Fitness to drive

Proposal for some changes in the *Regeling eisen geschiktheid 2000*

Gezondheidsraad **President**
Health Council of the Netherlands

To the Minister of Transport, Public Works and Water Management

Subject : presentation of advisory report *Fitness to drive. Proposal for some changes in the* Regeling eisen geschiktheid 2000
Your reference : VENW/DGP-2007/5323
Our reference : I-920/07/CP/db/481-J
Enclosure(s) : 1
Date : April 29, 2010

Dear Minister,

In response to your request for advice of 17 July 2007, I hereby submit the advisory report entitled *Fitness to Drive. Proposal for some changes in the* Regeling eisen geschiktheid 2000 (Fitness Criteria Regulations 2000). The advisory report, which was drawn up by a Committee established for that purpose, has been reviewed by the Standing Committee on Medicine.

Your request for advice addressed two issues. The first of these, concerning cerebral venous malformations, was answered in the advisory letter of October 2008. The second question, which is answered in this advisory report, involves the opportunity for a second opinion.

During further discussions between your Ministry and the Centraal Bureau Rijvaardigheids-bewijzen (CBR; the driving test organisation) and the Health Council of the Netherlands, it emerged that there is already an opportunity to obtain a second opinion and that this works well in practice. Accordingly, during these discussions, it was decided that the request for advice should focus on various implementation problems that the CBR is currently facing. These problems relate to new scientific findings concerning some of the clinical pictures listed in the *Regeling eisen geschiktheid 2000* (REG 2000).

The Committee has identified a discrepancy between the letter of the REG 2000 and the reality of everyday practice. However, it anticipates that a review of the REG 2000 will substantially reduce this discrepancy.

P.O.Box 16052
NL-2500 BB The Hague
Telephone +31 (70) 340 72 73
Telefax +31 (70) 340 75 23
E-mail: c.postema@gr.nl

Visiting Address
Parnassusplein 5
NL-2511 VX The Hague
The Netherlands
www.healthcouncil.nl

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The advisory report explores the following clinical pictures:

- Chronic heart failure
- Disorders of consciousness (other than epilepsy)
- Multiple sclerosis
- Intracranial tumours
- TIA and stroke
- Autism spectrum disorders.

The Committee has also found that there is still relatively little epidemiological data on the relationship between motorists' health status and their risk of causing road traffic accidents. It is recommended that further studies be conducted into this relationship.

I endorse the Committee's conclusions and recommendations.

I have also submitted a copy of this advisory report to the Minister of Health, Welfare and Sport.

Your sincerely,
(signed)
Professor J.A. Knottnerus

P.O.Box 16052
NL-2500 BB The Hague
Telephone +31 (70) 340 72 73
Telefax +31 (70) 340 75 23
E-mail: c.postema@gr.nl

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to:

the Minister of Transport, Public Works and Water Management

the Minister of Health, Welfare and Sport

No. 2010/07E, The Hague, April 29, 2010

The Health Council of the Netherlands, established in 1902, is an independent scientific advisory body. Its remit is “to advise the government and Parliament on the current level of knowledge with respect to public health issues and health (services) research...” (Section 22, Health Act).

The Health Council receives most requests for advice from the Ministers of Health, Welfare & Sport, Housing, Spatial Planning & the Environment, Social Affairs & Employment, Agriculture, Nature & Food Quality, and Education, Culture & Science. The Council can publish advisory reports on its own initiative. It usually does this in order to ask attention for developments or trends that are thought to be relevant to government policy.

Most Health Council reports are prepared by multidisciplinary committees of Dutch or, sometimes, foreign experts, appointed in a personal capacity. The reports are available to the public.

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Contents

Summary

On 17 July 2007, the Minister of Transport, Public Works and Water Management requested advisory reports on two issues.

The first issue concerns the rules concerning cerebral venous malformation described in the chapter on tumours and circulatory disorders in the *Regeling eisen geschiktheid 2000* (Fitness Criteria Regulations 2000). The Health Council of the Netherlands published an advisory letter on this topic in 2008.

The second issue concerns the option of a second opinion. Further discussions between the Health Council, the Ministry of Transport, Public Works and Water Management, and the *Centraal Bureau Rijvaardigheidsbewijzen* (the driving test organisation) demonstrated that this option is already available and that it works well in practice. Accordingly, during these discussions, it was decided that the request for advice should focus on various implementation problems that the CBR is currently facing. These problems relate to new scientific findings that affect some of the clinical pictures listed in the Fitness Criteria Regulations 2000.

The Committee has identified a discrepancy between the letter of the Fitness Criteria Regulations 2000 and the reality of everyday practice. However, it anticipates that a review of the Fitness Criteria Regulations 2000 will substantially reduce this discrepancy.

The Committee has also found that there is still relatively little epidemiological data on the relationship between motorists' health status and their risk of causing traffic accidents. It is recommended that further studies be conducted into this relationship.

This advisory report explores the following clinical pictures in greater detail:

- Chronic heart failure
- Disorders of consciousness
- Multiple sclerosis
- Intracranial tumours
- TIA and stroke
- Autism spectrum disorders.

In the case of chronic heart failure, it is proposed that the existing regulations be relaxed for the holders of Group 1 driving licences (licences A, B, and B + E). With regard to disorders of consciousness, there is an extensive description of the various aspects involved. This is because there has never before been such a specific recommendation on these disorders, in combination with fitness to drive. In the chapter on multiple sclerosis, the section entitled ‘Proposal for new regulations’ clarifies and strengthens implementation of the Fitness Criteria Regulations 2000. The chapter entitled intracranial tumours ends with a ‘Proposal for new regulations’ for individuals with tumours that do not require specific treatment and who, in the current situation, tend to fall between two stools. Progress in the diagnosis and treatment of TIA and stroke, coupled with the latest insights into specific risks, justify a relaxation of the rules. This may benefit Group 2 licence holders (C, C+E, D and D + E) in particular. Finally, there are descriptions and comments of autism spectrum disorders, inasmuch as this clinical picture affects the relationship with fitness to drive.

Chapter 1

Introduction

The Health Council has traditionally been involved in advising on medical fitness to drive a motor vehicle in traffic. The previous comprehensive advisory report on medical testing guidelines dates from 1994.[1] The pace of scientific progress requires that the guidelines be regularly re-assessed to determine whether any of their components require modification. Accordingly, a series of advisory reports on various sub-themes have been issued since 1994.[2-5]

Each of these advisory reports reflects the *Regeling eisen geschiktheid* drawn up by the Minister of Transport, Public Works and Water Management. The current regulations are known as the *Regeling eisen geschiktheid 2000* (hereinafter referred to as: REG 2000).

On 17 July 2007, the Minister of Transport, Public Works and Water Management asked the Health Council to issue an advisory report on two issues that are in line with previous advisory reports (see Annex A).

The first topic involves the regulations concerning cerebral venous malformation in section 7.6 of the REG 2000 on circulatory disorders. The Health Council published an advisory letter on this topic in 2008.[5]

The second issue concerns the option of a second opinion. Further discussions between the Health Council, the Ministry of Transport, Public Works and Water Management, and the *Centraal Bureau Rijvaardigheidsbewijzen* (the driving test organisation) demonstrated that this option is already available and that it works well in practice. Accordingly, during these discussions, it was decided that

the request for advice should focus on various implementation problems that the CBR is currently facing. These problems relate to new scientific findings.

After some general remarks in Chapter 2, the following clinical pictures are discussed in Chapters 3 to 8:

- Chronic heart failure (REG 2000, section 6.2)
- Disorders of consciousness (REG 2000, section 7.3)
- Multiple sclerosis (REG 2000, section 7.4)
- Intracranial tumours (REG 2000, section 7.5)
- TIA and stroke (REG 2000, section 7.6.1.2)
- Autism spectrum disorders (REG 2000, section 8).

Each chapter has the same structure:

- The wording of the existing regulations
- Implementation problems associated with the existing regulations
- Characteristics of the clinical picture
- The relationship between the clinical picture and traffic
- Proposed new wording.

A broad-based committee of experts was appointed to update the REG 2000 with regard to each clinical picture (see Annex B). The Committee met on five occasions. It found that there is still relatively little epidemiological data on the relationship between motorists' health status and their risk of causing road traffic accidents. A sound assessment system based on quantitative risk standards is not yet a feasible option. The Committee takes the view that there is still no substitute for clinical expertise. Accordingly, such expertise has a pivotal part to play in each clinical picture. Consideration is also given to guidelines developed outside the Netherlands.

Chapter 2

General principles and findings

The Committee feels that any update of the REG 2000 should take the following issues into consideration.

Imminent danger versus gradual loss of function

The Committee notes that the clinical pictures for which further advice is sought can be categorised into those:

- In which acute situations can arise that create hazards when driving a vehicle (e.g., a disorder of consciousness)
- In which the underlying disease process may result in a progressive loss of function (e.g. MS). The nature of the functional loss can then interfere with the individual's fitness to drive.

Each of these clinical manifestations requires a separate method of assessment. In the present REG 2000, the clarity of this distinction is not entirely consistent.

Functional loss that may or may not interfere with an individual's fitness to drive

The Committee uses the phrase 'The nature of the functional loss may interfere with fitness to drive' to indicate that not all disorders involving a loss of function cause the individuals in question to be immediately unfit to drive. The nature of

that loss of function must always be taken into consideration. In other words, exactly which sensory and motor functions (including their interactions with one another) are at issue? The loss of all or part of the field of vision as a result of a neurological disorder interferes directly with an individual's fitness to drive. However, an impaired ability to chew, caused by the same neurological disorder, has no effect whatsoever in this regard. It is this very distinction that the Committee has consistently attempted to incorporate into its advisory reports.

