Background
Driving a motor vehicle has become a necessary and basic daily activity. In this sense, it is essential to be able to drive to enjoy adequate mobility, especially for those who live in areas where public transport is limited (rural areas, small towns, etc).

Medical condition can negatively effect the capacity to drive safely (1). Thus, in the EU (2) North America (1) and Australia (3), the licensing authorities have imposed certain restrictions or conditions to the concession of driving licenses to persons with particular medical conditions; that is, they are permitted to drive in certain circumstances. In some cases, the conditions or restrictions affect the driving license (licensing restriction, such as a review after a stipulated period of time). Other cases limit driving (driving restriction, hours permitted to drive, maximum speed, etc). Or both, licensing and driving restriction.

Ophthalmic (4) and cardiac (5) pathologies, arthritis (6), neurological disorders (7) and cognitive disorders (8), among other pathological processes, are associated with an increased risk of involvement in a traffic accident. Persons who suffer from such pathologies are often issued a restricted or conditioned license. This philosophy is followed in order to protect the general population and the patient/driver. In some cases, because of these pathologies (depending on their severity), the decision may be taken not to allow the patient to drive at all, rescinding their license for as long as the medical cause persists. As the pathology in these cases is usually in a serious or advanced state, or seriously affects the driving of motor vehicles, it is often difficult that any substantial clinical improvement can be seen, and thus, in many such cases, the prohibition to drive is for life.

There are several aspects related to the medical condition and fitness to drive that are of growing interest and the cause of debate, not only scientific, but also in the sphere of the development of road safety policies and the legislative sphere.

The first aspect to consider is whether there is really a greater risk of accidents in drivers with particular pathologies which can justify the imposition of the above-mentioned restrictions or the refusal of a driving license. Examples showing increasing interest are diabetes, epilepsy, parkinson’s, etc. The great variety of pathological processes in existence and the diversity of their severity means that the information we possess concerning medical condition and accidents is limited.

The second controversial point is whether the imposition of restriction or conditions on drivers with certain pathologies is effective or not. The effectiveness of such measures has not, in general, been sufficiently evaluated (9) and the results have sometimes been contradictory (9,10). Recently, however, it has been shown that the licensing restriction
programs reduce the number of accidents and traffic violations for these drivers to a statistically significant degree (1).

The third aspect of great relevance is the establishment of procedures to demonstrate that a driver is not fit to drive. There is a great diversity of procedures at the time of evaluating these aspects among different countries.

Finally, current European legislation does not permit the issuing or renewal of driving licences for those who do not possess adequate driving ability. Council Directive 91/439/CEE, on driving licences, establishes in Annex III, the minimum standards of physical and mental fitness for driving a power-driven vehicle. In practice, various types of illness and disease, including the effect of medical treatment, can affect fitness to drive.

Member states implement this regulation differently. For example, Spanish legislation establishes that to obtain a driving licence, or to renew it (every ten years up to 45, every 5 years between 46 and 70 and every 2 years from 70 onwards), a medical-psychological examination, carried out in specific ‘Medical Driving Test Centres’, is obligatory. In these Medical Driving Test Centres, medical, eyesight and psychological tests are carried out with a view to assessing fitness to drive in accordance with Spanish legislation (Royal Decree 772/1997). Countries like Sweden are at the other extreme, as they do not carry out any periodical medical-psychological tests at all.

One of the aspects of growing interest in the European Union is the process to try to standardize the procedures to evaluate fitness to drive, as well as agreeing on the periods for which a driving license should be valid. This would involve the establishment of the periodicity of a medical-psychological test, or at least, to establish an age at which all drivers should undergo such an evaluation (60 years of age?, 65?). The actual Community Directive is currently being revised, taking sight, epilepsy and diabetes as the main point to be reviewed.

