

# TOXICOLOGICAL FINDINGS IN ROAD TRAFFIC FATALITIES

2024 Report

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Recommended title: National Institute of Toxicology and Forensic Sciences. *Toxicological Findings in Road Traffic Fatalities* 2024 Report. Madrid: Ministry of the Presidency, Justice and Parliamentary Relations, 2025.





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## Toxicological Findings in Road Traffic Fatalities

2024 Report



Publications of the Ministry of the Presidency, Justice and Parliamentary Relations: https://www.mjusticia.gob.es/es/areas-actuacion/documentacion-publicaciones/publicaciones General Catalogue of Official Publications: https://cpage.mpr.gob.es Report presented by Jorge González Fernández Director of the National Institute of Toxicology and Forensic Sciences NIPO: 143-24-055-3 ISSN: 2792-484X EDITED BY: Ministry of the Presidency, Justice and Parliamentary Relations.

General Technical Secretariat.

DESIGN: treceocho edición, SL.

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### Introductory note and acknowledgements

This 2024 annual report is the result of coordinated work between the National Institute of Toxicology and Forensic Sciences (INTCF), the Institute of Legal Medicine and Forensic Sciences of Catalonia (IMLCFC), the Institute of Legal Medicine of the Basque Country (IVML), the Institute of Legal Medicine and Forensic Sciences of Aragon (IMLCFA), the Institute of Legal Medicine and Forensic Sciences of Murcia (IMLCFM), the Institute of Legal Medicine and Forensic Sciences of Valencia (IMLCFV), the Institute of Legal Medicine and Forensic Sciences of the Balearic Islands (IMLCFIB) and the Luis Concheiro Forensic Sciences Institute (INCIFOR), in collaboration with the National Road Safety Observatory (ONSV) of the General Directorate of Traffic (DGT). It is aimed at improving knowledge of traffic fatalities during 2024 that were investigated from a toxicological-forensic perspective throughout the national territory.

As in previous years, in addition to the determinations carried out by the INTCF, those carried out in those institutes of legal medicine and forensic sciences (IMLCF) equipped with a chemical-toxicological analysis laboratory are included, incorporating the data provided by a total of seven IMLCFs, which allows for full and detailed information to be offered on the toxicological analyses of traffic accident fatalities.

Statistical data in this report (as well as the data for the four previous years) are available to the different Administrations and citizens on the JUSTICE IN DATA website (https://datos.justicia.es/intcf), developed by the Directorate General for Digital Transformation (DGTD) of the Justice Administration. Therefore, the different autonomous regions can easily explore the toxicological findings in road traffic fatalities within their own territory.

The cases evaluated and covered in this report come from requests made by judicial bodies throughout Spain, and the information presented refers to the toxicological analyses carried out by the INTCF (reference centre for toxicological matters) and by the IMLCFs equipped with a chemical-toxicological analysis laboratory (IMLCFC, IVML, IMLCFA, IMLCFM, IMLCFV, IMLCFIB and INCIFOR) from the *post-mortem* samples of 937 drivers and 195 pedestrians who died during 2024.

The aim is to show the results of toxicological analyses relating to the presence of alcohol, drugs of abuse and psychotropic drugs on road traffic victims and the incidence of the use of each of these three groups of toxins, either individually or in combination. This study also relates these toxicological findings to various epidemiological variables, such as sex, age, type of vehicle or the day of the week on which the fatal accident occurred, providing relevant information for those working in road accident prevention. Finally, a comparative study with *post-mortem* toxicological data obtained in previous years is included to show the evolution of some of the parameters evaluated.

This report is based on the work of the civil servant staff of forensic doctors, doctors, specialist technicians and laboratory assistants of the INTCF and the IMLCF who have been involved in carrying out the chemical-toxicological analyses related to these cases,

to whom the INTCF management would like to express its gratitude. In particular, we would like to highlight the coordination work carried out by the heads of the Chemistry and Drugs Services at the different INTCF centres (Begoña Bravo Serrano, María Inmaculada Frías Tejera, María Antonia Martínez González, Nuria Sanvicens Díez and Teresa Soriano Ramón).

We are also grateful to the following IMLCFs for their contribution in the collection and submission of *post-mortem* samples to the INTCF for analysis. Without this collaboration, it would not have been possible to prepare this report:

- · Institute of Legal Medicine and Forensic Sciences of Andalusia
- Institute of Legal Medicine and Forensic Sciences of Castilla y León
- Institute of Legal Medicine and Forensic Sciences of Castilla-La Mancha
- Institute of Legal Medicine of Galicia (IMELGA)
- Institute of Legal Medicine and Forensic Sciences of the Autonomous Region of Madrid
- · Institute of Legal Medicine and Forensic Sciences of the Canary Islands
- Institute of Legal Medicine and Forensic Sciences of Extremadura
- Institute of Legal Medicine and Forensic Sciences of Navarre
- Institute of Legal Medicine and Forensic Sciences of Asturias
- Institute of Legal Medicine and Forensic Sciences of Cantabria
- Institute of Legal Medicine and Forensic Sciences of La Rioja
- · Institutes of Legal Medicine and Forensic Sciences of Ceuta and Melilla

Our thanks also go to the ONSV for its work in the detailed review of each of case presented in accordance with the criteria established by the DGT.

As Director of the INTCF, I would also like to express my special thanks to the staff of the Computer Systems Section of the Madrid, Seville and Barcelona Departments for configuring and performing the statistical searches in the INTCF LIMS system and to Beatriz Ibor Alonso for her efforts in the compilation and final processing of all data.

Finally, I would like to highlight and thank Antonio Alonso Alonso, director of the INTCF until January 2024, and Carolina Sánchez de la Torre Hernández, until September 2024, for their contribution, year after year, to the development and improvement of this report on toxicological findings in road traffic fatalities.