Stringent requirements for the professional use of Group 1 driving licences (driving licence categories A, B, and B+E)

Stringent requirements must be imposed on applicants for a Group 1 driving licence who intend to use this for professional purposes, such as taxi drivers, minibus drivers, and those who 'supervise others while they are driving a motor vehicle'. As these applicants spend many hours behind the wheel and bear great responsibility, they must meet the same requirements as those with a Group 2 licence (driving licence categories C, C+E,D and D+E). In principle, therefore, applicants for a Group 1 licence who do not also meet the demands for Group 2 can only be declared fit to drive if this licence is to be used for purely private purposes.

In individual cases, the restriction to private use can be suspended for a maximum period of five years. This is conditional upon medical testing by a specialist and a certificate from the employer stating that the use of the licence for professional purposes will be restricted to no more than four hours a day. No such exceptions can be made where the professional use in question involves passenger transport. The same applies to situations which, in legal terms, involve 'supervising others while they are driving a motor vehicle', a phrase that covers driving instructors and driving examiners.

Chapter 3

Chronic heart failure

3.1 Wording of the existing regulations

REG 2000, section 6.2

An impairment of the heart's pumping ability (congestive heart failure) may result from one or more causes, such as the disorders listed in the following sections. Refer to these sections for details of the specific criteria associated with these disorders. If the cause is not listed below, or if the cause is not well understood, then the following guidelines generally apply:

- In the case of Group 1 driving licences, a signature of endorsement by the medical examiner is usually sufficient for the assessment of fitness to drive. A specialist's report is still required for Group 2 driving licences. In the case of individuals with mild to moderate symptoms, the maximum fitness-to-drive period for a Group 1 licence is five years. Such individuals are generally unfit for Group 2 driving licences.
- Individuals with severe symptoms (NYHA categories III and IV) are unfit for any type of driving licence.
- In the case of heart and/or lung transplants: see section 5.7.2.

3.2 Implementation problems with the present regulations

Under the present regulations, anyone classified as NYHA category III or IV is deemed to be unfit for any type of driving licence. Questions are regularly asked concerning the grounds upon which this rule is based.

3.3 Clinical picture

Heart failure is a clinical syndrome in which patients exhibit the following symptoms: shortness of breath at rest or on exertion, fatigue, and swollen ankles. Clinical examination reveals a number of typical clinical symptoms.[6]

Heart failure affects 2 to 4 percent of the population, a proportion that rises particularly sharply above the age of 75. The incidence of heart failure in the 70-80 age group is 10% to 20%.[6]

The severity of the symptoms is described using the New York Heart Association classification system[7]:

- NYHA I: no symptoms
- NYHA II: symptoms during intense exertion
- NYHA III: symptoms during moderate exertion
- NYHA IV: symptoms when at rest or in response to very light exertion.

The term ‘heart failure’ is not very clear. It is a manifestation of an underlying cause. Diagnoses that are based on the clinical picture alone are, to some extent, inaccurate. It is sometimes difficult to distinguish between categories II and III, in particular.[8-11]

Moreover, there is no clear relationship between the symptoms exhibited and the severity of impaired cardiac function. Symptoms that persist after the patient has commenced therapy, however, can be used to determine a prognosis.

Accordingly, risk assessment in heart failure is usually concerned with the extent to which the patient exhibits a stable clinical picture.[6] In NYHA III, the situation is reasonably stable, whereas that is not the case in Category IV (symptomatology at rest and during exertion). In NYHA III, the risk of arrhythmia should also be evaluated. ‘At risk’ patients are usually fitted with a device such as an ICD (implantable cardioverter-defibrillator). Details of the regulations on ICDs can be found elsewhere in REG 2000 (see also Chapter 4 of this advisory report).

In view of the ill-defined boundary between NYHA II and III, it is advisable to ease the cut-off point for Group 1 driving licences relative to the current regulations (i.e., only NYHA IV patients will be denied a Group 1 licence).

Individuals classified into NYHA Categories III and IV will continue to be deemed unfit for a Group 2 licence.

Changes to heart-failure-related medication in combinations involving diuretics, ACE inhibitors, AT 2 antagonists and beta blockers can result in a temporary reduction of blood pressure reduction combined with decreased consciousness. Accordingly, individuals are not fit to drive for a period of one week after a change of medication.

3.4 Heart failure and traffic

The greatest risk of heart disease in relation to driving a vehicle is the occurrence of arrhythmias and a loss of consciousness.[12] There isa range of treatment options for arrhythmias. The consequence of implanting a pacemaker or ICD, which is described elsewhere in REG 2000, has been disregarded for the purposes of this advisory report. This chapter focuses solely on heart failure.

In Canada, fitness to drive is determined on the basis of the 'risk of harm' formula. This involves linking together and collectively weighing factors such as the time of day when the vehicle is being driven, the type of vehicle used, the risk of circulatory deficiency, and the risk that it will lead to accidents or fatalities. On the basis of the 'risk of harm' formula, a Canadian expert committee indicated that no restrictions should apply to individuals classified as NYHA I to III. On this same basis, it concluded that patients classified as NYHA IV should not be deemed fit to drive.[13]

3.5 Proposal for new regulations

- All driving licences:
  - Individuals with severe symptoms (NYHA category IV) are unfit for any type of driving licence
  - Individuals with chronic heart failure, regardless of their NYHA category, are unfit for any type of driving licence for a period of one week following hospitalisation or a change of heart-failure related medication. The medications in question normally include combinations of diuretics, ACE inhibitors, AT 2 antagonists and beta blockers.
- Group 1
  - Individuals with moderate symptoms (NYHA III) are deemed fit for Group 1 driving licences. A signature of endorsement by a medical examiner is usually sufficient. This is valid for a period of three years.
- Group 2
  - Individuals with moderate symptoms (NYHA III) are deemed unfit for Group 2 driving licences.

Chapter 4

Disorders of consciousness (other than epilepsy)

4.1 Wording of the existing regulations

REG 2000, section 7.3

Regardless of the cause, individuals with disorders of consciousness (with the exception of the disorders of consciousness mentioned in sections 7.3.1 and 7.3.2) are deemed unfit for all types of driving licence (see also sections 6.9 and 8.5). In the case of patients with a previous – but not recent – history of consciousness disorders, and where the endorsement of the medical examiner shows that further specialist examination uncovered nothing unusual, no specialist examination is required. In all other cases, a specialist's report is required for the assessment of fitness to drive. Such individuals can be declared fit for Group 1 driving licences if they have been free of the disorders in question for a period of at least one year. Their fitness-to-drive period would then be five to ten years, dependant on the severity of the clinical picture.

These individuals are deemed unfit for Group 2 driving licences. However, those who have suffered no disturbances of consciousness for the past five years can be granted a fitness-to-drive period of five years.

4.2 Implementation problems with existing regulations

The regulations have recently been amended, with regard to sleep disorders. In the advisory report that was issued prior to this change, syncope was disregarded. Accordingly, this section explores this syndrome in greater detail. The current

regulations on syncope (collapse), which involve a one (for Group 1 driving licences) to five year (for Group 2 driving licences) period of disqualification, appear to be much too strict.

4.3 Clinical picture

Fainting involves a brief loss of consciousness, with a spontaneous recovery. Fainting is a common medical problem that can be caused by coronary artery diseases, or by neurological, psychogenic or metabolic disorders. Fainting caused by a drop in blood pressure, resulting in decreased blood flow and oxygen deficiency in the brain, is known as syncope.[14]

Types of syncope

There are three main types of syncope: reflex syncope, cardiac syncope, and syncope caused by orthostatic hypotension.

Reflex syncope

Reflex syncope is by far the most common cause of fainting. This disorder involves a temporary dysfunction of the autonomic reflexes that normally control the circulation. This causes a drop in systemic blood pressure and reduced blood flow to the brain. If there is only a slight drop in blood pressure, the affected individual sees black spots before their eyes and experiences a feeling of lightheadedness. However, if there is a substantial drop in blood pressure for more than five to six seconds, the individual will lose consciousness.[15]

Vasovagal syncope (classic fainting) is the most common form of reflex syncope. Typical triggers are emotions, pain, and prolonged standing. Carotid sinus syncope and the extremely rare glossopharyngeal nerve syncope derive their names from the nerves involved. In other situations, the name given to the type of reflex syncope involved is derived from the activity in which the patient was engaged at the onset of syncope, such as swallowing syncope, coughing syncope, urinary syncope and defecation syncope. Such special forms of reflex syncope are often referred to as situational syncope. Provided that there is no associated cardiac disease, reflex syncope patients have an excellent prognosis.

Cardiac syncope

Cardiac syncope is caused by structural heart abnormalities or cardiac arrhythmias. A cardiac cause is indicated when fainting is preceded by heart palpitations or chest pains, in the absence of prior (prodromal) symptoms. In the case of syncope during exertion, a cardiac cause (such as an aortic stenosis) should always be considered. Predictors of hazardous arrhythmias are a familial incidence of sudden cardiac death at a young age, a previous myocardial infarction, a history of heart failure and/or ventricular arrhythmias, or an abnormal ECG (long QT or Brugada syndrome, conduction or repolarisation disorders, old myocardial infarction, ventricular hypertrophy, arrhythmias).

Syncope caused by orthostatic hypotension

Orthostatic hypotension is when the systolic blood pressure falls by at least 20 mmHg or the diastolic pressure by at least 10 mmHg within three minutes after standing up. The main causes are neurological diseases involving primary autonomic failure (e.g. Parkinson's disease), secondary autonomic failure (e.g. diabetes mellitus), and medications (psychotropic drugs, alpha-blockers).

