risk related to sudden medical disabilities." The Canadian Provinces and the Territories have committed, through CCMTA's Medical Advisory Committee, to review the standards periodically and preferably no less than every two years. Input from medical specialty societies, as well as from the CMA, is sought in the development and review of the standards. I hope that the results of this meeting will eventually find their way into our Canadian guidelines.

#### REVIEW OF THE RISKS FOR DRIVING WITH EPILEPSY

*A. Krumholz, Department of Neurology, University of Maryland, Baltimore, USA*

The first driving accidents and death due to seizures while driving were reported in 1906 and when licenses became obligatory, patients with epilepsy were generally excluded. When it became clear that medications could control seizures very well in some patients, this was reconsidered. In England, in the 1940s, it was proposed that patients with controlled seizures could be permitted to drive. In 1949, Wisconsin was the first American state to allow patients with epilepsy to drive. By 1956, 25 of the 49 states permitted patients with controlled seizures to drive and by the 1970s all 50 states permitted this. We now have a hodgepodge of regulations and standards, which causes some difficulties but which also allows us to study the effects of different approaches to this issue. Some countries such as Greece, India, Brazil, and Russia still have a blanket prohibition on driving.<sup>6</sup>

We prohibit people with epilepsy from driving because of the concern that a person with epilepsy will have a seizure and thus harm someone. The most relevant risk then is that of seizures and more importantly of seizures while driving resulting in accidents. Gastaut and Zifkin<sup>7</sup> showed that not all seizures at the wheel cause accidents but almost all studies evaluate the risk of accidents among drivers with epilepsy instead because this can be more easily measured. These are not the same. Side effects of medications may also affect driving ability. Another inescapable concern is the risk of an epileptic driver causing a fatal accident. What must be assessed is how common this is, and how it should be weighed in our discussion of the risk of driving. Using crude accident rates to decide who should and should not drive is fraught with risks. If we simply base our judgement on the risk of having an accident for any reason, all men would have to give up their licenses and all women with epilepsy should be permitted to drive.

Studies of these problems can be biased in several ways. Early reports were anecdotal. Clinic populations generally have more severe epilepsy and take more medications. There may also be noncompliance with reporting regulations so that we may, even with community data, be looking at a small percentage of drivers with epilepsy. Community data derived from motor vehicle administrations or databases from large defined

populations are probably the best source for such studies. Problems still arise, however, with reliability – how reliable are patients when they tell us that they are not having seizures? This may be a problem with mandatory reporting states. We also found that in Maryland, when the required seizure-free interval was reduced from six months to three months, the authorities told us that not one of several hundred identified epilepsy patients had had further seizures in the three month period, but that is statistically impossible.

Earlier data from California and other studies supporting their findings show that the risk for any accident, seizure-related or not, is about twice that of the general population and that it is similar to that of patients with cardiovascular disease or diabetes, disorders which are generally much less stringently treated at least for noncommercial drivers.<sup>8,9</sup> In comparison, using a car phone increases the accident risk about four-fold.<sup>10</sup> Other studies suggest that about 10-15% of accidents for drivers with epilepsy are caused by seizures.

One can also study the risk of accidents due to seizures. About 1/10,000 accidents can be related to epilepsy compared to about 1/10 or 1000/10,000 which are related to alcohol. About 6/10,000 accidents are related to sudden death of the driver, a risk putting males over the age of 50-55 years at greater risk, and statistically at greater risk than patients with epilepsy on a per accident basis. Looking at traffic deaths, about 1/10,000 can be related to epilepsy. This is tragic but we should compare this and realize that about half, or 5000/10,000 can be related to alcohol.

There are also risks in restricting driving. These obviously involve employment and social and psychological consequences, but overly restrictive regulations can cause harm to the patient and to society by the potential to cause noncompliance with regulations. Gastaut and Zifkin<sup>7</sup> studied accidents in French drivers with epilepsy when regulations in France were extremely severe. Many of these patients continued to drive despite uncontrolled epilepsy showing that at least in some circumstances severe restrictions simply do not work.