Jorge González Fernández

GENERAL DATA (n = 1,280)

FIGURE 1: NUMBER OF FATALITIES (n = 1,280)
ANALYSED BY THE DIFFERENT AGENCIES

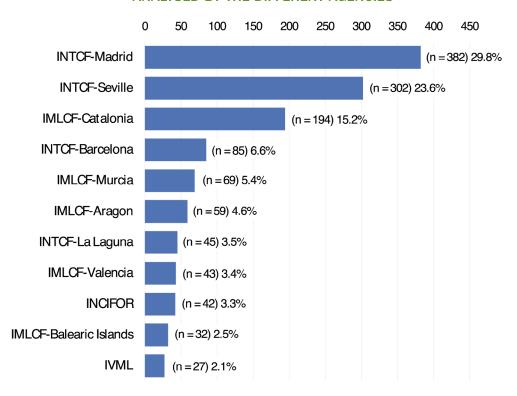


FIGURE 2: INTCF SCOPE OF ACTION



FIGURE 3: DISTRIBUTION BY AUTONOMOUS REGION (fatalities per 100,000 inhabitants)

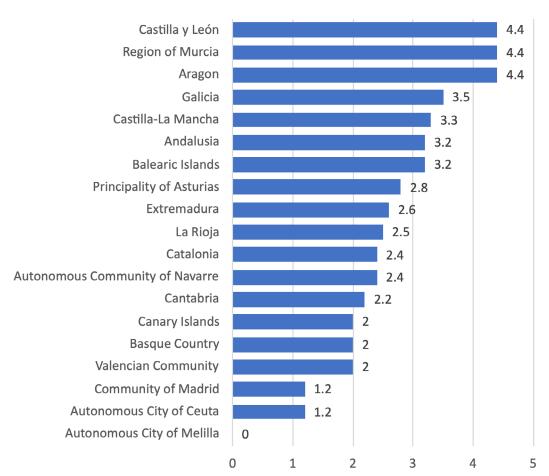
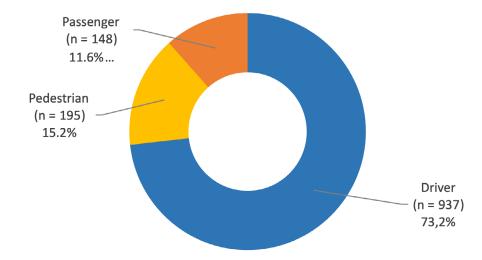


FIGURE 4: PERCENTAGE DISTRIBUTION OF THE NUMBER OF FATALITIES  $(n=1,\!280) \ BY \ ROLE \ IN \ THE \ INCIDENT$ 



DRIVERS (n = 937)

FIGURES 5 and 6: DISTRIBUTION BY SEX AND AGE RANGE (937 DRIVERS)

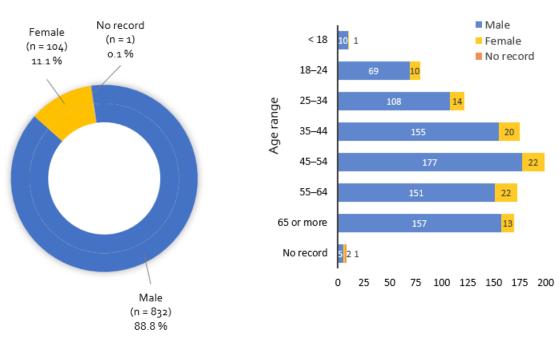


FIGURE 7: DISTRIBUTION BY TYPE OF VEHICLE (937 DRIVERS)

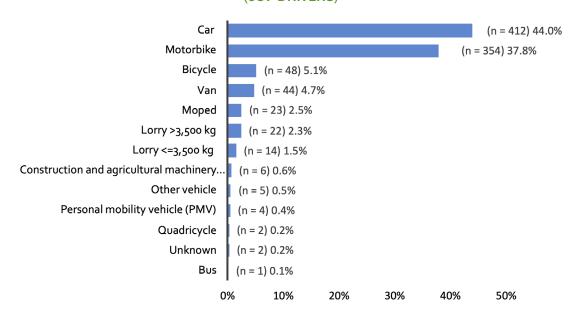


FIGURE 8 A: PERCENTAGE DISTRIBUTION ACCORDING
TO TOXICOLOGY RESULT (937 DRIVERS)

(blood alcohol threshold: 0.30 g/l)

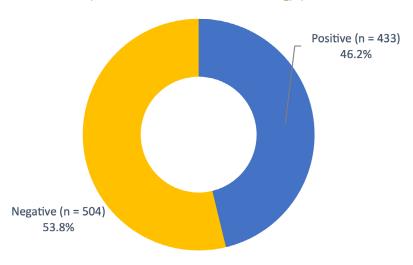
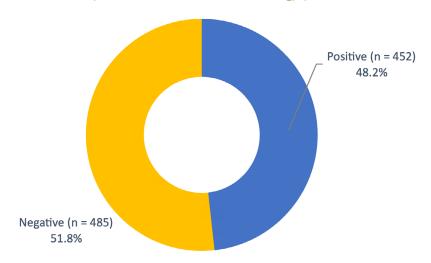


FIGURE 8 B: PERCENTAGE DISTRIBUTION ACCORDING
TO TOXICOLOGY RESULT (937 DRIVERS)
(blood alcohol threshold: 0.10 g/l)



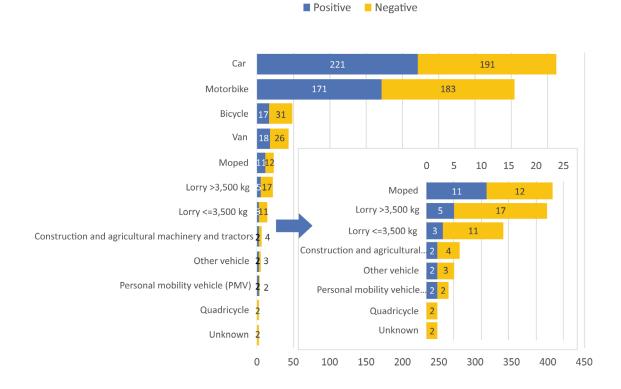
In previous editions of this report, a positive result was considered for the presence of any drug of abuse or psychotropic drug, regardless of the quantity, or a blood alcohol concentration equal to or above 0.30 g/l (the blood alcohol limit for novice and professional drivers) [1], detected above the detection thresholds, as shown in Figure 8 A.

Since the 2022 edition of this report, as well as on the web portal for justice data, we wanted to show the total data of "positives" according to strictly toxicological criteria and thresholds with respect to alcohol, i.e., including cases in which the presence of any drug of abuse or psychotropic drug is detected, regardless of the quantity, or a blood alcohol

concentration above 0.10 g/I (as a detection threshold according to international criteria [2]), as shown in Figure 8 B.

The aim is, therefore, to provide more objective scientific data and, at the same time, in accordance with the idea that "the only really safe level of alcohol is 0.0~g/l," a criterion applied in Law 18/2021 of 20 December amending the consolidated text of the Traffic, Motor Vehicle Circulation and Road Safety Act, approved by Royal Legislative Decree 6/2015 of 30 October on the subject of points-based driving permits and licences [3] for underage drivers.