Prevalence of syncope/fainting

Fainting is common in the general population (see Table 1 in Annex D).[16] It is estimated that nearly half of all people faint at some point in their lives. Incidences of fainting at a young age almost always involve reflex syncope. A survey of students at the Academic Medical Center (AMC) in Amsterdam showed that 35% had fainted at one time or another.[14] This study makes no mention of the rare cases of fainting at an early age that are caused by epilepsy or heart disease. Giving blood samples, prolonged standing, getting up, and hot weather were identified as triggers, which makes it very likely that the condition in question was reflex syncope. The incidence of fainting episodes/reflex syncope in young women was almost double that in men. The strikingly high prevalence of reflex syncope at a young age in this study is consistent with earlier data cited in the literature.[16]

While it is much less common in middle age, there is a clear increase in syncope during old age. Syncope in the older age group is more often caused by orthostatic and post-prandial hypotension, carotid sinus syndrome, cardiac arrhythmias and heart valve disorders. This group also has a lower incidence of vasovagal syncope.[14,16]

Risk of recurrence of syncope

Sheldon *et al.* found evidence that, in syncope, the risk of recurrence is highly dependent on the number and frequency of prior episodes.[17,18] The percentages cited in this study correspond well with data from the International Study of Syncope of Unexplained Etiology (ISSUE). Patients without structural heart abnormalities and with a history of one or two prior episodes have a one-year risk of recurrence of 10-20%. This rises to about 40% in those with 4-6 prior episodes.[19]

4.4 Disorders of consciousness and traffic

New scientific findings

Sheldon *et al.* reported on 209 patients who were diagnosed with reflex syncope on the basis of positive tilt table tests.[20] Five of these 209 patients had fainted while driving. In four of these 209 cases (2%), this caused an accident. There were no fatalities or injuries to passengers or bystanders, only the drivers were injured. Sheldon *et al.* calculated that the average risk that patients with vasovagal syncope would experience a syncopal episode while driving was 0.33% per patient per annum.

A recent survey of 104 patients with reflex syncope found that there were four cases of syncopal episodes while driving. In only one of these cases did this result in an accident.[21]

It is likely that the risk of a recurrence of syncope while driving can be substantially reduced by specific instructions aimed at preventing reflex syncope. These might include “Do not drive if you do not feel well”, “Be sure to drink your fill before you leave”, “Make sure it is not too hot in the car”, “Restrict long car trips as much as possible”.[22]

A recent large-scale, case-control study provided insight into the risk of suffering a recurrence of syncope while driving, for patients who had previously suffered an episode while driving.[23] In a group of 3 877 patients with syncope, 381 (10%) had experienced a syncopal episode while driving. The members of this subset were slightly younger, included slightly more males, and had a higher incidence of coronary artery disease than the other patients. The main causes of fainting were reflex syncope (37%) and cardiac arrhythmia (12%). In the course of an observation period averaging nearly four years, recurrent syncope while driving occurred in 72/381 (19%) of patients with syncope (8-year risk of syncope 25%). In 713/3 496 of the patients with syncope, recurrent syncope occurred in circumstances other than when driving (8-year risk of syncope

28.9%). The risk of a recurrent syncopal episode after one year was 14% in patients who had experienced syncope while driving and 17% in the remaining patients. Nearly 50% of relapses occurred within six months after the initial evaluation. Ten of the 381 patients (2.6%) experienced a further syncopal episode while driving. The cumulative risk of recurrence while driving was calculated at 0.7% at 6 months and 1% after one year. In connection with this risk of recurrence, it is important realise that the patients in question had received the best possible treatment.

About 5% of the patients in the above-mentioned study suffered from ventricular arrhythmias.[23]

A study specifically aimed at patients with life-threatening ventricular disorders was performed by Akiyama *et al*.[24] In a study of antiarrhythmic medication versus defibrillators, many of the 559 participating patients frequently experienced symptoms suggestive of an arrhythmia. Loss of consciousness was reported in 2% of cases, dizziness or palpitations that compelled the car driver to stop the vehicle in 11% of cases, and dizziness or palpitations that did not compel the driver to stop the vehicle in 22% of cases. Fifty of the 559 patients (9%) had been involved in traffic accidents. On the basis of the symptoms, an arrhythmia was assumed to be involved in six cases (6/599 = 1% of patients). In this study, the calculated annual risk of an accident resulting from an assumed incidence of syncope of 0.4 percent per patient year is almost identical to the values obtained by Sheldon (0.33%) and Lurie (0.1-0.2%) for reflex syncope.[20,25]

A striking feature of the study conducted by Akiyama *et al.* is the discrepancy between the high percentage of symptoms that suggest a fall in blood pressure and the number of road traffic accidents (involving injuries) caused by these symptoms. In the discussion section, the authors refer to earlier data from the literature indicating that actually becoming ill when driving causes traffic accidents in about 50% of cases, that 2% of these accidents involve injuries, and only 0.33% of them involve a fatality. For patients in the study conducted by Akiyama *et al.*, the calculated total risk of being involved in a road traffic accident was 3.4% per patient per year. This was lower than the rate reported for all car drivers in the USA (7.1%) and also lower than the rate for drivers of a similar age to the population studied by Akiyama *et al.* (4.9%). It should be noted that Akiyama's study was based on questionnaires completed by 559 out of a total of 1,016 patients who were invited to participate.

European and Canadian guidelines for syncope and driving vehicles

In 2001, the European Society of Cardiology's (ESC) Task Force on Syncope drew up guidelines for driving and syncope[26-28] (update: 2004).[29,30] The ESC guideline (and update) is based on the comprehensive ESC Task Force report entitled 'Driving and heart disease' which was published in 1998.[31]

The above-mentioned guidelines are now outdated. New guidelines based on a multidisciplinary approach, and modified in keeping with recent publications, were published in the European Heart Journal in September 2009.[32] The new guidelines were approved by the European Federation of Neurological Societies, the European Federation of Autonomic Societies, European Union of Geriatric Medicine, and the European Society of Emergency Medicine. They are almost universally supported by clinical experts throughout Europe. Accordingly, these guidelines were used as the basis for the Dutch fitness-to-drive requirements for syncope patients.

However, the 2009 ESC guidelines are extremely concise. The 2003 Canadian Cardiovascular Society Consensus Conference, which focused on the Assessment of the Cardiac Patient for Fitness to Drive or Fly, provides clear information on the risks involved, and more detailed rules.[13] The Canadian guidelines are clearer and more practical than their European counterparts. They distinguish between patients with and without prior symptoms. In the case of clear, sufficiently long lasting, and low frequency prodromal symptoms, the risk involved is so slight that no restriction would appear to be indicated. The same applies to repeated syncope during prolonged standing or while blood samples are being taken. Exceptions are made for patients with few or no prodromal symptoms, patients who faint while seated, and patients with a history of numerous episodes. A one-month restriction on car driving is recommended for individuals who have experienced more than one episode in the preceding six months.

In the Netherlands, practising neurologists and cardiologists have no specific guidelines for the examination and treatment of syncope patients. Expertise is available, however, in the form of the Netherlands Syncope Network, an organisation consisting of specialists in this area.

4.5 Proposal for new regulations

I Epilepsy, see REG 2000, section 7.2

II Hypoglycaemic, see REG 2000, Section 5.2

III Syncope: see below

IV Psychiatric, advice from a specialist

Sub III Syncope

A Cardiac syncope

- When implanting an ICD: REG 2000, section 6.7.4
- When implanting a pacemaker: REG 2000, section 6.7.3
- Arrhythmia patients are considered unfit for Group 1 and Group 2 driving licences until drug therapy has been instituted and has proved successful for a period of three months
- Patients receiving ablation therapy are considered unfit for Group 1 and Group 2 driving licences for a period of up to three months after surgery, even if the therapy has proved successful throughout that period.

B Reflex syncope

Vasovagal

The classical form, i.e. involving a triggering factor such as emotion, giving a blood sample, and prolonged standing, as well as prodromal symptoms such as light-headedness, sweating, and nausea.

- Less than three times a year: no driving ban. With the exception of: vasovagal episodes in a sitting position (e.g. as when driving a car) and vasovagal episodes with very fleeting prior sensations; this group must be evaluated by a syncope expert. Three times a year, or more: recommendation following evaluation by a syncope expert
- Situational (swallowing syncope, coughing syncope, urinary syncope, defecation syncope, etc.): no driving ban. With the exception of coughing syn-

cope: driving ban for Groups 1 and 2 until the coughing fits are under control and the patient has been symptom-free for one month.

Carotid sinus syncope

- Should always be assessed by an syncope expert
- In cases involving the cardioinhibitory type of carotid sinus syndrome, if the decision is taken to implant a pacemaker and if this procedure is therapeutically successful (i.e. no marked drop in blood pressure in response to carotid sinus massage): fit to drive again one week after implantation
- No pacemaker implanted or procedure not therapeutically successful, see: reflex syncope of unknown origin.

Reflex syncope of unknown origin

- Associated with symptoms of unknown origin that only occur on one occasion, and with a low risk of cardiac syncope:
  - Group 1 driving licences: individuals are deemed fit to drive again after a symptom/free period of one month
  - Group 2 driving licences: individuals are deemed fit to drive again after a symptom/free period of six months
- In the case of symptoms of unknown origin coupled with suspected cardiac syncope, or after multiple episodes, a driving ban is imposed until an examination has been conducted by a syncope expert and adequate therapy has been instituted or until the patient has been symptom-free for a period of 12 months.