To summarize: the crude accident rate in people with epilepsy who drive is increased by about two-fold but the percentage that is due to seizures is small, about 10-15%, and the risk is similar to that of other chronic medical disorders such as diabetes and substantially less than that seen with alcohol use. Importantly, the risk of people with epilepsy having seizures and thus potentially causing accidents is predictable and can be based on the chance of seizure recurrence, the seizure-free interval, the nature of the seizure, and the exposure to driving.

There are many unresolved issues: What is an acceptable risk? We know that there is always some, and the threshold of acceptable risk must be determined by society. What measures best predict this risk? The seizure-free interval is a good measure of this which is widely used. If so, then what seizure-free interval is best? And finally, what should be the role of the physician in the process?

#### REGULATIONS FOR EPILEPTIC DRIVERS IN EUROPE

*John Kirker, President, commission on epilepsy and driving, International Bureau for Epilepsy*

The 1980 report of the European Union/International Bureau for Epilepsy workshop, updated in 1996, provided useful

proposals.<sup>11</sup> These are intended to be broad and European Community members are expected to have regulations that are in accord with these. For drivers of private cars, there were suggestions for a three to six month driving ban for a first seizure, and 12 months for established epilepsy, with qualifications for seizures only in sleep and for very infrequent seizures. Mandatory reporting was not supported and the need for a recognized appeal procedure was specified. The workshop results were put forward as a model. The report did not recommend a single specific seizure-free period. For professional drivers ("Group 2") a five to ten year period without seizures off medications has been proposed. Some countries have special rules for single seizures but most do not. Group 2 regulations are a particular concern because of international truck traffic. Countries of the former Eastern bloc operate under much more restrictive rules, generally three years seizure-free and two years off medication and, in some cases, even more restrictive.

#### ROLE OF THE EEG IN ASSESSING FITNESS TO DRIVE

*D.G.A. Kasteleijn-Nolst Trenité, Manager, Scientific Research, Epilepsy Centre, Stichting Epilepsie Instellingen Nederland, Heemstede, The Netherlands*

A normal EEG does not exclude epilepsy and an epileptiform discharge in an EEG does not mean that a person has epilepsy. Factors influencing the likelihood of finding epileptiform activity include the length of the recording and whether sleep is recorded. Different experts may also differ in interpreting the same recording. The physician evaluates a combination of clinical and EEG information. Most countries do not require an EEG without epileptiform activity in epileptic drivers. Germany has required this in the past but this regulation is now being changed.

After a single idiopathic seizure, however, the likelihood of recurrence in the first three months is very high if the EEG shows epileptiform activity, and much higher than if the EEG is normal.<sup>12</sup> We thus permit subjects to drive three months after an initial single seizure if the EEG is normal, and if there has been no recurrence; but if the EEG is abnormal, a six-month seizure-free interval is required. In established epilepsy, the routine EEG does not reliably determine the recurrence risk for an individual patient.

Special EEG techniques can be used to study the relationship between interictal epileptiform activity and driving or between subclinical seizures, especially absences, and driving ability. Will the brief burst of generalized spike and wave activity cause any difficulty in driving? We studied this using an instrumented car over 250 km of highway driving per subject, each of whom had generalized epileptiform discharges.<sup>13</sup> We found that three out of seven subjects had changes only in the lateral position of the car with respect to the white lines and that those with the greatest difficulty had quite active epilepsy. Thus, many patients with epileptic discharges had no change in their driving behaviour.

In other patients with idiopathic generalized epilepsy, telemetered EEG has shown that epileptiform activity is usually suppressed during city or highway driving and that there is an increase with relaxation, for example at a traffic light. However, there are exceptions in which the reverse occurs. These studies have also shown that there is enormous variation among the patients: one obtains a great deal of information about a specific

person but it is difficult to generalize from these results.

Patients may have brief myoclonic jerks with intermittent photic stimulation (IPS) and standardized IPS in the EEG laboratory enables one to predict their sensitivity to visual stimuli in daily life.<sup>14</sup> Eyelid myoclonia alone with IPS should not be interpreted to prohibit driving.

People sitting next to the driver and who are photosensitive often experience seizures caused by sunlight flickering through trees at certain frequencies. However, one needs to look at the light before it can evoke a seizure. Thus the driver is normally not affected. We can reduce sensitivity to these stimuli with sunglasses and I recommend to all my photosensitive patients that they use these when driving. The use of prolonged recording, especially with video monitoring or close observation, can help in interpreting the clinical information.