FIGURE 9: DISTRIBUTION ACCORDING TO TOXICOLOGY RESULT AND TYPE OF VEHICLE (937 DRIVERS)



 $\mbox{FIGURE 10: DRIVERS (n = 937).} \\ \mbox{PERCENTAGE DISTRIBUTION BY TYPE OF SUBSTANCE DETECTED}$ 

(without taking into account possible associations) (alcohol detection threshold of 0.10 g/l)

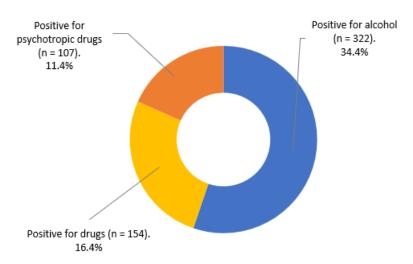
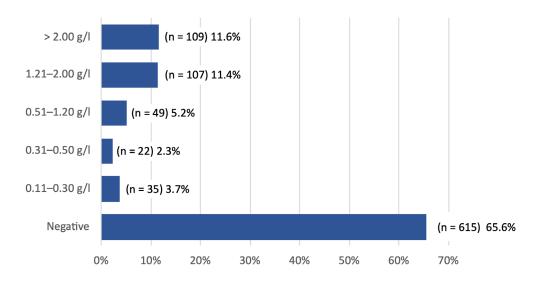


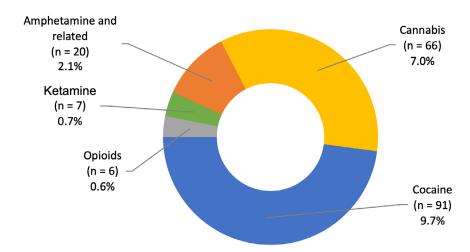
FIGURE 11: DRIVERS (n = 937).
DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL



Some 23.0% of drivers had a blood alcohol level greater than 1.20 g/l.

FIGURE 12: DRIVERS (n = 937).

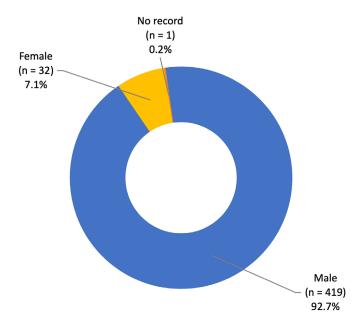
PERCENTAGE DISTRIBUTION OF DRUGS DETECTED (without taking into account possible associations)



Regardless of whether there was associated use of drugs of abuse, alcohol and/or psychotropic drugs, cocaine (9.7%) was the most commonly used drug, followed by cannabis (7.0%).

DRIVERS: CASES WITH POSITIVE TOXICOLOGY RESULT (n = 452)

FIGURE 13: POSITIVE DRIVERS (n = 452).
PERCENTAGE DISTRIBUTION BY SEX

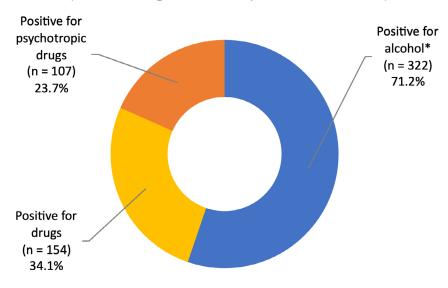


Males accounted for 92.7% of drivers with positive toxicology results.

FIGURE 14: POSITIVE DRIVERS (n = 452).

PERCENTAGE DISTRIBUTION BY TYPE OF SUBSTANCE DETECTED

(without taking into account possible associations)



<sup>\*</sup> Positive for alcohol: blood alcohol concentration greater than 0.10 g/l.

FIGURE 15: POSITIVE DRIVERS (n = 452).

CLASSIFICATION OF RESULTS ACCORDING TO THE TYPE AND/OR

COMBINATION OF SUBSTANCES DETECTED

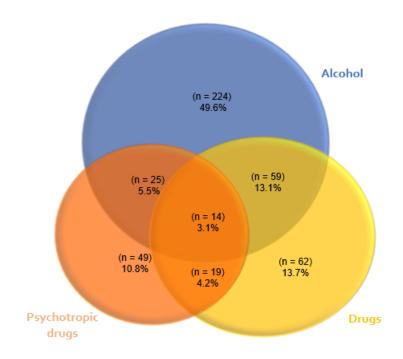
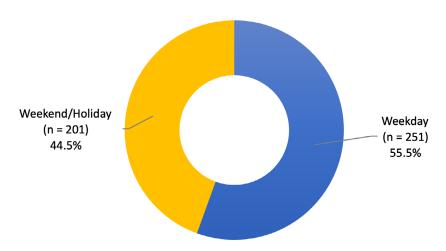


FIGURE 16: POSITIVE DRIVERS (n = 452).
DISTRIBUTION BY DAY OF THE WEEK



For the purposes of this report, holidays are considered to be from Friday at 22:00 to Monday at 08:00, as well as applicable public holidays (local, regional and national holidays).

FIGURE 17: POSITIVE DRIVERS (n = 452).
PERCENTAGE DISTRIBUTION BY AGE RANGE AND DAY OF THE WEEK

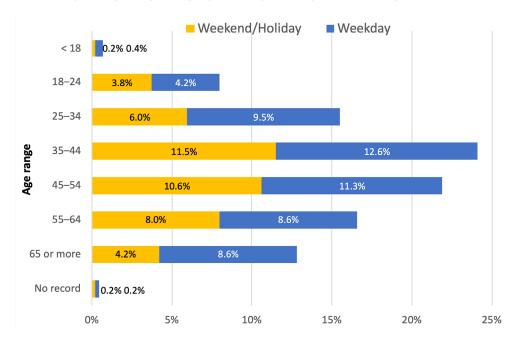
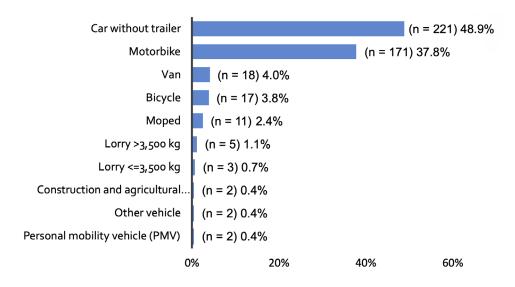


FIGURE 18: POSITIVE DRIVERS (n = 452).
DISTRIBUTION BY TYPE OF VEHICLE



0.11-0.30 g/l

0%

FIGURE 19: ALCOHOL POSITIVE DRIVERS (n = 322).
DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL

Some **67.1**% of drivers who tested positive for alcohol had a blood alcohol level greater than 1.20 g/l.