C Syncope due to orthostatic hypotension

If the orthostatic hypotension can be prevented by a change of medication, for example, and if that proves to be successful, then the individual in question is not considered unfit to drive. If the symptoms continue:

- Group 1:
  - The patient is prohibited from driving a car, unless they experience no symptoms when in a sitting position and exhibit prodromal symptoms that facilitate adequate action. Fitness to drive for a period of one year.

- Group 2:
  - Driving ban, unless a syncope expert indicates that the ban can be lifted.

Chapter 5

Multiple sclerosis

5.1 Wording of the existing regulations

REG 2000, section 7.4

More or less progressive, possibly with intermittent clinical pictures:

- These involve disorders of the brain or spinal cord, such as Parkinson's disease, Alzheimer's disease (see section 8.6 for details of dementia), multiple sclerosis, cervical myelopathy, and serious diseases of peripheral nerves and skeletal muscles. The patients in question are generally not eligible for Group 2 driving licences.
- A specialist's report is required (prepared by a qualified neurologist and possibly a neuropsychologist) in order to assess a patient's suitability for a Group 1 driving licence. In the case of cervical myelopathy, however, a signature of endorsement by a medical examiner is sufficient. To form an appropriate judgment, one of the CBR's practical fitness-to-drive experts should also be consulted (this involves a technical examination and/or a driving test). The fitness-to-drive period, which depends on the disease's degree of progression and the severity of symptoms, is restricted to a maximum of five years.

5.2 Implementation problems with existing regulations

With regard to multiple sclerosis (MS), neither the number of periods in which symptoms are more serious (relapses) nor the interval between these periods are indicative of the future course of the disease. Accordingly, neither of these meas-

ures can be used to determine whether or not a given individual is fit to drive. It is necessary to examine how individuals function between relapses. Are essential functions impaired to such an extent that this interferes with the individual's fitness to drive? In addition to acute relapses, most MS patients experience a slow, progressive loss of function over a number of years (the actual figure varies widely). Initially, the greatest emphasis is usually on motor and/or sensory impairment. Indeed, visual impairment is sometimes the main determining factor affecting an MS patient's fitness to drive.

5.3 Clinical picture

MS is a demyelinating disorder of the central nervous system. It is the most common chronic neurological disorder in young adults. The disease usually appears between the ages of 20 and 50.

MS is characterised by a wide variety of complaints and symptomen.[33] In adults, the initial symptoms usually involve monofocal symptoms of neurological deficit, such as inflammation of the optic nerve (optic neuritis) or a disorder of the spinal cord (transverse myelitis).[34] The disorder often exhibits relapses, periods when symptoms become more severe. In the initial stages, aside from these relapses, the disease usually progresses very gradually. Ultimately, however, the pace of progression accelerates. Approximately 80% of patients initially exhibit the moderately progressive form of this disease. However, half of this group will go on to develop the more strongly progressive form of MS.

At the first assessment, within six months of diagnosis, most patients exhibit relatively limited neurological disorders. Around one quarter of them encounter physical limitations, more than one third experience social strain, and one quarter have general health problems. One in ten patients report cognitive symptoms. The three-year period following the first assessment is generally characterised by an increase in neurological disorders and a decline in physical abilities. At the same time, there are no substantial changes in social ability, general health and cognitive performance. However, susceptibility to fatigue is clearly a significant factor in MS.[35]

In the group that initially suffered no relapses, the decline in neurological functions and physical abilities during the first three years is more pronounced than in the group that did experience relapses in the early stages.[36]

In the Netherlands, well over four hundred new cases of MS are diagnosed each year. The disease often has an erratic and uncertain course, which makes it difficult to give patients a reliable prognosis. Few studies have been conducted

into the long-term prognosis in terms of MS patients' degree of autonomy, dependency, and social ability.

5.4 MS and traffic

A Swiss study carried out in 1977 showed that drivers with multiple sclerosis were at increased risk of being involved in traffic accidents. Accordingly, these researchers argue that individual MS patients should be regularly be assessed to determine whether they are fit to drive.[37] Studies carried out in the United States showed that MS patients with cognitive symptoms, in particular, are at increased risk of being involved in road traffic accidents.[38] A Danish study showed that, compared to healthy drivers, drivers suffering from MS were more likely to be treated in Accident and Emergency Departments as a result of traffic accidents.[39] A German study advocates that patients who have had a relapse should subsequently undergo a fitness-to-drive test. At the same time, these researchers indicate that there are substantial individual differences within the patient population as a whole.[40] A Norwegian study involving a group of MS patients applying for a driving licence showed that cognitive and emotional limitations, and to a lesser extent the duration of the disease and the degree of neurological impairment, were the main factors for rejecting such applications.[41]

5.5 Proposal for new regulations

The original text of section 7.4 remains unchanged, except that it now makes no mention of multiple sclerosis as a clinical picture. The following applies specifically to multiple sclerosis:

- Group 1:
  - Fit to drive provided that, between relapses, the individual does not experience any dysfunctions that interfere with their fitness to drive. A specialist's report (drawn up by a neurologist and possibly a rehabilitation physician) is always required. This must always include assessments of the patient's abilities (sensorimotor, cognitive, visual, auditory), and the role of susceptibility to fatigue
  - If dysfunctions between relapses interfere with the individual's fitness to drive, then a driving test will be conducted by the CBR's expert.

A fitness-to-drive period of no more than three years, however, in the event of clear progression a shorter period may be used (the rate of progression differs from one person to another, but it is often quite slow).

Use of the licence for professional purposes is restricted to those who, between relapses, do not suffer from dysfunctions that interfere with their fitness to drive.

- Group 2:
  - Functional impairment in MS may be exertion-related (functional impairment is worsened by fatigue). Partly for this reason, driving vehicles in a professional capacity is very different from using the licence for private purposes. MS patients deemed unfit for Group 2 driving licences, with the exception of those who, between relapses, do not suffer from dysfunctions that interfere with their fitness to drive. Such individuals can be deemed fit to drive for a maximum period of three years.

Chapter 6

Intracranial tumours

6.1 Wording of the existing regulations

REG 2000, section 7.5

In addition to the distinction between brain tumours (in the strict sense of the term) and intracranial tumours located outside the brain, the occurrence (or absence) of epilepsy is a key factor in determining fitness to drive. Patients with intracranial tumours still require a specialist's report. Furthermore, cases involving disorders of the visual system are subject to the requirements listed in Chapter 3.
A. Brain tumours – in the strict sense of the term.
Patients who develop a stable clinical picture, with no dysfunctions, are deemed fit for Group 1 driving licences for a maximum period of five years. If the specialist's report pinpoints motor or cognitive disorders, then the patient must take a mandatory driving test (conducted by one of the CBR's practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a period of one year. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

B. Intracranial tumours located outside the brain.
In the absence of dysfunctions, subjects are deemed fit for Group 1 driving licences for a maximum period of five years. If the specialist's report pinpoints motor or cognitive disorders, then the patient must take a mandatory driving test (conducted by one of the CBR's practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit

to drive for a maximum period of one year. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

Group 2 driving licences
Patients with an intracranial tumour are deemed unfit for Group 2 driving licences. An exception is made for patients whose specialist's report indicates that curative treatment of the tumour has been successful. In the absence of dysfunctions, and subject to the approval of a specialist medical examiner, patients can be deemed fit to drive for a maximum period of three years. If there are any remaining physical or mental dysfunctions following curative treatment, then the patient must take a mandatory driving test (conducted by one of the CBR's practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a maximum period of three years. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

6.2 Implementation problems with existing regulations

As currently applied, the regulations address various issues related to individuals with a benign intracranial tumour that was not subjected to invasive treatment. This usually involves tumours (acoustic neuroma) of the eighth cranial nerve.[42] These tumours generally grow very slowly, mainly resulting in unilateral hearing loss.[43] In many cases, if the decision is taken to operate, the resultant damage can be worse than the disease itself. The current regulations do not take account of this situation. This situation is similar to the one that prompted the Health Council´s first partial advisory report on intracranial vascular disorders, which was presented in October 2008.

6.3 Clinical picture

There are many types of intracranial tumours, ranging from fast-growing, destructive glioblastomas, which can infiltrate large areas of one or both hemispheres (very quickly causing serious damage) to small acoustic neuromas (which only interfere with hearing and balance functions in one ear).[44,45]

The most common brain tumour is a grade IV glioma (glioblastoma multiforme).[46] With the intensive chemoradiation treatment that is currently used, this disease has a two-year survival rate of 25%. A substantial proportion of all relapses occur within the first year after diagnosis. This means that patients who are completely free of symptoms after the first treatment can be in the terminal stages of this disease just six months later. Patients with a low-grade glioma can remain stable for twenty years, while functioning perfectly normally.[47] But that

group too includes cases where disease progression is already apparent within the first year.

Whether a tumour located in the skull causes symptoms, and if so, to what extent, depends on: 1) the tumour site, 2) the size of the tumour, and 3) the nature of the process involved. In addition, the number of lesions involved is a factor in brain metastases. Following treatment, patients with malignant brain tumours may show temporary improvement. Over time, however, tumour growth will resume.

6.4 Intracranial tumours and traffic

When assessing someone's fitness to drive, the nature of the underlying disease is less of an issue than the occurrence (or absence) of dysfunctions that interfere with the individual's fitness to drive. The Committee therefore takes the view that the definition used by the current regulations needs to be refined. Rather than focusing on the stability of the situation, greater emphasis should be given to the existence (or absence) of disability. Accordingly, the Committee proposes that the word 'stable' be deleted from section 7.5 (A) in REG 2000.