#### Discussion

*Guberman:*

Some patients with generalized epilepsy, usually adults, report no seizures but have frequent spike and wave bursts in the EEG. Fitness to drive is a major problem in these patients. We monitor them with eight hours of videotelemetry to try to quantify how many bursts they are having and how long they are. I am concerned by studies showing some impairment of reaction time even with very brief bursts.<sup>15</sup> Although the patient really does not notice anything, some reflexes may be impaired during driving.

*Rémillard:*

When the patient or family says that the patient is unaware that these bursts of spike and wave activity have occurred, this means that there is impairment of consciousness. The patient has absence. So, whether reporting is mandatory or not, the patient cannot drive until he is free of absences for the statutory period prescribed by law. We should try to improve drug levels or change medication.

*Andermann:*

Patients who have had remission of their generalized epilepsy yet report that they have one absence attack in a year which may last a few seconds, constitute a very special group and there is no consensus as to how this should be addressed. We do not routinely evaluate their reaction time in the EEG laboratory. Most of them are driving, are not taking medication, and do not like to take medication. Reporting them is nebulous: you don't know what to report. And if you don't know, it is very unlikely that the licensing body is going to be able to give you an answer. One may decide to re-interview the patient and family and to treat to "clean up" the EEG. But then how long should this continue, and should the patient be treated just so she can drive? These are all very difficult questions to answer.

#### EPILEPSY AND DRIVING-THE EPIDEMIOLOGICAL POINT OF VIEW

*Claire Laberge-Nadeau, Director, Laboratoire sur la sécurité des transports, Centre de recherche sur les transports, Université de Montréal*

We have studied accident rates and accident risk ratios in different age groups in drivers with and without known medical conditions affecting fitness to drive. Regulations concerning

fitness to drive with various medical conditions are applied in most industrialized countries but their scientific basis is difficult to assess and the evidence is at times contradictory. We studied diabetes mellitus in males, age 65 or less, driving heavy trucks,<sup>16</sup> and also older drivers with vision problems. We will also discuss how these methods might be applied to epilepsy.

Regulations in Québec in 1987 permit Type II diabetics treated with insulin and, exceptionally, Type I diabetics, to drive trucks under certain conditions, but not buses, minibuses, or emergency vehicles. The Nova Scotia Supreme Court more recently opened this to Class 1 licenses for insulin-dependent diabetics. The American Federal Highway Administration has also recently permitted waivers of the commercial vehicle restrictions on insulin-treated diabetics.

We performed a cohort study with a control group, stratified by age and class of license. We compared the crash rates of diabetic and healthy truck permit holders to estimate relative risk. We used anonymized data from the SAAQ and also linked to files of the health insurance board (RAMQ) to validate health status. We also considered professional and nonprofessional drivers separately as their accident rates are not the same, and used a telephone survey to estimate exposure – kilometres driven, driving habits, night driving, type of road, etc.

*Urs Maag (Professor, mathematics and statistics, Université de Montréal)*

Can such epidemiological methods be applied to epilepsy? The problem is that a clinician may find that an individual in a higher risk group is at a lesser risk than the average risk we can calculate for such a group, but regulations are meant to be applied uniformly. In Québec we can link original sets of data on individuals, respecting privacy, and we have several dependent variables. Studying crash mortality rate is almost hopeless. The rates are so low that it is almost impossible to find any differences. For crashes with injury, large sample sizes are needed. We can also look at demerit points and suspensions. Although suspensions are rather rare, demerit points are generally good predictors of future crashes. We have not yet done any good study of crash risks for people with epilepsy. Because of the different types of epilepsy and seizures, one would need very careful definition of the medical status of the subjects. The large sample required would also require the collaboration of all relevant specialists in the province.

### Question

*Krumholz:* Would it be worthwhile to look at rates before and after changes to regulations to see if these accomplish what was intended?