As already explained, Spain is unique in that all drivers must undergo a periodic medical-ophthalmological-psychological examination to evaluate fitness to drive. This approach to a systematic evaluation of all drivers can be understood as a screening, in the sense that those cases where the medical condition could impair fitness to drive are actively sought out. In this sense, Spanish legislation (Royal Decree 772/1997), based on the community directive 91/439/CEE, specifies in detail the processes which can result in restrictions to, or even refusal of, a license. The information from the medical evaluation is not stored in any database.

Objectives
This study intends to i) analyze the final result of the medical-psychological examination and to find out the different medical, ophthalmological causes and psychological evaluations that give rise to the categories: Fit, fit with restrictions and not fit. Furthermore, the study intends to ii) analyze the relationship of these aspects with age, type of license (professional or non-professional) and number of kilometres driven. Finally, iii) the involvement of the drivers included in the study in traffic violations and accidents, in both the year before the medical-psychological test and the year after it, is also analyzed. In addition, with a view to presenting this study in the ICADTS T2004 congress, iv) the consumption of medicaments and alcohol has been analyzed with respect to the final result of the medical-psychological examination.
Methodology
Fitness to drive in Spain is evaluated in Medical Driving Test Centres following Spanish regulations (Royal Decree 772/1997). This evaluation is carried out by the health professionals who work in these Centres. They are: ophthalmologist, psychologist and general practitioner. Each one examines the driver in particular areas fitting their specialization. Finally, the three professionals reach a decision concerning fitness to drive.

The purpose is to check that the driver complies with the minimum requisites to drive safely. The stringency of the requisites will depend on the type of license requested (professional or not).

There are three different final results to the test:

FIT: This result is reached when the anamnesis, examinations and tests the driver undergoes detect no pathologies that can interfere in driving safely.

FIT WITH RESTRICTIONS: This means that the driver will be able to drive, but under certain conditions, due to a pathology detected in the tests and which affects his/her psycho-physical fitness to drive. There are various types of restriction:

i) The driver may need to adapt the vehicle due to some physical condition.
ii) A speed limit.
iii) A shorter period of validity to the license as the pathology he/she suffers makes this advisable.

NOT FIT: This result means that the driver has not reached the minimum required conditions to drive safely. This may be permanent or temporary (that is, he/she cannot drive until such time as the minimum requirements are met).

The study included 5234 drivers. The final sample distribution was as follows: (i) gender: males=3741; females=1493; (ii) age group: < 25= 616; 25-34= 1107; 35-44= 1013; 45-54= 1126; 55-64= 642; > 64= 730.

The SPSS program, version 11.5, has been used for the statistical analysis of the data. P-values of \( \leq 0.05 \) were considered to be a significant difference.

Results
32.6% (1,704) of drivers suffer an illness. This is more frequent among men (35.3%) than among women (25.6%, \( \chi^2_1 = 46.22; p <0.0001 \)). The average total number of illnesses (among drivers who suffer an illness) is 1.33 ± 0.66. Men with pathologies present a significantly higher average of illnesses than women (F=17.87; p < 0.0001). The percentage of drivers suffering some pathology (\( \chi^2_5 = 541.273, p < 0.001 \)), as well as the number of illnesses (F= 18.83, p<0.0005) significantly increases with age (Figure 1).

82.7% of drivers attending the Medical Driving Test Centres were found to be fit, 16.65% fit with restrictions and 0.65% not fit. A positive tendency can be seen in the frequency of cases with restrictions and not fit as the age increases. The frequency of “fit” decreases as age increases (negative tendency).
The percentage of drivers taking medicaments on a regular basis differs ($\chi^2 = 178.75$, $p<0.0005$) according to the final result of the examination: 19.3% of those fit to drive, 39.6% of those fit with restrictions and 44.1% of those not fit to drive. Similarly, significant differences can be seen in the number of medicaments being taken ($F=35.00$, $p<0.0005$): 1.45±0.79 for those who were fit to drive, 1.98±1.25 for those fit with restrictions and 2.0±1.07 for those who were not fit.