The suggested rewording of Section 6.5 ('requires no treatment') for Group 2 driving licences only relates to the above situation. It is inapplicable to patients whose therapy has been terminated because their prognosis is hopeless. The Committee feels obliged to point this out, purely for the sake of completeness, as it feels that situations of this kind are unlikely to occur in practice.

6.5 Proposal for new regulations

In addition to the distinction between brain tumours (in the strict sense of the term) and intracranial tumours located outside the brain, the occurrence (or absence) of epilepsy is a key factor in determining fitness to drive. Patients with intracranial tumours still require a specialist's report. Furthermore, cases involving disorders of the visual system are subject to the requirements listed in Chapter 3.

Group 1

a Brain tumours – in the strict sense of the term

- Patients who develop a clinical picture, with no dysfunctions that interfere with the individual's fitness to drive, are deemed fit for Group 1 driving licences for a maximum period of three years.

- If the specialist’s report pinpoints motor or cognitive disorders that interfere with the individual’s fitness to drive, then the patient must take a mandatory driving test (conducted by one of the CBR’s practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a period of one year. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

b Intracranial tumours located outside the brain
- In the absence of dysfunctions that interfere with the individual's fitness to drive, patients are deemed fit for Group 1 driving licences for a maximum period of five years.
- If the specialist's report pinpoints motor or cognitive dysfunctions that interfere with the individual's fitness to drive, then the patient must take a mandatory driving test (conducted by one of the CBR’s practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a maximum period of five years. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

Group 2

- Patients with an intracranial tumour are deemed unfit for Group 2 driving licences. An exception is made for patients with benign tumours that do not require therapy, or where the specialist’s report indicates that curative treatment of the tumour has been successful. In the absence of dysfunctions that interfere with the individual’s fitness to drive, and subject to the approval of a specialist medical examiner, patients can be deemed fit to drive for a maximum period of three years. If there are any physical or mental dysfunctions that interfere with the individual's fitness to drive, then the patient must take a mandatory driving test (conducted by one of the CBR’s practical fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a maximum period of three years. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

Chapter 7

TIA and stroke

7.1 Wording of the existing regulations

REG 2000, section 7.6

Circulatory disorders of the brain

Circulatory disorders of the brain include stroke (cerebral haemorrhage or cerebral infarction, also known as CVA), TIAs (transient ischemic attacks), dilations of arteries (aneurysms) and other vascular malformations of blood vessels in the brain.

7.6.1 Group 1 driving licences
(…) 7.6.1.2 TIA and stroke
7.6.1.2 TIA and stroke
A TIA does not restrict an individual's fitness to drive. Following a stroke, individuals are deemed unfit for Group 1 driving licences for a period of six months. At the end of that period, a specialist report must be drawn up by a neurologist or a rehabilitation physician. In the absence of mental or physical dysfunctions, individuals are deemed fit to drive for an indefinite period of time. If individuals do suffer from dysfunctions, then they must take a driving test (conducted by one of the CBR's practical fitness-to-drive experts). If they pass this driving test then they are deemed fit to drive for a maximum period of five years. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

7.6.2. Group 2 driving licences

7.6.2.1 (….)

7.6.2.2 TIA and stroke

After a TIA or stroke, individuals are deemed unfit for Group 2 driving licences for a period of five years. At the end of this period, individuals can be declared fit to drive again if the neurological report shows that they are free of any mental or physical dysfunctions. Such individuals can be deemed fit to drive for a maximum period of three years. Epilepsy sufferers are also subject to the provisions of section 7.2.

7.2 Implementation problems with existing regulations

The implementation problems involve questions such as “What is a stroke?”; “What is the best way to deal with a silent infarction on the MRI?”; “What is the best way to deal with a cerebral infarction caused by an air embolism?”; “What action should be taken in response to a perimesencephalic haemorrhage?” and the like.

There is also a major implementation issue concerning Group 2 driving licence holders, for whom a TIA means a five-year driving ban. There may be indications that this period could be reduced to two years.

7.3 Clinical picture

In recent years, scientific views concerning the treatment of TIA and stroke have changed.[48,49] The current guidelines on TIA or stroke for general practitioners and specialists have been adjusted in line with the conclusions drawn by a range of studies.

The Dutch College of General Practitioners (NHG) “TIA” standard provides guidelines for the diagnosis and management of patients with symptoms of neurological deficits that occur suddenly, but which disappear again before they visit their GP. The classical criterion – that a diagnosis of TIA requires symptoms of deficit that persist for more than 24 hours – has been dropped.

This revision of the definition of TIA was inspired by a number of partly pragmatic considerations. The distinction between a TIA and a limited stroke has no real basis in terms of disease causation, nor does it have a clear prognostic significance. In addition, symptoms of deficit that spontaneously disappear may be due to infarction, while the treatment given to patients with a history of TIA is no different from that given to patients who, following a cerebral infarction, either recover completely or display limited residual symptoms.

In any case, quick action is indicated if the patient exhibits neurological disorders, as this may indicate that they have suffered a stroke. In the case of a TIA, special consideration should be given to the prevention of cardiovascular complications in the short and long term.

In the first few months after the TIA, a vascular problem in the brain is the most serious risk. Later on, however, there is a greater risk of cardiac problems.[50]

A new feature of the standard is the need, in some TIA patients, for short-term surgical intervention due to an increased risk of stroke following the TIA. In this way, rapid diagnosis and secondary prevention in the acute stage can significantly reduce the risk of future strokes.[51,52] Yet there is still a need to be particularly alert to the occurrence of cognitive disorders (dementia).[50] Several tests for these disorders are currently under development.[53] The proposed medical testing should focus specifically on such cognitive deficits.

The NHG "CVA" (CerebroVascular Accident) standard provides guidelines for the diagnosis and management of patients who exhibit symptoms indicative of a stroke. Until recently, there were no effective treatments for these patients. Accordingly, it was difficult to formulate guidelines capable of withstanding scientific scrutiny.[54] Over the past few years, much has changed for the better in the area of stroke-patient care, especially in the Netherlands. The establishment of stroke services has enabled many regions to develop a coherent chain of care. The development of evidence-based treatment guidelines has greatly enhanced the efficacy of such care.[55] Improvements in treatment outcome have mainly been achieved by: 1) consultation with a neurologist at an earlier stage and 2) the earlier initiation of thrombolytic therapy.

Overall, the Committee considers that scientific knowledge in the area of TIA and stroke has changed so much in recent years that an adjustment of the Regulations would now seem to be indicated.

7.4 TIA/stroke and traffic

A great deal of research is currently being conducted into rehabilitation following a stroke, and into the issue of these patients being able to drive a car again.[56] To those involved, this is a matter of the greatest importance.[57] For such patients, being unable to drive would make it difficult or impossible for them to steer a path through everyday society.[58]

Following a stroke, they tend to do less driving and their style of driving changes. A study carried out in Northern Ireland showed that 57.2% of Group 1 drivers were back behind the wheel less than one month after a TIA.[59] A Canadian study has shown that 66% of drivers resume driving after a stroke.[60] While

many drivers who have had a stroke (35%) resolve never to drive again[60], a Swedish study showed that many of these individuals are not always aware that they actually still have a limited ability to drive.[61] Accordingly, the latter study emphasised the importance of a driving test in this regard. A Norwegian study also showed – perhaps unexpectedly – that drivers who have previously had a stroke do not have an increased risk of being involved in road traffic accidents.[62]

Following a TIA or a mild cerebral infarction, there was a high risk of recurrence (5%, on average) in the week following the first attack. This risk can be reduced by very rapid access to analysis and treatment. In the medium term (five years), the risk of recurrence is 2-5% per year, which is comparable to the risk involved in cases of myocardial infarction. This data was derived from older studies, predating the use of statins, in which patients were treated with more effective platelet inhibition measures. The long-term (10-year) risk of recurrence is even lower, affecting just 18% of surviving patients (an average of around 2% per year).

However, the group of patients who have experienced a TIA or a cerebral infarction has less risk of a recurrence than of vascular complications (mainly myocardial infarction, CHD (Coronary Heart Disease), and vascular death). ltimately, it is these complications that are the determining factor for the survival and morbidity of these patients.[50]

In addition, following a TIA or cerebral infarction, there is a 20-30% risk of post-stroke dementia (PSD). A diagnosis of PSD can only be confirmed by extensive (and very labour intensive) neuropsychological testing.[63] This 30% sub-group is substantially outnumbered by those who have cognitive disorders, but who have not yet developed dementia.

In terms of fitness to drive, the above findings mean that patients in the acute stage (i.e. the first week, during analysis, and at the start of treatment) are not permitted to drive. Following this period, the determining factor is not the risk of recurrence, but rather:

a the remaining deficit (paralysis, haemianopsia);
b the remaining cardiovascular risk;
c cognitive disorders.

A neurologist or rehabilitation physician informs the CBR concerning the existence of such a dysfunction and how this might interfere with the individual's fitness to drive. The CBR is also given an estimate of the subject's susceptibility to fatigue.

7.5 Proposal for new regulations

In this proposal, the concept of “dysfunctions that interfere with an individual’s fitness to drive” (as described in Chapter 2) has been inserted into the passages on various vascular disorders. This has further refined the concept of “dysfunction” from the existing REG 2000.

7.6 (REG numbering) Circulatory disorders and vascular malformations of blood vessels in the brain

This covers the following disorders: cerebral haemorrhage, cerebral infarction (or CVA), TIAs (Transient Ischemic Attacks), cerebral venous sinus thrombosis, artery dilatations (aneurysms), and other vascular malformations of blood vessels in the brain.