### Answer

*Maag:* As a statistician I'm always leery of before and after studies particularly when they cover a long time. Fortunately for society, you have to wait to accumulate enough data on car crashes, but problems then arise with the data. People's health status changes, they acquire other diseases, traffic volumes change, and even cars change over the years.

### Question

*Guberman:* What level of relative risk are we willing to tolerate to decide whether laws should be liberalized or made tighter?

### Answers

*Maag:* A statistician simply calculates the risk with a confidence interval. It is up to society to decide what risk is acceptable. One can make two types of error. If you are very strict, you will have no risky drivers, but at a huge societal cost to many while saving costs in terms of traffic accidents. If you are very liberal then you take the cost from the individual and shift it to society because you have more crashes. So society, as a whole, has to debate which costs we wish to decrease, knowing full well that it will therefore increase others.

*Laberge-Nadeau:* I am told by the SAAQ that caution is warranted before reaching a relative risk of 2 and that this is evaluated more carefully with a risk of 2 or 3. We provide the results and they must make a decision that applies to everyone.

### DRIVING AND EPILEPSY – REGULATIONS AND TRENDS IN THE UNITED STATES

#### *Krumholz*

There are special issues relating to driving in the USA that are worth noting. Our country is large and the greatest population growth is in suburban areas of the south and west where public transport is limited. Over 75% of two-adult households have two or more cars. These are a status symbol and bound to the sense of worth in the USA. We are also a very litigious society.

Individual state laws govern personal vehicle driving, which concerns most of our patients, and federal laws govern commercial vehicles. State regulations can be changed by bureaucrats without much involvement of the legislature, and common law and case law determine how these rules are applied. Epilepsy, as a very definable disorder with impairment of consciousness, has been an important model for regulations governing fitness to drive beyond the number of people affected.

Only six states have retained mandatory reporting. This is a drop from the past and it is generally felt that mandatory reporting does not work well for reasons that have been discussed here. I think that this is a clear trend that will continue.

The seizure-free interval is hotly debated. Intervals from three months to one year are most common and the trend is to reducing this to six months in many states and to three months in some, including my home state of Maryland.

A consensus statement from the American Academy of Neurology, the American Epilepsy Society, and the Epilepsy Foundation of America was published in 1994.<sup>17</sup> They discussed the optimum seizure-free interval and what modifying factors should be considered for it. An interval of three months was "preferred".

Why three months? Patients with epilepsy clearly prefer shorter seizure-free intervals and evidence suggests that with relaxing of restrictions, self-reporting and compliance improve. Empirically it seemed logical because there was no evidence clearly against it. Intervals such as one year or two years had been chosen arbitrarily and without strong data to support any particular rule. There is evidence that about 80% of patients seizure-free for three months will also be seizure-free for a year. The risk of having an accident while driving if one had been seizure-free for a year after a single unprovoked seizure was 0.0019%, and that if the interval were reduced to six months from 12 months, restricting 100,000 epileptic drivers would only

reduce the number of accidents by seven. It was judged that this was not a large reduction and as three months was almost as good a predictor as six months, then three months would be a reasonable delay. There have been no great increases in accident rates reported from individual states that have used the shorter intervals. In Wisconsin, there has not been a significant increase in accident rates after moving from a one-year to a six-month restriction. Despite the initial radical appearance of the three-month interval, I can only suggest keeping an open mind about it.

Data on different seizure-free intervals from Maryland raise some questions about very short intervals. We performed a retrospective case control study asking what the risk is for a seizure that causes a driving accident.<sup>18</sup> For a control group, we used patients with epilepsy who had no seizure-related accidents matched for sex and age within three years. We recruited patients from medical clinics in Maryland and tried to identify all those with a history of accidents. We evaluated 61 patients and in 11, (18%), the accident occurred with their first seizure. This, therefore, could not have been predicted or prevented and is in keeping with other studies. We also found that 25% of these epileptic drivers had multiple crashes, and 34% of crashes involved driver injury, 15% caused injury to others and there were three deaths. At a 12-month seizure-free interval, significantly more control subjects than study subject drivers had had accidents. The difference in risk was significant at a six-month seizure-free interval but not at three months, that is, both 12- and six-month intervals reduced the risk of accidents while the three-month interval had no significant protective effect. Numbers were small, however, and there was a trend to significance at three months. Although, with these data, a seizure-free interval of one year would produce a 75% reduction in seizure-related accidents, a three-month interval would still reduce baseline risk by 50%. With a one-year interval, 50% of drivers without accidents would not have been permitted to drive: this is reduced to 30% with a three-month interval. We also found that subjects whose antiepileptic medication had been adjusted in the previous year had a lower risk of accidents than those whose antiepileptic medication had not changed. This may mean that the former are receiving more or better medical care, or that they take newer antiepileptic medications. We know that shorter seizure-free intervals can reduce noncompliance and this is also a benefit.