20%

30%

40%

(n = 35) 10.9%

10%

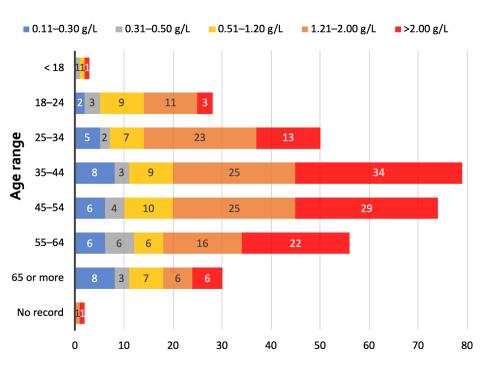


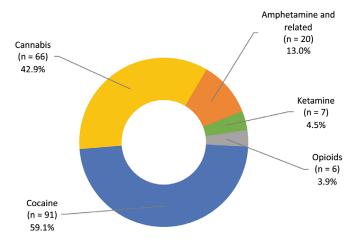
FIGURE 20: ALCOHOL POSITIVE DRIVERS (n = 322).
DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL AND AGE RANGE

Of drivers who tested positive for alcohol with a blood alcohol level greater than 1.20 g/l, 46.3% are in the 25-54 age group.

FIGURE 21: DRUG POSITIVE DRIVERS (n = 154).

DISTRIBUTION OF DRUGS DETECTED

(without taking into account possible associations)



Regardless of whether there was associated use of drugs of abuse, alcohol and/or psychotropic drugs, cocaine (**59.1**%) was the most commonly used drug, followed by cannabis (**42.9**%).

FIGURE 22: DRUG POSITIVE DRIVERS (n = 154).
DISTRIBUTION ACCORDING TO DRUG DETECTED AND TYPE OF VEHICLE

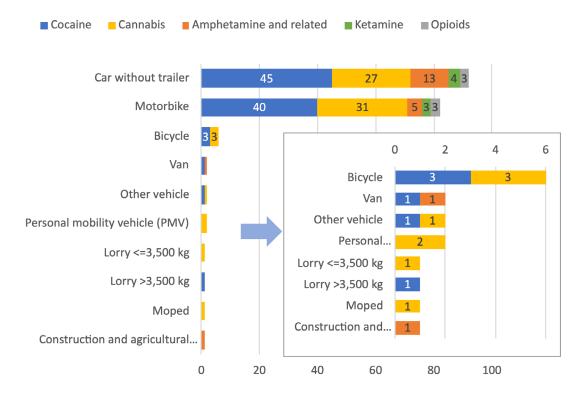
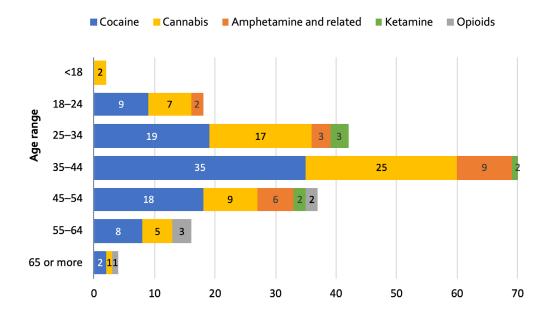


FIGURE 23: DRUG POSITIVE DRIVERS (n = 154).

DISTRIBUTION ACCORDING TO DRUG DETECTED AND AGE RANGE (without taking into account possible associations)



The highest percentages are for cocaine (46.8%) and/or cannabis use (33.1%) in drivers between 25–54 years old.

FIGURE 24: ALCOHOL AND DRUG POSITIVE DRIVERS (n = 59). DISTRIBUTION OF CASES BY DRUG DETECTED. MOST FREQUENT COMBINATIONS

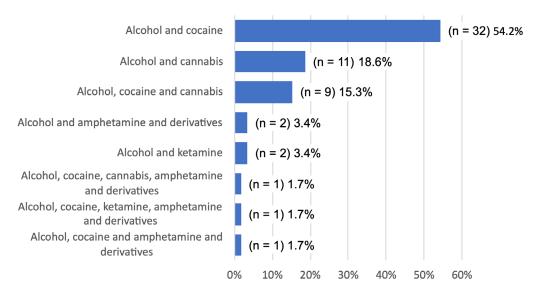
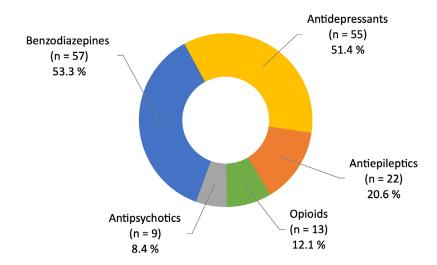


FIGURE 25: PSYCHOTROPIC DRUG POSITIVE DRIVERS (n = 107).

PERCENTAGE DISTRIBUTION OF PSYCHOTROPIC DRUGS DETECTED

(without taking into account possible associations)



The term "opioids" refers to drugs (tramadol, oxycodone, methadone, etc.) that bind to opioid receptors in the central nervous system, excluding heroin (opiate).

PEDESTRIANS (n = 195)

FIGURE 26: PEDESTRIANS (n = 195). PERCENTAGE DISTRIBUTION BY SEX

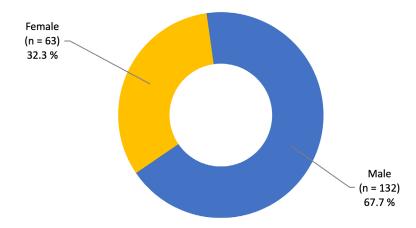


FIGURE 27: PEDESTRIANS (n = 195). DISTRIBUTION BY AGE RANGE

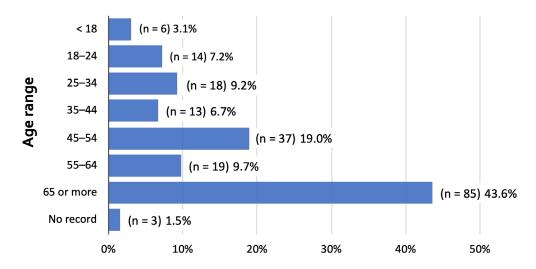
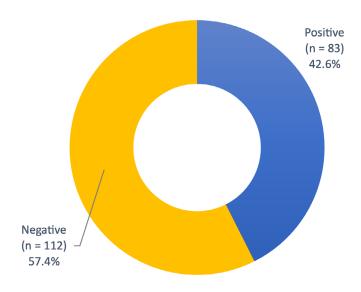