7.6.1 (REG numbering) Group 1 driving licences

7.6.1.1 Aneurysms and other malformations of blood vessels in the brain

- A1. Aneurysms and other malformations of the cerebral arteries discovered by chance, with a risk of haemorrhage
  In view of their relatively low risk of haemorrhaging, individuals in which an aneurysm or another form of vascular malformation is discovered by chance, who have not suffered any related haemorrhaging, and who have not been treated for these conditions, are not subject to any restrictions with regard to their eligibility for Group 1 driving licences. Those who have received treatment are subject to the requirements listed under A2.

- A2. Aneurysms and other malformations of the cerebral arteries that were discovered after haemorrhaging
  Individuals who have suffered a cerebral haemorrhage from an aneurysm or other form of vascular malformation are deemed unfit for Group 1 driving licences for a period of up to six months after the onset of the haemorrhaging in question. In such cases, a specialist's report (drawn up by a neurologist or a rehabilitation physician) is required in order to identify any physical or mental dysfunction. If such individuals do not have any dysfunctions that interfere with their fitness to drive, then they are deemed fit to drive for an indefinite period of time. Individuals who do suffer from dysfunctions always take a mandatory driving test (conducted by one of the CBR’s practi-

cal fitness-to-drive experts) to determine whether they are indeed fit to drive. If they pass this driving test then they are deemed fit to drive for a maximum period of three years. The CBR has an extensive protocol for such driving tests.

- B1. Malformations of blood vessels in the brain discovered by chance, involving veins only and with no clinical symptoms
  This involves a range of disorders, including cerebral cavernous haemangiomas and congenital venous malformations. When discovered by chance, these disorders often show signs of haemorrhaging but without any associated clinical symptoms. These individuals are deemed fit for Group 1 driving licences, provided that the specialist's report (drawn up by a neurologist) indicates that there is a minimal risk of a haemorrhage. Given the dynamic nature of the disorders in question, such individuals are deemed fit to drive for a maximum period of three years.

- B2. Malformations of blood vessels in the brain, involving veins only, and with clinical symptoms that have not been treated
  Individuals with malformations of blood vessels in the brain, involving veins only, including cerebral cavernous haemangiomas and congenital venous malformations that have haemorrhaged, with corresponding clinical symptoms, are deemed unfit for Group 1 driving licences for a period of up to six months after the onset of the clinical symptoms in question. A specialist's report (drawn up by a neurologist or a rehabilitation physician) is required, stating that the risk of haemorrhage is considered to be minimal. Such individuals are then deemed fit to drive for a maximum period of three years. Individuals with dysfunctions that interfere with their fitness to drive are required to take a driving test (conducted by one of the CBR's practical fitness-to-drive experts). The CBR has an extensive protocol for such driving tests.

- B3. Malformations of blood vessels in the brain, involving veins only, and with clinical symptoms that have been treated
  Individuals with malformations of blood vessels in the brain, involving veins only, including cerebral cavernous haemangiomas and congenital venous malformations that have haemorrhaged, with corresponding clinical symptoms, and who have received treatment, are deemed unfit for Group 1 driving licences for a period of up to six months after the treatment in question. In such cases, a specialist's report (drawn up by a neurologist or a rehabilitation

physician) is required. Such individuals are then deemed fit to drive for a maximum period of three years. Individuals with dysfunctions that interfere with their fitness to drive take a mandatory driving test (conducted by one of the CBR's practical fitness-to-drive experts). The CBR has an extensive protocol for such driving tests.

7.6.1.2 TIA and stroke

- Given the relatively high risk of recurrence, individuals who have suffered a TIA or stroke – which was not the result of an aneurysm or other malformation of the blood vessels in the brain – are deemed unfit for Group 1 driving licences for a period of two weeks following the onset of the symptoms of deficit. Following this two-week period, and after initiating appropriate therapy, there are no restrictions on the individual's fitness to drive, unless there is a dysfunction that interferes with the individual's fitness to drive, in which case this must be assessed by a medical examiner. Individuals with such a dysfunction are deemed unfit for Group 1 driving licences for a period of three months. At the end of that period, a specialist report must be drawn up by a neurologist or a rehabilitation physician. In the absence of cognitive or physical dysfunctions that interfere with their fitness to drive, individuals are deemed fit to drive for an indefinite period of time. If individuals do suffer from dysfunctions that interfere with their fitness to drive, then they must take a mandatory driving test (conducted by one of the CBR's practical fitness-to-drive experts). If they pass this driving test then they are deemed fit to drive for a maximum period of five years. The CBR has an extensive protocol for such driving tests. Epilepsy sufferers are also subject to the provisions of section 7.2.

7.6.2 (REG numbering) Group 2 driving licences

7.6.2.1 Aneurysms and other malformations of blood vessels in the brain

- A1. Untreated aneurysms and other malformations of the cerebral arteries Individuals with an aneurysm or other malformation of the cerebral arteries that has not been treated to reduce risk of haemorrhage are deemed unfit for Group 2 driving licences. An exception is made for untreated aneurysms, smaller than 10 mm, that are discovered by chance. These individuals are deemed fit for Group 2 driving licences, provided that the specialist's report (drawn up by a neurologist) is favourable. Such individuals can be deemed fit to drive for a maximum period of three years.

- A2. Aneurysms and other malformations of the cerebral arteries that were discovered after haemorrhaging
  Individuals who have suffered a cerebral haemorrhage from an aneurysm or other form of vascular malformation, and who have been treated for this condition, are deemed unfit for Group 2 driving licences for a period of up to six months after the treatment in question. In such cases, a specialist's report (drawn up by a neurologist or a rehabilitation physician) is required after six months, in order to identify any physical or mental dysfunction that interferes with their fitness to drive. If the specialist's report indicates that the individual in question has no physical or mental dysfunction that interferes with their fitness to drive, then they are deemed fit to drive for a maximum period of three years.
  If the specialist's report indicates that the individual in question does have physical or mental dysfunctions that interfere with their fitness to drive, then they are deemed unfit for Group 2 driving licences. If a specialist's report (drawn up by a neurologist or a rehabilitation physician) indicates that the individual in question has been free of dysfunctions that interfere with their fitness to drive for a period of at least five years, then they can be declared fit to drive again. Such individuals can be deemed fit to drive for a maximum period of three years.

- B1. Malformations of blood vessels in the brain, which may or may not have been discovered by chance, involving veins only and with no clinical symptoms
  This involves a range of disorders, including cerebral cavernous haemangiomas and congenital venous malformations. When discovered by chance, these disorders often show signs of haemorrhaging but without any associated clinical symptoms. These individuals are deemed fit for Group 2 driving licences, provided that the specialist's report (drawn up by a neurologist) indicates that there is a minimal risk of a haemorrhage. Given the dynamic nature of the disorder in question, such individuals are deemed fit to drive for a maximum period of three years.

- B2. Malformations of blood vessels in the brain, involving veins only, and with clinical symptoms that have not been treated
  Individuals with malformations of blood vessels in the brain, involving veins only, including cerebral cavernous haemangiomas and congenital venous malformations that have haemorrhaged, with corresponding clinical symptoms, are deemed fit for a Group 2 driving licence again six months after the

onset of the clinical symptoms, provided that a specialist's report (drawn up by a neurologist) indicates that there is a minimal risk of a haemorrhage and that the individual in question does not have any physical or mental dysfunction that interferes with their fitness to drive. Such individuals can be deemed fit to drive for a maximum period of three years. If the specialist's report indicates that the individual in question does have physical or mental dysfunctions that interfere with their fitness to drive, then they are deemed unfit for Group 2 driving licences. If a specialist's report (drawn up by a neurologist or a rehabilitation physician) indicates that the individual in question has been free of dysfunctions that interfere with their fitness to drive for a period of at least five years, then they can be declared fit to drive again. Such individuals can be deemed fit to drive for a maximum period of three years.

- B3. Malformations of blood vessels in the brain, involving veins only, and with clinical symptoms that have been treated
  Individuals with malformations of blood vessels in the brain, involving veins only, including cerebral cavernous haemangiomas and congenital venous malformations that have haemorrhaged, with corresponding clinical symptoms, and who have received treatment, are deemed fit for a Group 2 driving licence again six months after the treatment in question, provided that a specialist's report (drawn up by a neurologist or a rehabilitation physician) indicates that the individual in question does not have any physical or mental dysfunction that interferes with their fitness to drive. Such individuals can be deemed fit to drive for a maximum period of three years. If the specialist's report indicates that the individual in question does have physical or mental dysfunctions that interfere with their fitness to drive, then they are deemed unfit for Group 2 driving licences. If a specialist's report (drawn up by a neurologist or a rehabilitation physician) indicates that the individual in question has been free of the physical or mental dysfunctions that interfere with their fitness to drive for a period of at least five years, then they can be declared fit to drive again. Such individuals can be deemed fit to drive for a maximum period of three years.

7.6.2.2 TIA and stroke

- Given the relatively high risk of recurrence, individuals who have suffered a TIA or stroke – which was not the result of an aneurysm or other malformation of the blood vessels in the brain – are deemed unfit for Group 2 driving licences for a period of two weeks following the onset of the symptoms of deficit. After a TIA or stroke, and after initiating appropriate therapy, if a spe-

cialist’s report (drawn up by a neurologist or a rehabilitation physician) indicates that the individual in question has been free of dysfunctions that interfere with their fitness to drive for a period of at least five years, and provided that they pass a driving test, then they can be declared fit to drive again. Such individuals can be deemed fit to drive for a maximum period of three years. Epilepsy sufferers are also subject to the provisions of section 7.2.