Thus, reporting, compliance, the risk of accident and especially a history of recurrent crashes and other risk factors, and the effect on seizure-free drivers are all important issues. Whichever interval one uses, outcomes need to be measured and we plan to continue this study.

I emphasize also that the consensus group recommended that favourable and unfavourable modifiers be considered with the seizure-free interval. Favourable modifiers included seizures with medically directed medication change, some simple partial seizures, solely nocturnal seizures, and seizures with acute reversible illness; while noncompliance, alcohol, a history of crashes, and lack of credibility were factors that should perhaps prolong the seizure-free interval. In the USA these are indeed taken into account.

When one deals with a patient, we also have to use common sense. One patient with a seizure every four to six months sees

me every three months and says he would like to start driving. I tell him that even so, my advice and common sense is that he should not.

The consensus committee was unanimously opposed to mandatory reporting and is very clear that the patient is responsible for the initial and subsequent reports. We need to emphasize improving compliance from patients rather than making physicians into policemen. The physician should advise the patient about the regulations and the obligation to report, as well as our own recommendations. The consensus also called for physician immunity from prosecution both if a physician reported a patient who refuses to report or who is judged to be endangering the public, and if a physician chooses not to report a patient.

## DRIVING AND EPILEPSY – REGULATIONS AND TRENDS IN EUROPE

*Kirker*

Seizure-free intervals in Eastern European countries are about 30 years behind those in Western Europe, for which the European Union directives provide guidelines. Individual countries can still make progress under these. In urbanized countries there is a move to restrict and reduce private car ownership so the tide is against further liberalization. We should inform the legislators that present regulations in most countries are unworkable because they are not believed by patients with epilepsy, nor by many of the physicians involved. If we can produce regulations that allow the controlled epileptic driver to drive, it will improve compliance and will exclude more of the unsafe epileptic drivers, which is to everyone's advantage.

## THE PROFESSIONAL DRIVER

*Sylvain Tremblay, CCMTA*

Our committee reconfirmed yesterday that an individual who has been seizure-free for 10 years, on or off medication, can be eligible for any class of license whereas in the USA and in some Canadian jurisdictions, heavy commercial truck driving permits require a period not only seizure-free, but off medication.

## MEDICALETHICS, DRIVING AND EPILEPSY

*Guy-M. Rémillard, Epilepsy Clinic, Montréal Neurological Hospital; and Neurology Service, Hôpital du Sacré-Coeur de Montréal*

Let us begin with a premise that we can agree on. Driving a motor vehicle in our society is important but it should not be without reservation or without exception. I don't think it makes any difference whether this is called a right or a privilege, but it is clearly not a private concern alone.

One of the aims of human rights is to abolish discrimination based on handicap. If we are to act ethically we must act, as much as possible, from a position of knowledge. In order to be fair, we should refine our studies to assess the influence of multiple variables such as age, type of epilepsy, driving history, etc. What are the facts? One of the functions of this meeting is to review these. In this way, not only can we approximate the most reasonable regulatory approach, but also have some idea of the



moral residue, the good and bad consequences of the actions that we will recommend. This is why we are here as moral agents, ethicists, all of us.

Raffle's<sup>19</sup> study of bus drivers in England shows us that despite great care in examining candidates, there will still be loss of control at the wheel by epileptics because some hide their condition. Some events are due to the first seizure and cannot be prevented. In practice, we know that some people hide their epilepsy and that many patients, perhaps most in some jurisdictions, are unknown to licensing authorities. Some of these patients are less well-controlled and their accident rate is presumably higher. In the doctor's office, the situation is not discussed as much as it should be, because the consequences are perceived as too ominous. Optimal rules would be easier to apply and this is what rules should be: they should be optimal in order for them to be applicable with the correct moral residue. So the ethics of the situation requires finding and living with the right moral risk or residue.