As for patterns of consumption and their relationship to the final result of the examination, neither the frequency of the consumption of alcohol ($\chi^2 = 1.10$, $p>0.05$), nor the amount of alcohol consumed ($F=0.9$, $p>0.05$), nor the distribution of consumption by level (low, moderate, high; $\chi^2 = 4.86$, $p>0.05$) vary among those who are fit, fit with restrictions or not fit (Table 1).

**Discussion**

This study shows that an important part of the driving population (1 out of every 3) suffers some kind of pathology. However, only some of them has the pathology resulted in a restriction to or a refusal of a driving license: 16.65% were considered fit with restrictions and 0.65% were denied a license for medical-ophthalmological-psychological causes.

One of the aspects included in the Community Directive 91/439/CEE on driving licenses, and which is included in Spanish legislation, is that “Driving licences shall not be issued to, or renewed for, applicants or drivers who regularly use psychotropic substances in whatever form, which can hamper the ability to drive safely where the quantities absorbed are such as to have an adverse effect on driving. This shall apply to all other medicinal products or combinations of medicinal products which affects the ability to drive” (annex III, point 15, CD 91/439/CEE). The relation between medicacion and road safetty is of growing interest (11-12).
Table 1: Medical-ophthalmological-psychological examination results, medication use and alcohol consumption.

<table>
<thead>
<tr>
<th>Medical-ophthalmological-psychological examination: results of the evaluation</th>
<th>Medicaments used on a regular basis</th>
<th>Mean number medicaments taken</th>
<th>Regular drinkers</th>
<th>Mean standard drink units/week</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>mean ± SD</td>
</tr>
<tr>
<td>Fit</td>
<td>4329</td>
<td>82.7</td>
<td>835</td>
<td>19.3</td>
</tr>
<tr>
<td>Fit with restrictions</td>
<td>871</td>
<td>16.65</td>
<td>345</td>
<td>39.6</td>
</tr>
<tr>
<td>Not fit</td>
<td>34</td>
<td>0.65</td>
<td>15</td>
<td>44.1</td>
</tr>
<tr>
<td>Total</td>
<td>5234</td>
<td>100.0</td>
<td>1195</td>
<td>22.8</td>
</tr>
</tbody>
</table>

χ² = 178.75, p < 0.0005, F=35, p < 0.0005, χ² = 1.10, p > 0.05, F=0.9, p > 0.05

In practice, an important number of drivers are taking medicaments, including those that clearly affect fitness to drive. However, in no case has the fact of undergoing treatment with certain medicaments produced the restriction to or refusal of a driving license. It should be pointed out that i) the use of medication is associated, in most cases, with the existence of a pathology and, ii) it is to this pathology, and not the medication, that gives rise to the restriction or denial of a license. That is, from the point of view of fitness to drive, the medication cannot be evaluated separately from the medical condition, which makes it difficult to comply with the present stipulations of the above-mentioned Community Directive (point 15). The current data shows that the frequency and average of illnesses and consumption of medication is higher among those who are not fit, or fit with restrictions than among those who are fit.

Driving under the effects of alcohol is one of the main causes of road traffic accidents. It has been pointed out that drivers with a restriction for medical reasons (apart from the restriction imposed) often adopt compensatory measures (driving fewer kms, resting more frequently, not travelling by night, etc). This study shows that, quite independently of the final result of the tests (fit, fit with restrictions and not fit), drivers consume alcohol in identical measures (frequency, quantity and level of consumption – low, moderate, high -). This may well not be applicable to other countries, only to Spain, where alcohol consumption is very frequent and it is difficult to dissociate the habit of consuming alcohol and driving (13). Even so, it is an aspect of great relevance.

Conclusion
This study shows that an important number of drivers suffer some pathology and are refused a driving license, or obtain a license with restrictions because of it. The analysis of the consumption patterns of medicaments shows that pathology and medication should be analyzed jointly from the point of view of fitness to drive. Drivers consume alcohol in equal measure, independently of their fitness to drive.

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References