

# Consensus Guideline for the Assessment of Fitness for Private Driving of Persons with Epilepsy in Korea

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Korea lacks practical guideline regarding driver's licensing for persons with epilepsy. Therefore, these consensus guidelines would be useful for assessing the fitness of persons with epilepsy for as drivers of personal vehicles in Korea. In the guidelines, a person with chronic epilepsy may receive a driver's license after a seizure-free period of two years. A person with seizures occurring only during sleep or with simple partial seizures (that would not impair driving safety) may receive a driver's license, if no other seizures that might impair their safe driving have occurred for at least two years. A person with newly-diagnosed epilepsy or an isolated seizure may receive a driver's license after a seizure-free period of one year. Driving should be prohibited during withdrawal of medication and for 12 months after withdrawal. These guidelines apply to drivers of personal vehicles but not to commercial drivers. (2011;1:1-5)

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## Introduction

The cumulative incidence rate of epilepsy over an lifetime is at least 4% of the population, and active epilepsy has a prevalence of 4 to 10 per 1,000 persons in the adult population [1,2].

Among people with epilepsy, not a few drive cars and have their own driver's licenses, but no guidelines exist for assessing their fitness for driving in Korea. In principle, all Korean people with epilepsy are prohibited from driving automobiles, pursuant to Clause 2, Article 70, Chapter 7 of the Driver's License of the Road Traffic Act (enacted on Dec 8, 1992). However, Clauses 1 & 2, Article 74 of the Act's Enforcement Decree (enacted on Apr 30, 1999) states that even a person with epilepsy may drive a car, upon getting a clinic's medical certificate saying that they can do so.

Such regulations determine absolutely whether the patient may drive a car, but they have no consistency, thus causing confusion due to doctors' substantial differences in judgment with regard to what constitutes driving fitness.

Advanced countries have long since adopted legal regulations for assessing the driving fitness of people with epilepsy, and such countries have recently tended toward relaxing their stringency based on researchers' studies. Hence, it is also desirable for the Republic of Korea to work out the legal standards for assessing the driving fitness of people with epilepsy.

The Korean Epilepsy Society (KES) intends to prepare for the establishment of such legal standards by creating and operating its own guidelines.

## The Process of Determining Consensus Guidelines for Assessing Driving Fitness

Beginning April 2009, the Korean Epilepsy Society conducted a one-month survey of its members, in the first step of working out consensus guidelines for assessing the driving fitness of people with epilepsy. At that time, 123 doctors from neurology (64%), pediatrics (24%), neurosurgery (6%), psychiatry (5%), and other fields (1%) responded to the survey. The respondents comprised 96% specialists and 4% residents. Based on the results, the KES held a symposium in June 2009, titled "Driving by People with Epilepsy," and, on November 19, 2009, held a "Public Forum on the Driving Regulations for People with Epilepsy," to collect expert opinions on driving-fitness assessments of people with epilepsy. The KES then created a draft assessment on the basis of the survey, the symposium, and the hearing. In February 2010, the KES collected opinions regarding this draft from the organization's standing commissioners and directors. In March 2010, the Standing Committee decided on the KES's own "Consensus Guidelines for Assessing the Driving Fitness of People with Epilepsy in the Republic

of Korea."

## **Consensus Guideline for Assessing the Driving Fitness of People with Epilepsy in the Republic of Korea**

- A driver's license may be issued to a person with chronic active epilepsy if the individual has had no seizures for at least two years.
- A driver's license may be issued to a person with simple partial seizures but no driving problems if the individual has had no seizures that might impair the safety of their driving for at least two years.
- A driver's license may be issued to a person who only experiences seizures during sleep, if the individual has had no waking seizures for at least two years.
- A driver's license may be issued to a person with newly diagnosed epilepsy if the individual has had no seizures for at least one year.
- A driver's license may be issued to a person with an isolated unprovoked seizure if the individual has had no seizures for at least one year.
- A driver's license should not be issued to a person with epilepsy during withdrawal of antiepileptic drugs due to seizure remission, but one may be issued if the individual has had no seizures for at least one year after the complete discontinuation of the antiepileptic drug.
- This guideline applies to drivers of personal vehicles but not to commercial drivers (buses or taxis).

## **Regulations Regarding the Seizure-free Period of at Least Two Years in Chronic Active Epilepsy**

This consensus guideline says that a driving license may be issued to a person with chronic active epilepsy if the individual has had no seizures for at least two years. This guideline applies to private driving but not to commercial driving. This is based on the results of 2009 KES survey and Korean expert opinions for the driving fitness of people with epilepsy. According to the 2009 KES survey results, 64.2% of the respondents indicated two years should be the minimum seizure-free period required for issuing a personal driver's license to a person with epilepsy [3].