#### SUGGESTIONS FOR A MODEL LAW FOR CANADA

*G.-M. Rémillard*

Prof. Krumholz commented on the recurrence risk after a first unprovoked seizure, and what the risk of recurrence would be from the 7th to the 12th month as compared to after a year. From the 13th to the 18th month, considering time driving and seizure/accident ratio, it has been calculated that there would not be very much difference.

The current required seizure-free interval in the United Kingdom is 12 months and Chadwick stated he would feel comfortable with a seizure-free interval of six to 12 months, but this was his personal view. Is Europe more paternalistic than the United States, where a three-month rather than the six- or 12-month interval is suggested? Chadwick was asked, "What would you think of permitting people with epilepsy after a first seizure to resume driving after three months, but after a second seizure, impose a driving ban of say, six months?" He replied that, based on his studies, "I wouldn't have much problem with such a system" (personal communication). Thus a first unprovoked seizure due to epilepsy would entail a three-month suspension; and a second attack, a six-month ban. This is the interval that I would like to suggest for us here in Canada.

What evidence can we base guidelines on? Class 1 evidence, provided by well-designed, randomized controlled clinical trials, will never be possible with driving. Class 2 evidence is provided by well-designed observational studies with concurrent controls, case controls or cohort studies. Class 3 evidence comes from expert opinion, case series, case reports, and studies with historical controls. There is much of that in the literature on epilepsy and driving. Guidelines have been based mainly on this level of evidence. When there is only Class 3 evidence, consensus is more difficult to develop and so are guidelines. This is why they have been so inconsistent. The strength of recommendations can only be based on the strength of the studies available to back them up.

The American Academy of Neurology suggested a three-month seizure-free interval and even suggested favourable modifiers to this three month period. Thus, there could even be less than three month intervals with individual assessment. They

also had unfavourable modifiers. We also have favourable modifiers in Québec such as seizures exclusively during sleep and recurrence after medically directed change in treatment.

For commercial or professional driving, in Québec we have provisions for permit holders of classes 1, 2, 3, and 4a/b/c to be able to drive if they have been seizure-free for five years and off medication, provided they have three EEGs at one-year intervals. The SAAQ will also evaluate individual cases for shorter intervals, mainly for class 3 drivers. They will deliver a license when they believe that the person is not unduly dangerous considering the type of work, absence of sleep deprivation, and regular work schedules. I do not think that they would allow shorter intervals for a bus driver. One can be seizure-free and on medication for 10 years in Québec and hold license class 1, 2, 3, or 4a/b/c. I think I am responsible for that addition because during these deliberations, I wrote to the SAAQ that it is unfair to discriminate against people who have had no seizures for many years but who want to remain on medication. However, I also know that some people do not wish to go off medication because they still have attacks that they have not disclosed.

For class 5 permits (private passenger cars and minivans), I think the rules should be open. I think that doctors would then discuss more with patients and that self-reporting would then increase, thus diminishing the danger due to people who have not reported. I think that the SAAQ should make every neurologist become more involved in the process by making the rules more applicable. The SAAQ should provide Québec neurologists with information kits so that they can train others in their region and become experts on the subject. Follow-up studies would be required after the rules change, to examine the differences, as Krumholz stated, and necessary corrections made accordingly.

Physicians must also meet their responsibilities if patients are to comply with regulations. If we spend time telling our patients about the rules because we can believe in them, and convince patients that following them is a good thing, they will accept them more easily. They will self-report more and I think there will be fewer accidents. We should emphasize that factors such as sleep deprivation and noncompliance should be avoided, and remind patients that normal rest and avoidance of excesses make seizures less likely. Many already know this but need encouragement and explanation. Also stress, with compassion, the importance of medication compliance and the danger of uncontrolled seizures, and most will comply.