FIGURE 28: PEDESTRIANS (n = 195).
PERCENTAGE DISTRIBUTION ACCORDING TO TOXICOLOGY RESULT

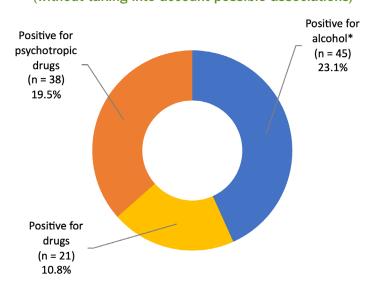


Of 195 pedestrians killed in road traffic accidents and autopsied, 83 (42.6%) tested positive for alcohol, drugs of abuse and psychotropic drugs, either alone or in combination.

FIGURE 29: PEDESTRIANS (n = 195).

PERCENTAGE DISTRIBUTION BY TYPE OF SUBSTANCE DETECTED

(without taking into account possible associations)



st Positive for alcohol: blood alcohol concentration greater than 0.10 g/l.

FIGURE 30: PEDESTRIANS (n = 195). DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL

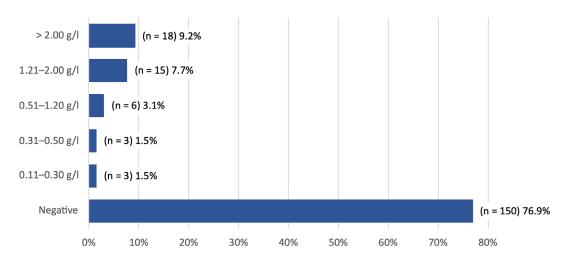
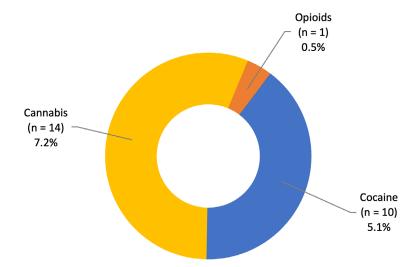


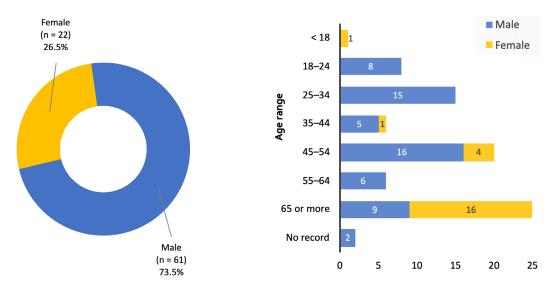
FIGURE 31: PEDESTRIANS (n = 195).

PERCENTAGE DISTRIBUTION OF DRUGS DETECTED (without taking into account possible associations)



PEDESTRIANS: CASES WITH POSITIVE TOXICOLOGY RESULT (n = 83)

FIGURES 32 and 33: POSITIVE PEDESTRIANS (n = 83).
DISTRIBUTION BY SEX AND AGE RANGE

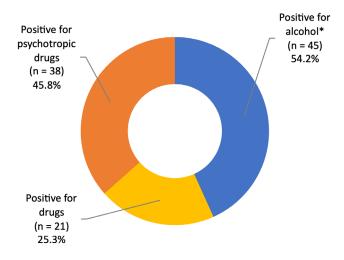


Of pedestrians killed in traffic accidents with positive toxicology results, **73.5**% were male.

FIGURE 34: POSITIVE PEDESTRIANS (n = 83).

PERCENTAGE DISTRIBUTION BY TYPE OF SUBSTANCE DETECTED

(without taking into account possible associations)



\* Positive for alcohol: blood alcohol concentration greater than 0.10 g/l.

FIGURE 35: POSITIVE PEDESTRIANS (n = 83). CLASSIFICATION OF RESULTS ACCORDING TO THE TYPE AND/OR COMBINATION OF SUBSTANCES DETECTED

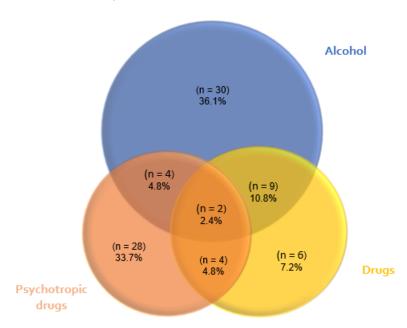
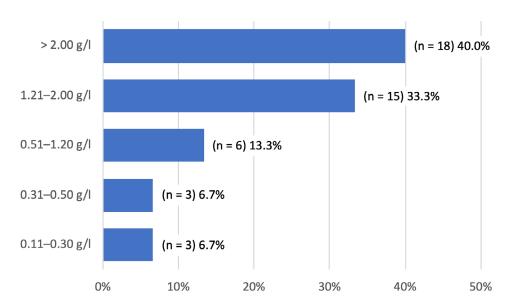


FIGURE 36: ALCOHOL POSITIVE PEDESTRIANS (n = 45). DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL



Of deceased pedestrians who tested positive for alcohol, **73.3**% had a blood alcohol level greater than 1.20 g/l.

FIGURE 37: ALCOHOL POSITIVE PEDESTRIANS (n = 45).
DISTRIBUTION ACCORDING TO BLOOD ALCOHOL LEVEL AND AGE

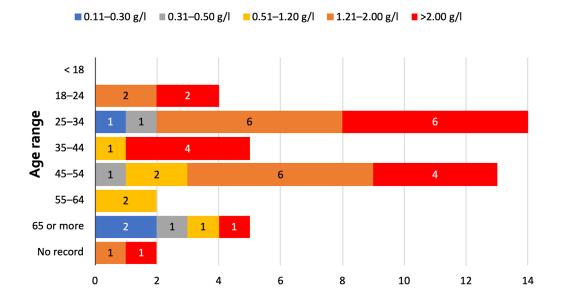
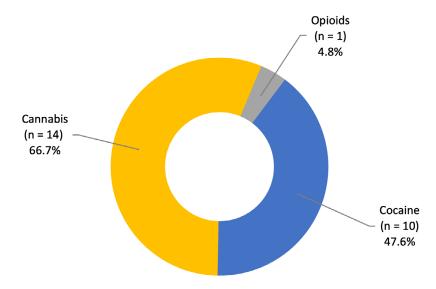


FIGURE 38: DRUG POSITIVE PEDESTRIANS (n = 21).