7.7 (REG numbering) Steady-state defects

This involves post head-injury defect states associated with brain damage, traumatic spinal cord injuries, juvenile onset spasticity, residual states of hemiplegia, hyperkinetic syndromes, and the like.

- The patients in question are generally not eligible for Group 2 licences.
- A specialist examination is not required for Group 1 driving licences, provided that the medical examiner’s (rehabilitation physician) notes contain sufficient information to assess the individual's fitness to drive. If this is not the case then a specialist’s report is required, drawn up by an expert neurologist (and possibly a neuropsychologist). To form an appropriate judgment, if necessary, one of the CBR’s practical fitness-to-drive experts should also be consulted (this involves a technical examination and/or a driving test). Such individuals can be deemed fit to drive for a maximum period of ten years. If there are any doubts about their fitness to drive in the near future, then the maximum period is restricted to five years.

Chapter 8

Autism spectrum disorders (ASD)

8.1 Wording of the existing regulations

The REG 2000 chapter on psychiatric disorders (chapter 8) does not include a separate section on autistic spectrum disorders (ASD). With regard to the present topic, the chapters on neurological disorders, psychiatric disorders and medicinal products are likely to be particularly important (Chapter 7, specifically Sections 7.2, 8, and 10).

As this is the first time that ASD has been included in the Regulations, the Committee has explored the clinical picture in greater detail.

8.2 Implementation problems with existing regulations

ASD was not previously included in the Regulations. In practice, however, an increasing number of queries about this clinical picture are being received from the CBR. There is the question of whether driving lessons are needed, for example. In recent years, there has been a substantial increase in the number of individuals (young adults/adults or their parents/guardians) wanting information at the start of driving lessons. Accordingly, the Committee feels that the requirement for individuals to declare that they are suffering from this disorder cannot be justified. Indeed, there is no scientific evidence to underpin the need for this obligatory notification.

8.3 Clinical picture

In the official classification systems, ASD is designated as pervasive developmental disorders (PDD). PDD is a group of developmental disorders that is used to diagnose childhood autism and autism-related disorders.[64] The current classification system (DSM-IV-R[65]) refers to Autistic Disorder (AS, code 299.00), Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS, code 299.80), and Asperger's Disorder (Asp, code 299.80). According to DSM-IV-R, at least six symptoms must be present before the diagnosis of AS can be made. At least two of these symptoms must be in the area of social interaction problems (A1), at least one must be in the area of communication problems (A2), and at least one must be in the area of stereotypical patterns of behaviour, interests and activities (A3). A diagnosis of Asperger's Disorder requires at least two problems in the area of social interaction and at least one in the area of stereotypical patterns of behaviour, interests and activities. Furthermore, Asperger's does not involve delays in language development or cognitive development. With regard to a diagnosis of PDD-NOS (residual category), aside from problems in the above-mentioned areas, DSM-IV-R imposes no requirements regarding the number and type of symptoms. In everyday practice, however, the rule is that there should be ≥ 3 and ≤ 5 symptoms, at least one of which must be in the cluster of social interaction problems.[65,66]

Rett's disorder and Heller's disorder, both of which are autism spectrum disorders, have been disregarded here.

The frequency of occurrence is approximately 1:150/100, 25% of which involve a diagnosis of Autistic Disorder while the remaining 75% include other PDD groups (boys:girls, 5:1).[67] The increased frequency in recent years (formerly 4-5:10,000), has been provisionally attributed to earlier and better diagnosis, combined with increased demand for an official diagnosis. The latter appears to be associated with changed (increased) demands in society, pertaining to school and work, for example.

ASD is a largely hereditary disorder (up to 90%, as shown by twin studies), however, nothing is yet known about the mode of inheritance involved.[68] ASD is a syndrome definition (based on behavioural characteristics) rather than the description of a clinical picture whose aetiology (cause) is known (even though there is no doubt regarding the existence of an underlying neurobiological cause).

A complicating factor is that ASD has a very heterogeneous clinical picture. There is considerable variation in the level of functioning (25% of AS patients –

and fewer PDD-NOS patients – exhibit a low level of functioning), and in the extent and severity of the symptoms. There is a great deal of psychiatric comorbidity. Seventy percent have a single comorbid psychiatric disorder, while 41% have two comorbid psychiatric disorders (especially anxiety disorders, ADHD, and oppositional defiant disorder, but also mood disorders, Tourette syndrome, obsessive-compulsive disorder, eating disorders, and psychotic disorders).[69,70] Somatic comorbidity has also been described, which is more common than might be expected in a normal population (epilepsy, mental retardation, as well as certain genetic syndromes such as Fragile-X, tuberous sclerosis and VCF syndrome).[69,71]

Observations indicate an increasing incidence of drug dependence[69] and many neuropsychological (information processing) problems have been described.[68,69]

While ASD is a lifelong disorder, it is becoming increasingly apparent that its course can vary. The current classification system suffers from the drawback that once a diagnosis within ASD has been made, those symptoms that appear at an early age will also be included. There is no medicine or therapy that can cure this disease. However, there are treatments (both behavioural and pharmacological) that produce an effect at symptom-level.

The increased frequency of occurrence means that ever more questions are being asked about these patients' fitness to drive (including method of driving instruction, fitness for a driving licence, requisite re-testing).

Much less is known about adults with ASD than about children with this disorder. Longitudinal studies have shown that the core symptoms decline as individuals approach adulthood. There is an improvement in communication and reciprocity in social interactions. However, only 10-25% of adult ASD patients are capable of living independently or of living independently with supervision, of completing an educational programme, of performing regular work or of establishing a social network. Early, effective language development and an IQ score > 70 are favourable for the prognosis.[69] In adults, the process of reaching a diagnosis and a differential diagnosis can sometimes be very complex. There is no gold standard and, as with children and young people, a great deal of comorbidity is involved.[69]

8.4 ASD and traffic

The scientific literature offers no clues on how to best to organise the Regulations, other than on the basis of existing knowledge and expert opinion. At international level, only the UK has specific regulations for ASD. In that country, this

diagnosis is not considered sufficient reason to deny people a fitness-to-drive licence. However, consideration is given to the individual's tendency to act impulsively and to whether or not they are aware of the impact of their own actions on others and on themselves.

Given this disorder's high frequency of occurrence and great heterogeneity, it is obvious that many ASD sufferers will have no problem in obtaining and retaining a driving licence, or in safely negotiating road traffic situations. When formulating the proposed regulations, in addition to the validity of an ASD diagnosis in adults, the occurrence of comorbidity and medication use were also taken into account. The proposal means that ASD does not necessary impose restrictions on an individual's fitness to drive, except in some specific cases (doubts or explicit questions in advance, involvement in road traffic accidents) where ASD sufferers are advised against participating in motor traffic, or where such participation is subject to certain conditions (see Annex C).

8.5 Proposal for new regulations

Groups 1 and 2

- When assessing a subject's capabilities, recourse can be made to "Points to note in connection with medical testing for ASD", which is contained in Annex C. The individual in question may then be awarded a fitness to drive declaration that is valid for a maximum period of three years, or possibly a fitness to drive declaration that is subject to certain conditions (e.g. "only permitted to drive vehicles with an automatic transmission"). The medical testing should be based on a checklist of risk factors and should be carried out by a specialist with expertise and experience in the field of ASD in adults
- If doubts are raised (in relation to ASD), other than those issues raised by the individual concerned, then a decision can be taken to proceed with medical testing for ASD (see above) and a declaration of fitness to drive that is valid for up to three years, or a fitness to drive declaration that is subject to certain conditions (e.g. "only permitted to drive vehicles with an automatic transmission")
- If, to form an appropriate judgment, the CBR considers that a driving test is required, then it can call upon one of its practical fitness-to-drive experts. After taking a driving test, such individuals can be deemed fit to drive for a maximum period of three years.

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Annexes

Annex **A**

The request for advice

In the Lower House of the Dutch Parliament, I was recently asked parliamentary questions about the withdrawal of a driving licence following a stroke. For your information, I have enclosed details of these parliamentary questions and of the answers that I gave on that occasion.

In my response to the House, I promised to ask the Health Council for an advisory report.

In this letter, I am asking you to prepare two advisory reports.

1 My first request to your Health Council is for an advisory report on a possible update of the advisory report presented by the Health Council on 4 July 2001, concerning the fitness to drive of patients suffering from brain tumours or circulatory disorders of the brain. I can imagine that recent medical developments might constitute sufficient reason to update various points of your advisory report.

2 My second request for the advice of your Health Council is of an entirely different order. The *Regeling Eisen Geschiktheid 2000* (Fitness Criteria Regulations 2000) sets generally applicable rules. In most cases, these Regulations are perfectly satisfactory. Partly in response to the specific case that prompted the questions put to me in Parliament, I can imagine that there are certain specific clinical pictures to which the *Regeling Eisen Geschiktheid 2000* is not readily applicable. In such special individual cases, it may be necessary to augment the *Regeling Eisen Geschiktheid 2000* by adding the option of consulting a medical specialist, to reach a well-founded decision about such people's fitness to drive.

I would be grateful if the Health Council could produce an advisory report indicating whether you concur with my position that there are certain special clinical pictures to which the *Regeling Eisen Geschiktheid 2000* is not readily applicable. If you do indeed share my view on this matter, I would like your Health Council to send me a further description of the specific diseases for which the opinion of a medical specialist can be more decisive than the *Regeling Eisen Geschiktheid 2000*.