#### DRIVING REGULATIONS IN CANADA – DISCUSSION BY PARTICIPANTS

*R. McLachlan:*

About half of Canadian neurologists agree with the one-year interval which is standard in Canada for private automobiles. Others felt it should be shorter. My suggestion is to maintain the one-year interval but to allow three- to six-month intervals in some patients.

*Participant:*

Some neurologists tell patients that they will take their licenses away when they have no authority to do so. The availability of neurologists and the delays in obtaining tests may make a three-month rule unworkable.

*Andermann:*

There are very clear inequalities in the availability of neurological services in Canada. The decisions have to be taken by the people who are trained to make them: we don't presume to change this. It is quite clear that the neurologist has no right to take anybody's license away. That is really going beyond what he is qualified to do and is the role of the licensing authority only. As to delays for appointments and the seizure-free interval, it is nevertheless known whether there have been any further seizures. The interval will be calculated from the seizure and not from when the report is received.

The quality of the letters sent by physicians to the licensing bodies should respond to education. Neurologists need to know what is expected of them and I think that they would then act accordingly.

*Reynolds: (British Columbia)*

Dr. Krumholz has noted that the patient has to accept responsibility for his actions. I think that this is very important: he has a moral and legal obligation to be a safe driver. The physician must also emphasize that the patient should drive safely and if we want voluntary notification I think that we have to accept this responsibility. One British Columbia neurologist at times reports to us that he has "read the Riot Act to this patient" but I don't think that too many neurologists do that, though they should.

*Participant: (Northwest Territories)*

There is a drive toward an evidence-based approach to setting regulations but good evidence is scarce at best. The error is always on the side of protecting the public and we want to infringe on personal rights to the least possible degree. In the NWT it is very difficult to get a neurological opinion and most patients are managed either by their general practitioner, or in most of our communities, by a nurse practitioner. So the onus of responsibility is to make sure that these people are, in fact, safe when driving.

*Participant:*

I believe that if more emphasis were put on the obligation of the driver to report immediately any change in his medical condition, we would not have to be so concerned about mandatory reporting.

*Laberge-Nadeau:*

Self-assessment can be unreliable (e.g., Matthews and Moran<sup>20</sup>). It is documented that proven dangerous drivers consider themselves to be good drivers. I am dubious about relying on that: in principle I agree but in practice, I'm not sure.

**SUMMARY AND CONCLUSION***Andermann:*

The purpose of the neurologist is to enable the person who has had a seizure or who has epilepsy not to be unnecessarily troubled and to lead as normal a life as possible. It has been very apparent that there should be some uniformity of approach in each country at least and, if possible, internationally.

We all feel that mandatory reporting is counterproductive. I hope that there will be a statement to this effect from the lay

societies and from the association of neurologists. This issue is very much alive, as we have heard from the CMA and CMPA representatives and has not been beaten to death: this will only occur when it is gone for good.

The second issue is the seizure-free period. Many patients are not even aware of the current rules. To reduce from one year to three months would be a major dislocation but a six-month interval after an unprovoked seizure might be acceptable, certainly to the neurological community, and perhaps also to the different provincial bodies. One of the big surprises is the enormous declaration gap. Many people, perhaps more than are declared, have seizures and are thus unknown to the SAAQ. There is obviously room for a public information campaign, and there should also be material explaining the rules of that province available to everybody who comes to a neurologist. This may lead to a reduction in the gap between the actual occurrence of seizures and the awareness of the problem that the provincial licensing body has.

Some clinical aspects are straightforward and some are not. My interpretation of the rules is that myoclonus, as the only residual manifestation in young people with juvenile myoclonic epilepsy, is not a contraindication to driving. There is some question about this as some patients with a brief spike and wave burst may have myoclonic jerks and a 1-2 second interval when they are unaware.

Patients, in all good faith, may not know whether they are aware during the aura of a temporal lobe seizure. Patients with some simple partial seizures – a sensory aura or some simple motor manifestations – may be able to drive safely, but it is good neurological practice to question a witness when the issue of awareness during an aura arises.

Nocturnal attacks are a problem. The pattern of exclusively nocturnal seizures should be established for a period of one year and such regulations should be maintained.