PERCENTAGE DISTRIBUTION OF DRUGS DETECTED

(without taking into account possible associations)



Regardless of whether there was associated use of drugs of abuse, alcohol and/or psychotropic drugs, cocaine alone was the most commonly used drug (66.7%).

FIGURE 39: DRUG POSITIVE PEDESTRIANS (n = 21).
DISTRIBUTION ACCORDING TO DRUG DETECTED AND AGE RANGE

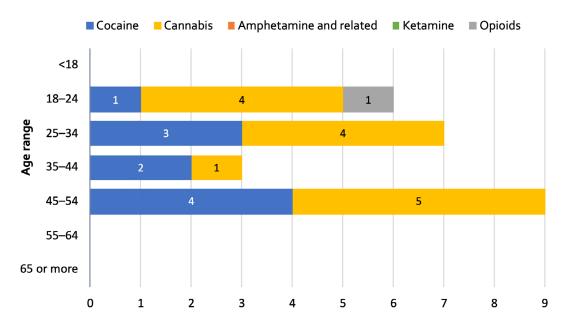
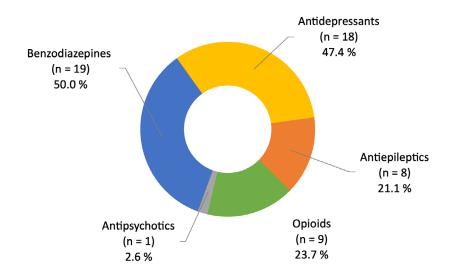


FIGURE 40: PSYCHOTROPIC DRUG POSITIVE PEDESTRIANS (n = 38). PERCENTAGE DISTRIBUTION OF PSYCHOTROPIC DRUGS DETECTED



The term "opioids" refers to drugs (tramadol, oxycodone, methadone, etc.) that bind to opioid receptors in the central nervous system, excluding heroin (opiate).

### COMPARATIVE STUDY

FIGURE 41: EVOLUTION OVER
TIME OF THE PERCENTAGE OF DRIVERS ACCORDING TO TOXICOLOGY RESULT
(blood alcohol threshold: 0.30 g/l)

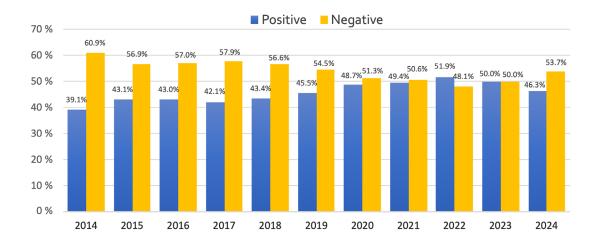
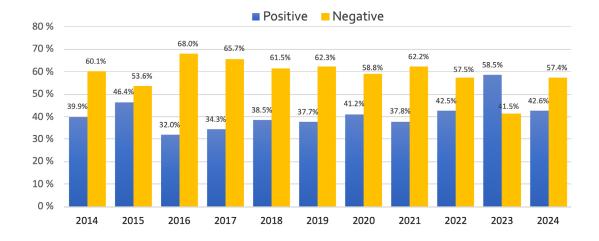


FIGURE 42: EVOLUTION OVER TIME OF THE PERCENTAGE OF PEDESTRIANS ACCORDING TO TOXICOLOGY RESULT



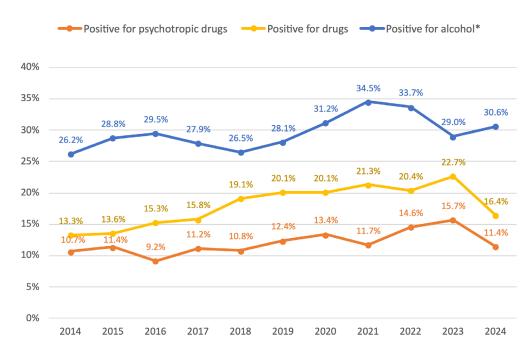


FIGURE 43: EVOLUTION OVER TIME OF THE PERCENTAGE OF POSITIVE DRIVERS ACCORDING TO TOXICOLOGY RESULT

The comparative study of the last eleven years for the number of drivers with positive toxicology results shows an increase of **7.2**% in 2024 compared to 2014.

With regard to alcohol consumption by deceased drivers, an increase of **1.6%** of positive cases is observed in 2024 compared to 2023.

In contrast, there was a significant decrease in positive drug use cases, which fell **6.3**% in 2024, falling back in a single year to values close to those of 2017.

Finally, in relation to psychotropic drugs, there is also a notable decrease of **4.3**% compared to 2023, reaching levels similar to those of 2015.

<sup>\*</sup> Positive for alcohol: blood alcohol concentration of 0.30 g/l or more.

Cannabis — Opioids — Amphetamine — Ketamine Cocaine 16 % 13.4% 13.2% 14 % 12.9% 12.2% 11.3% 12 % 10.3% 10.1% 9.7% 10 % 8.9% 10.6% 8 % 7.0% 6.7% 6.7% 8.0% 6 % 6.2% 6.0% 4 % 2.1% 2.1% 2.0% 1.9% 1.7% 1.6% 1.5% 1.7% 0.9% 2 % 0.8% 0.7% 1.1% 0.4% 0.8% 0.0% 8:2% 0.3% 0.2% 0.0% 0.0% 1.4% 0.6% 0.4% <sup>0.0%</sup>2019 2014 2015 2016 2017 2018 2020 2021 2022 2023 2024

FIGURE 44: EVOLUTION OVER TIME OF THE PERCENTAGE OF POSITIVE DRIVERS BY DRUG TYPE

This latest year shows a slowdown in the marked upwards trend in cocaine use that had been occurring in recent years, with an overall fall of 3.5% of positive cases among drivers killed in traffic accidents, which represents a relative decrease of 26.6% compared to 2023. In the case of cannabis, the decline that started in 2019 is maintained, with a 1.9% decrease in 2024 compared to 2023.

# FINAL OBSERVATIONS

### SUMMARY OF FINAL OBSERVATIONS WITH THE GREATEST MEDICAL-LEGAL AND SOCIAL IMPACT

Data obtained and presented in the report lead us to draw the following conclusions that have the greatest impact, not only in the medical-legal sphere but also because of their significant impact in terms of road safety.