Such periods differ from country to country and from region to region, but, recently, countries have shown a gradual, general tendency toward easing relevant restrictions. In 2002, Japan released new regulations on driving by people with epilepsy. Japan's preceding regulations completely restricted driving by people with epilepsy regardless of their seizure-free period, but the new regulations allow such individuals to get driver's licenses if they have had no seizures for two years or longer [4]. In 2009, the European Union (EU) released new driving regulations, which lowered the minimum seizure-free period for driving fitness, in a person with chronic epilepsy, from the existing two years to one year [5]. In the United States of America (USA), the minimum seizure-free period differs from state to state; 28 states set the period at 3 to 12 months (median, 6 months), while 23 states have more flexible periods, based on the patients' clinical conditions [6].

Around the world, these gradual reductions in restrictions on driving for people with epilepsy occurred because epilepsy does not have much influence on traffic accident rates. According to a population-based study in the United States, 0.2% of deadly traffic accidents were caused by epilepsy, while 31%, 24%, and 4.1% were caused by drinking, drivers younger than 25 years, and heart disease patients, respectively [7]. According to data at the Belgian Traffic Bureau Website [8], the maximum relative risk of a traffic accident being caused by a person with epilepsy is 1.8. This risk is quite low compared to not only 7.0, the relative risk for men younger than 25, but also 3.2 and 3.1, the relative risks for women younger than 25 and people aged 76 years or older, respectively. The relative risk of 1.8 is similar to 2.0, the relative risk for a person on 17 to 19 hours of sleep deprivation; 2.0, the risk for a person at the lawful intoxication limit (0.05%); and 1.6, for women during menstruation. These data suggest that driving by people with epilepsy is not so dangerous when compared to groups with other characteristics and has a lower relative risk than one might consider.

## **Assessment of Driving Fitness in Those with Simple Partial Seizures or Seizures during Sleep**

This consensus guideline states that a driver's license may be issued to a person with simple seizures alone but no problems with driving or to a person with seizures that occur only during sleep if the individual goes for at least two years with no seizures that might impair the safety of their driving. According to the KES survey in

2009, most respondents (78.9%) advocated differential driving restrictions according to types of epileptic seizures [3]. Among these respondents, 69.1% and 72.4% agreed with issuing driver's licenses to people with recurring only simple partial seizures and to people with recurring seizures only during sleep, respectively [3]. The respondents reached these conclusions based on the views of experts, not on scientific proof [6,9], but they followed a global trend seen in the European Union (including the United Kingdom and Germany), the USA, Japan, Australia, etc.

Gibberd and Bateson [10] examined the clinical features and prognoses of 645 epileptic patients experiencing seizures during sleep, and based on this data, Thomas *et al.* [11] reported the annual risk of a seizure while awake was 15% (95% CI 8.2 to 26.5%). Moreover, D'Alessandro *et al.* [12] prospectively observed persons with pure sleep-related epilepsy for up to six years, concluding that the estimated risk of a seizure while awake was 13% (95% CI 7 to 18%) during 6 years of follow-up, with the highest risk on a yearly basis occurring in the second year, 5.7% (95% CI 3.0-10.4%), which was low compared to the rate in an earlier study [10]. The preceding two study results are lower than 20%, the risk at which the EU allows a person to drive a personal car. However, the study by D'Alessandro *et al.* [12] is limited in that it excluded frontal lobe epilepsy, and the follow-up period was as short as 2 to 6 years. Accordingly, Thomas *et al.* [11] systematically reviewed the risks of a seizure while awake in patients with purely sleep-related seizures and concluded that no evidence supports legal regulations allowing a person with pure sleep-related epilepsy to drive a car.

### Minimum Seizure-free Period Set at One Year in Newly Diagnosed Epilepsy and Unprovoked Single Seizure

The consensus guideline states that one year is the minimum seizure-free period after which a driver's license may be issued to a person with newly-diagnosed epilepsy or with an unprovoked, isolated seizure. According to the 2009 KES survey, 56% and 45% of respondents were against allowing people with newly diagnosed epilepsy or unprovoked isolated seizure, respectively, to drive cars after a one-year, seizure-free period [3].

After all, the minimum seizure-free period of one year in these situations are based on the data of the previous studies rather than the 2009 KES survey.

The existing studies show that recurrences occur in approximately

46% of patients after their first unprovoked single seizure [5]. Such recurrence rates vary according to whether the individuals have any drugs prescribed. The rates were 55.5% and 33.1% for persons who received no treatment after single seizure [13-15] and for populations in which at least 80% received treatment, respectively [15,16]. Berg and Shinnar [17] reported that recurrences occurred in 42% of patients within two years after their first single seizure, based on a meta-analysis of patients with and without drug treatment. Based on a literature review, Beghi *et al.* [18] said that recurrence rates are 25 to 52% (38% on the average) within two years after the first single seizure.