Patients with generalized epilepsy with spike and wave discharge and only occasional absences are an interesting and different group. It is very hard to know what to do with these people as they do not want to take medication and the history is confirmed by the families. Should they take medication because they have one or two witnessed absences in a year? This is not really soluble and illustrates that no matter how hard we try, we cannot fit everything into the legislation that we think should be available to us. I encourage neurologists to submit more detailed reports when called upon, leading to a more individualized assessment by the authorities. It is not the job of the neurologist to permit the patient to drive or to forbid it, but better information from the physician should enable the ministry's medical consultants to make the most reasonable decisions.

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## REFERENCES

1. McLachlan RS, Jones MW. Epilepsy and driving: a survey of Canadian neurologists. *Can J Neurol Sci* 1997;24:345-349.
2. Drachman DA, Swearer JM. Driving and Alzheimer's disease: the risk of crashes. *Neurology* 1993;43:2448-2456.
3. Dubinsky RM, Stein AC, Lyons K. Practice parameter: risk of driving and Alzheimer's disease (an evidence-based review): report of the quality standards subcommittee of the American Academy of Neurology. *Neurology* 2000; 54: 2205-2211.
4. Taylor J, Chadwick D, Johnson T. Risk of accidents in drivers with epilepsy. *J Neurol Neurosurg Psychiatry* 1996;60:621-627.
5. Salinsky MC, Wegener K, Sinnema F. Epilepsy, driving laws, and patient disclosure to physicians. *Epilepsia* 1992;33:469-472.
6. Krumholz A. Driving and epilepsy: a historical perspective and review of current regulations. *Epilepsia* 1994; 35:668-674.
7. Gastaut H, Zifkin BG. The risk of automobile accidents with seizures occurring while driving. *Neurology* 1987;37:1613-1616.
8. Waller JA. Chronic medical conditions and traffic safety. *N Engl J Med* 1965;273:1413-1420.
9. Hansotia P, Broste SK. The effect of epilepsy or diabetes mellitus on the risk of automobile accidents. *N Eng J Med* 1991; 324: 22-26.
10. Redelmeier DA, Tibshirani RJ. Association between cellular-telephone calls and motor vehicle collisions. *New Engl J Med* 1997; 336: 453-458.
11. Sonnen AE. Epilepsy and driving: a European view. International Bureau for Epilepsy. Paswerk Bedrijven, Haarlem, The Netherlands 1997:11-32.
12. Van Donselaar CA, Geerts AT, Schimsheimer RJ. Idiopathic first seizure in adult life: who should be treated? *BMJ* 1991;302:620-623.
13. Kasteleijn-Nolst Trenité DG, Riemersma JB, Binnie CD, Smit AM, Meinardi H. The influence of subclinical epileptiform EEG discharges on driving behaviour. *Electroencephalogr Clin Neurophysiol* 1987;67:167-170.
14. Zifkin BG, Kasteleijn-Nolst Trenité DG. Reflex epilepsy and reflex seizures of the visual system: a clinical review. *Epileptic Disord* 2000;2:129-136.
15. Binnie CD, Marston D. Cognitive correlates of interictal discharges. *Epilepsia* 1992;33 (Suppl 6):S11-S17.
16. Laberge-Nadeau C, Dionne G, Ekoe JM, et al. Impact of diabetes on crash risks of truck-permit holders and commercial drivers. *Diabetes Care* 2000;23:612-617.
17. Consensus conference on driver licensing and epilepsy: American Academy of Neurology, American Epilepsy Society, and Epilepsy Foundation of America. Washington, D.C., May 31-June 2, 1991. Proceedings. *Epilepsia* 1994;35:662-705.
18. Krauss GL, Krumholz A, Carter RC, Li G, Kaplan P. Risk factors for seizure-related motor vehicle crashes in patients with epilepsy. *Neurology* 1999; 52:1324-1329.
19. Raffle PAB. The HGV/PSV driver and loss or impairment of consciousness. In: Godwin-Austen RB, Espir MLE, (Eds.), *Driving and epilepsy*. Royal Society of Medicine International Congress and Symposium Series 1983;60:35-39.
20. Matthews ML, Moran AR. Age differences in male drivers' perception of accident risk: the role of perceived driving ability. *Accid Anal Prev* 1986;18:299-313.