#### **DRIVERS**

In general terms, alcohol continues to be the most commonly detected substance in driver fatalities, followed by cocaine and cannabis, and, thirdly, by psychotropic drugs.

Of the 937 drivers killed in road accidents and subjected to autopsy and toxicological analysis, 452 drivers, i.e. 48.2% (figure 8 B), tested positive for alcohol (blood alcohol threshold 0.10 g/l), drugs of abuse and/or psychotropic drugs, either alone or in combination compared to 53.6% in 2023.

The overall decrease of 5.4% of positives detected in 2024 compared to 2023 is due to a significant decrease in the detection of drugs from 22.7% to 16.4% and of psychotropic drugs, which fell from 15.7% to 11.4%, while the detection of alcohol rose from 32.7% to 34.4%, with these percentages referring to associated and/or isolated substance use (figure 10).

Drivers who died with positive toxicology results were predominantly male.

An overwhelming majority of cases (92.7%) with positive toxicology results were male drivers and only 7.1% were female drivers (figure 13), a ratio of 13:1, which is obviously an epidemiological fact of great significance in the development of road accident prevention campaigns.

Alcohol is still the most commonly detected substance in drivers killed with positive toxicology results. There is a high proportion of cases where combined use of alcohol with other substances and/or psychotropic drugs is detected.

The percentage distribution within the group of drivers killed with positive toxicology results (n = 452) according to the type of substance detected was as follows: 71.2% were positive for alcohol (threshold above 0.10 g/l), 34.1% were positive for drugs and 23.7% were positive for psychotropic drugs (figure 14).

In 13.1% of cases, combined use of alcohol and substances of abuse was detected, and in a further 3.1% of cases, the administration of psychotropic drugs was added to alcohol and other drugs (figure 15).

A high proportion of fatalities testing positive for alcohol and other substance use occurs on public holidays.

Some 44.5% of deaths where alcohol and other substances were found to be present occurred on public holidays (figure 16), a high proportion compared to non-holiday days, which account for 55.5% of the remaining cases.

The age range of the majority of drivers with positive toxicology results was 25 to 54 years old.

Of drivers with positive toxicological results, 61.5% were in the 25–54 age group (figure 17), with the 35–44 age group accounting for 24.1% of positive cases.

In all age groups there is a higher proportion of deaths involving alcohol or other substance use on weekdays than on public holidays.

In 2024, there was a reversal of the trend of the previous year, in which more positive cases were detected in young people aged 18–34 on Saturdays, Sundays and public holidays than on weekdays. In 2024, it is noted that those aged between 25 and 34, there is a predominance of cases on working days (9.5%) over holidays (6%), with practically similar proportions in the other age groups, albeit slightly higher for working days (figure 17).

Most drivers with positive toxicology results were driving a passenger car or motorbike.

Therefore, 48.9% of positive drivers were driving a passenger car and 37.8% were riding a motorbike (figure 18).

Most deceased drivers who tested positive for alcohol had a very blood alcohol level greater than 1.20 g/l, which correlates to very severe intoxication.

It is noteworthy that in 67.4 %, or two out of three cases, of drivers killed with positive results for alcohol, a very high blood alcohol level of over 1.20 g/l was detected, which correlates with very severe intoxication (figure 19).

In addition, 33.9%, one out of three cases, exceeded 2 g/l of alcohol in the blood, so that the impairment of the psychophysical abilities necessary for driving is clearly evident.

A clear decrease in the detection of drugs of abuse in drivers killed in road accidents has been seen in 2024.

In 2023, positive results for substance use in deceased drivers were found in 196 cases. In 2024, these figures decreased significantly to 154 cases detected.

Overall data for the whole of Spain indicate that the drug of abuse most detected among deceased drivers in all age ranges was cocaine, followed by cannabis.

With regard to cases testing positive for drugs of abuse (n = 154), and regardless of whether there was associated use of drugs of abuse, alcohol and/or psychotropic drugs, cocaine alone was the most detected drug nationwide (59.1%), followed by cannabis (42.9%) (figure 21), with a clear predominance in the 35–64 year age range (figure 23).

Overall data indicate that the most commonly detected psychotropic drugs in drivers killed were benzodiazepines, followed by antidepressants, opioids and antiepileptics.

The percentage distribution within the group of drivers killed with positive results for psychotropic drugs (n = 107) according to the type of substance detected was as follows: 53.3% were positive for benzodiazepines (a similar proportion to 2023), 51.4% were positive for antidepressants (40.7% in 2023), 20.6% for antiepileptics (9.6% in 2023) and 12.1% for opioids, either alone or in combination (figure 25). It should be noted that there has been a sizeable increase in the percentages of antidepressant and antiepileptic drugs detected.

The most prevalent associated alcohol and drugs of abuse findings were, firstly, the simultaneous presence of alcohol and cocaine, followed by the simultaneous presence of alcohol and cannabis, and alcohol, cocaine and cannabis.

The most prevalent co-occurrence of alcohol and drugs of abuse (n = 59) were: the presence of alcohol and cocaine (54.2%), the co-occurrence of alcohol and cannabis (18.6%), and the combined presence of alcohol, cocaine and cannabis (15.3%) (figure 24), with no significant changes in these associations compared to 2023.

In smaller proportions, combined consumption of alcohol with other substances such as amphetamines and their derivatives and ketamine has been detected.

A comparative study of the proportion of drivers testing positive for drugs over the past eleven years shows that in 2024, the decline in the number of positive tests already started in 2023 will be even more pronounced.

The decrease in the percentage of driver fatalities testing positive for alcohol or other substances in blood in 2024 was 3.7% in absolute terms.

This decline is marked by a notable decrease in drug detection from 22.7% in 2023, when it reached its highest proportion in the last decade, to 16.4% in 2024, to which the also lower detection of psychotropic drugs must also be added, from 15.7% to 11.4% proportionally (figure 43).

In contrast, alcohol consumption increased 1.6% in 2024 compared to 2023.

The individualised study by type of drug detected allows us to determine a notable decrease in cocaine among deceased drivers, from 13.2% in 2023 to 9.7% in 2024, a value similar to that found in the chemical-toxicological analyses carried out during 2018. Cannabis use among deceased drivers has also been observed to be on a downwards trend, which has continued since 2018, falling from 8.9% to 7.0% in 2024 (figure 44).