Knowing the timing of recurrence is more important than knowing the rate of recurrence, for judging the driving risks. One study analyzed recurrence rates by period after the first seizure, on an assumption setting the probability of recurrence within two years at 87% in patients who experienced recurrence, even once in a lifetime, after single seizure [17,19-21]. The rates of recurrence were 32%, 53%, and 68% within 3, 6, and 12 months, respectively [15,22]. Therefore, the number that recurs within a year is the average total recurrence (49%) times the percentage that has a second seizure in the first year (68%) = 33.3%. In contrast, the number that recurs since 1 year after the first seizure is the average total recurrence (49%) times the percentage 32% that has a second seizure since 1 year after the first seizure (100% minus 68%) = 15.7%. Additionally, Berg and Shinnar [17] argued through meta-analysis that the rates of recurrence were 8%, 5%, and 4% during the third, fourth and fifth years after the first seizure, respectively.

Hauser *et al.* [23] examined recurrence rates after 2 or 3 seizures. After 2 seizures, 73% relapsed in an observation period of 4 years; after 3 seizures, 76% in an observation period of 3 years. Out of the patients who experienced seizure recurrence, 78% and 80% recurred within 12 months after 2 and 3 seizures, respectively. Therefore, the recurrence rate since 12 months after 2 or 3 seizures may be as low as approximately 20%.

In general, the socially-acceptable relative risks for traffic accidents are 2 to 3 [5]. As mentioned above, such values seem socially acceptable considering that the relative risks were 2.0-7.0 for persons younger than 25, aged 76 or older, sleep-deprived for 17 to 19 hours, and having drunk alcohol within the legal intoxication limit (0.05%) [8]. The Chance of an Occurrence of a Seizure in the next Year (COSY) formula calculates such chances using a relative risk. The COSY requires not only a relative risk, but also a deadly accident rate per driver during one year, driving hours per day, and a mortality

probability in case of a seizure during driving [5]. When relative risks are 2 or 3, COSY are 20% and 37%, respectively. Therefore EU currently accepts the rates of 20% to 37%. Comparing to such acceptable COSY, the estimated recurrence rate 15.7% since 12 months after the first seizure and the estimated relapse rate 20% since 12 months after 2 or 3 seizures are socially acceptable.

### **Driving Should be Prohibited during Withdrawal of Medication and for 12 Months after Withdrawal**

This consensus guideline states that the driver's license should not be issued to a person with epilepsy during withdrawal of medication due to seizure freedom, but one may be issued if the individual has had no seizures for at least one year after the complete discontinuation of the antiepileptic drug. According to the 2009 KES survey, most respondents (75.2%) did not approve of allowing people with epilepsy to drive cars if they began to reduce their antiepileptic drugs to discontinue medication after seizure remission, and the majority of them (61.5%) only agreed with allowing such people with epilepsy to drive cars if they had been seizure-free for at least one year after completely discontinuation of their antiepileptic drugs [3].

Report of the Quality Standards Subcommittee of the American Academy of Neurology Practice Parameter showed that the seizure recurrence rate is approximately 40% when medication is discontinued after seizure remission [24]. The relapse rate is highest within one year after the discontinuation. Approximately 30% of such patients show recurrence within one year [25], and, according to Berg and Shinnar [17], such patients' COSY was 25% (C.I. 21-30%) within the first year after discontinuation of medication, while the COSY was 4% during the second year. If patients had no seizures for 3, 6, and 12 months after the discontinuation of medication, their COSY was 28%, 21%, and 20%, respectively [26]. These findings indicate that driving is permissible if an individual has had no seizures for at least 3 months after the discontinuation of medication. In the United Kingdom and USA, their official guidelines recommend that driving should be prohibited during withdrawal of medication and for 6 months after the complete discontinuation of medication [5,27].

### **Conclusions**

This KES consensus guideline allows people with epilepsy to drive cars if they have had no seizures, for at least 2 years in cases of chronic active epilepsy, for at least 1 year in cases of unprovoked single seizure or newly diagnosed epilepsy, and for at least 1 year in cases of medication discontinuation due to seizure remission. Recently, driving restrictions for people with epilepsy around the world have eased because epilepsy has not been reported to have much influence on traffic accident rates.

In contrast to such a trend, the driving restrictions in this consensus guideline are somewhat strict, because Korean experts have not altered their stringent views over the last ten years. Such restrictions may continue to exist even in the future, unless experts change their attitudes toward epilepsy and people with epilepsy.

Therefore, it will be necessary to encourage doctors to change their views on driving by people with epilepsy, through symposiums and studies about safe driving by people with epilepsy.

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