Since a refusal to grant a fitness to drive declaration and cancellation of the driving licence by the CBR can have far-reaching consequences for the individuals in question, I would ask you to treat this request for advice as a matter of priority.

Finally, and perhaps unnecessarily, I would like to point out that a hardship clause is not an option for standards that are directly derived from European directives, such as standards for visual acuity.

Minister of Transport, Public Works and Water Management
(signed)
C. M. P. S. Eurlings

Annex **B**

The Committee

- Prof. J.J. Heimans, MD PhD, *chairman*
  Professor of Neurology, VU University Medical Center, Amsterdam
- J. Groeneweg, MD PhD
  Psychologist/ safety expert, University of Leiden
- Prof. L. J. Kappelle, MD PhD
  Professor of Neurology, University Medical Center, Utrecht
- Prof. P. J. Koudstaal, MD PhD
  Professor of Neurology, Erasmus MC, University Medical Center Rotterdam
- M. C. T. F. M de Krom, MD PhD
  Neurologist, University Medical Centre, Maastricht
- B. E. Lahuis, MD PhD
  Child and adolescent psychiatrist, University Medical Center, Utrecht / currently Chairman of the Board at the Character Foundation for Child and Adolescent Psychiatry
- Prof. C. H. Polman, MD PhD
  Professor of Neurology, VU University Medical Center, Amsterdam
- W. Wieling, MD PhD
  Internist, Academic Medical Centre, Amsterdam
- Prof. F. Zijlstra, MD PhD
  Professor of Cardiology, University Medical Center, Groningen

- R. A. Bredewoud, MD, *advisor*
  Head of the Medical Department, Centraal Bureau Rijvaardigheidsbewijzen, Rijswijk, The Netherlands
- E. Schoten, *scientific secretary*
  Health Council of the Netherlands, The Hague
- C. A. Postema, MD PhD, *scientific secretary*
  Health Council of the Netherlands, The Hague

The Health Council and interests

Members of Health Council Committees – which also include the members of the Advisory Council on Health Research (RGO) since 1 February 2008 – are appointed in a personal capacity because of their special expertise in the matters to be addressed. Nonetheless, it is precisely because of this expertise that they may also have interests. This in itself does not necessarily present an obstacle for membership of a Health Council Committee. Transparency regarding possible conflicts of interest is nonetheless important, both for the President and members of a Committee and for the President of the Health Council. On being invited to join a Committee, members are asked to submit a form detailing the functions they hold and any other material and immaterial interests which could be relevant for the Committee's work. It is the responsibility of the President of the Health Council to assess whether the interests indicated constitute grounds for non-appointment. An advisorship will then sometimes make it possible to exploit the expertise of the specialist involved. During the establishment meeting the declarations issued are discussed, so that all members of the Committee are aware of each other's possible interests.

Annex **C**

Medical testing for ASD

C.1 Points regarding medical testing for ASD

The Committee recommends that any medical testing for ASD be carried out by psychiatrists with adequate knowledge and experience in the field of ASD in adults. The medical examiner is also required to consult the therapist (or therapists).

During medical testing, the psychiatrist must first determine whether the diagnosis of ASD (which was reported as part of the application for a 'Fitness to Drive Declaration') was made by a psychiatrist with expertise in this area. Next he/she must focus on the treatment, on whether or not any adverse effects have resulted from therapy (or pharmacotherapy) and on the presence of dysfunctions that interfere with the individual's fitness to drive.

Based on the presence of risk factors, a judgement can be made about whether the patient's disorder would involve risks if they were to drive a vehicle. The following checklist is designed to provide a framework within which a psychiatrist with the appropriate expertise can assess whether a given individual is fit to drive. Depending on the severity of the risk involved, this may have to be preceded by focused treatment. Depending on the risk involved, a monitoring process lasting one to three years will be initiated, after which the individual will be re-assessed.

Risk factor checklist:

- The ability to plan and organise (and to anticipate) behaviour
- Multi-tasking ability
- Possessing: overview of traffic situations, sufficiently fast reactions and adequate flexibility (multi-tasking ability), inhibition (individuals with poor impulse control may exhibit risky driving behaviour without being able to foresee the consequences, e.g. outbursts aimed at other road users)
- The exclusion of rituals or routines that might interfere with driving
- The presence of psychiatric comorbidity (e.g. ADHD symptoms)
- The presence of somatic comorbidity (e.g. epilepsy)
- The use of various medicinal products (including psychotropic drugs)
- The use of sedatives (especially benzodiazepines)
- A history of a higher than average number of accidents (here it should be borne in mind that the case history may be unreliable on this point. Checking the facts with objective sources such as the police and insurance companies is not feasible in practice)
- Having some understanding of their own limitations
- Having some understanding of the main aspects of possible treatment, and cooperating with that treatment (e.g. patient compliance).

Explanatory notes concerning the issues of comorbidity and substance abuse

ASD is known to be accompanied, in many cases, by comorbidity in the form of problems involving attention, hyperactivity and impulsiveness, as well as anxiety and obsessive-compulsive disorders, depression, and sometimes psychotic problems. Somatic comorbidity is frequently involved (mainly epilepsy, but also a number of genetic disorders). Substance abuse is also an important issue in ASD. When assessing an individual's fitness to drive, due consideration should be given to both comorbidity and substance abuse.

If comorbidity is present (both psychiatric and somatic), then the guidelines described for the relevant target group should be followed. Where medicinal products (including psychotropic drugs) are being used, then the guidelines drawn up for such cases should be followed. Moreover, consideration should be given to the fact that various medicinal products can favourably affect ASD-related problems, thereby improving road safety.

In all cases, medical testing should include a consideration of objective information about medication use by the applicant. Such information is available, for example, in the form of a 'medication history report', which applicants them-

selves can obtain from their pharmacy, free of charge. With the consent of the individual in question, the medical examiner may consult with their regular therapist and advise them to reduce their use of benzodiazepines.

The DSM-IV-R excludes certain combination diagnoses on formal grounds, but this does not mean that the symptoms associated with such 'excluded' disorders are any less real. In formal terms, for example, a classification of ADHD cannot be not made in conjunction with ASD. In everyday practice, however, comorbid ADHD is a frequently encountered problem within the ASD group.

Explanatory notes concerning the issues of previous accidents (including traffic accidents) and attitude

During the assessment, it may be necessary to explore the applicant's history in respect of accidents (including traffic accidents). In addition, medical testing should determine the extent to which the individual concerned really understands the nature and scope of their illness, it should also address their attitude and (where appropriate) patient compliance.

Monitoring of medical testing

It is vital that information obtained from medical tests should ultimately be made available, to enable the rules to be adjusted. For this reason, too, it makes sense for the inspections to be carried out by a small group of psychiatrists, who can then provide periodic feedback about the subjects that they have tested and about the sticking points that they encountered.

C.2 Recommendations concerning the fitness to drive of ASD sufferers

a Prior to the start of the driving lesson

- Is the instructor able to take account of the disorder during the driving lesson (information density, talking speed, clarity, addressing the subject in a calm voice)? Ideally, the instructor should, on at least one occasion, contact a counsellor/therapist who the student knows well and who is therefore in a position to advise on the best way to tackle driving lessons
- When there are doubts about starting 'lessons', a driving lesson simulator can be used to assess the subject's attention, inhibition capability and reaction time in a range of complex road traffic situations
- Before starting lessons in real traffic, it is advisable to hone the purely technical skills involved (changing gear, steering, parking, hill start) in a

simulator or on the circuit. The simulator can be used to focus specifically on different traffic situations, to give students experience in using different driving strategies to deal with different situations

- Finally, the strengths-weaknesses profile of ASD students should be examined. What are their limitations in terms of executive functions (planning, organising behaviour, and multi-tasking)? To what extent does the individual in question require psychotropic drugs to improve their performance? Or do these medicinal products actually produce adverse effects that affect the individual's fitness to drive? The profile should provide a realistic assessment of the individual's abilities and limitations in terms of driving a motor vehicle in a responsible manner in traffic. Adjustments such as mandating the use of a vehicle with automatic transmission can, if required, be imposed as binding recommendations.

b During the driving lesson

- It turns out that, despite the painstaking precautions taken 'rior to the start of the driving lesson', recurring problems can be expected when driving in traffic. These involve attention (multi-tasking), overview, speed, inhibition capability and reaction time, anticipation, and flexibility. In such cases, serious consideration should be given to: 1) discouraging ASD sufferers from driving motor vehicles in traffic or 2) imposing conditions before granting fitness to drive status (e.g. the individual is only allowed to drive vehicles with an automatic transmission). ASD sufferers are always entitled to a justification/explanation of such decisions.

c While holding a driving licence

- In the event of road traffic accidents caused by the individual in question and resulting from incorrect actions that can be linked to one or more characteristics of ASD, consideration should be given to switching their status to 'unfit to drive'. Confiscate driving licence, mandate the use of vehicles with an automatic transmission, retesting, additional lessons, and/or raising (again) all of the considerations and opinions listed under points a and b.

Annex **D**

Prevalence of causes of fainting in the general population

Table 1 Prevalence of causes of fainting in the general population (Wieling *et al.* 2003)

Circulatory	Reflex syncope	
	- up to the age of 25	350/1,000
	- throughout life	500/1,000
	Cardiac syncope	
	- up to the age of 25	<1/1,000
	- throughout life	-
Neurological	Epilepsy	
	- up to the age of 25	5/1,000
	- throughout life	8/1,000
Psychiatric	Pseudo-fainting	Rarely seen outside hospitals. In hospitals, accounts for 5% of all fainting spells, on average
Metabolic	Hypoglycaemia	-