#### **PEDESTRIANS**

In 2024, a recovery of the percentage values similar to 2022 is observed, after the notable upturn in 2023, with a 15.9% decrease in the proportion of positive toxicological results for alcohol, drugs of abuse and/or psychotropic drugs in pedestrian road traffic fatalities.

Of 195 pedestrians killed in road traffic accidents and autopsied, 42.6% tested positive for alcohol, drugs of abuse and psychotropic drugs, either alone or in combination (figure 28).

The distribution by sex of pedestrians with a positive toxicological result shows a ratio of 2.7:1, with 73.5% of males and 26.5% of females (figure 32).

Alcohol and psychotropic drugs are still the substances most commonly detected in pedestrian road traffic fatalities, followed by drugs of abuse.

The highest prevalence of positive results in pedestrians was for alcohol (54.2%) and psychotropic drugs (45.8%), followed by drugs of abuse (25.3%) (figure 34), either exclusive or combined use.

In fact, of the positives detected, combinations of alcohol with other drugs of abuse appear in 10.8% of cases, and with psychotropic drugs in 4.8% (figure 35).

Most deceased pedestrians who tested positive for alcohol had a very high blood alcohol level that was greater than 1.20 g/l, which correlates to very severe intoxication.

It is noteworthy that 73.3% of the pedestrian fatalities with positive results for alcohol had a blood alcohol level greater than 1.20 g/l (figure 36), with 40% of the cases exceeding 2 g/l.

By age group, these high rates stand out among 25–34 and 45–54 year olds.

The drugs most commonly detected in pedestrians hit by vehicles are cocaine and cannabis.

Almost exclusively, in the 21 cases of pedestrians hit by vehicles in which drugs of abuse were detected, the substances found were cocaine and cannabis, with only one case where opiates were detected.

All of the positive cases in the drug test were in the 18–54 age range.

Overall data indicate that the most commonly detected psychotropic drugs in pedestrians killed were benzodiazepines, followed by antidepressants, opioids and antiepileptics.

The percentage distribution within the group of pedestrians killed with positive results for psychotropic drugs (n = 38) according to the type of substance detected was as follows: 50% were positive for benzodiazepines, 47.4% were positive for antidepressants, 23.7% for opioids, and 21.1% were positive for antiepileptic drugs (figure 40).

## METODOLOGY

#### 1. NATIONAL INSTITUTE OF TOXICOLOGY AND FORENSIC SCIENCES

#### 1.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- · Enzyme immunoassay.
- · Headspace gas chromatography with flame ionisation detection (HS-GC-FID).
- · High-performance liquid chromatography with diode-array detector (HPLC-DAD).
- Gas chromatography coupled with mass spectrometry (GC-MS).
- · Gas chromatography in tandem with mass spectrometry (GC-MSMS).
- Ultra performance liquid chromatography in tandem with mass spectrometry (UPLC-MSMS).
- Liquid chromatography coupled with high resolution mass spectrometry (LC-HRMS).

All reported results for drugs and psychotropic drugs [4] have been confirmed by analytical techniques based on mass spectrometry [5-14].

All analytical results have been obtained within the quality system implemented at the INTCF in accordance with ISO 17025. INTCF, specifically, is accredited by the National Accreditation Body (ENAC) for the quantitative determination of ethyl alcohol in biological fluids, among other analyses [15].

The following is a description of the national and international intercomparison exercises in which the Chemistry and Drugs services of the different INTCF departments participate annually and whose results are essential for externally assessing the competence of our laboratories in this type of drug of abuse testing.

TABLE 1: INTCF DEPARTMENT CHEMISTRY AND DRUGS SERVICE PARTICIPATION IN INTERCOMPARISON EXERCISES

	Barcelona	Madrid	Seville	La Laguna
Programme: Blood Ethyl Alcohol Intercomparison Exercise Organiser: INTCF Seville Frequency: four-monthly Parameters/samples: ethyl alcohol and other volatile compounds in blood and plasma	x	x	х	х
Programme: Whole Blood Alcohol / Volatiles Survey (AL1) Organiser: College of American Pathologists Frequency: four-monthly Parameters/samples: ethyl alcohol, volatiles and ethylene glycol in blood	x	X		
Programme: Toxicology Organiser: LGC Standards Frequency: annual Parameters/samples: identification and quantification of blood ethanol			Х	X
Programme: Vitreous Fluid (VF) Organiser: College of American Pathologists Frequency: six-monthly Parameters/samples: ethyl alcohol, potassium and sodium in vitreous humour		x		
Programme: Forensic Toxicology Criminalistics (FTC) Organiser: College of American Pathologists Frequency: six-monthly Parameters/samples: drugs in blood and urine	x	x		
Programme: Forensic Blood Toxicology Proficiency Testing (Quartz) Organiser: LGC Frequency: quarterly Parameters/samples: drugs of abuse and psychotropic drugs in blood		x	х	X
Programme: Blood Drug Analysis (CTS-5661) Organiser: Collaborative Testing Services Frequency: annual Parameters/samples: drugs of abuse and psychotropic drugs in blood		x		
Programme: International Quality Assurance Programme (IQAP-UNODC) Biological Specimens Group.  Organiser: United Nations Office on Drugs and Crime (UNODC)  Samples: 4 urine samples  Frequency: biannual  Parameters: identification and quantification of the most common drugs of abuse		x	х	

#### 2. INSTITUTE OF LEGAL MEDICINE AND FORENSIC SCIENCES OF CATALONIA

#### 2.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- Enzyme immunoassay.
- Headspace gas chromatography with flame ionisation detection (HS-GC-FID), detection and quantification of ethanol.
- Gas chromatography coupled with mass spectrometry (GC-MS), detection and quantification of drugs of abuse and psychotropic drugs.
- High-performance liquid chromatography in tandem with mass spectrometry (HPLC-MSMS), detection and quantification of drugs of abuse and psychotropic drugs.

The IMLCFC participated in the following intercomparison exercises in 2024:

- Blood Ethyl Alcohol Intercomparison Exercise (BAIE) organised by the INTCF (3 exercises).
- UNODC-BS: detection of psychoactive substances in urine (2 exercises).
- LGC STANDARDS: detection and quantification of carboxyhaemoglobin in blood, ethanol, methanol, paracetamol, drugs in blood, GHB in urine, volatile substances and screening in urine (17 participations).

#### 3. INSTITUTE OF LEGAL MEDICINE OF THE BASQUE COUNTRY

#### 3.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- Enzyme immunoassay with Beckman Coulter AU 680 analyser and Thermo Fisher reagents.
- Electrochemical technique for glucose determination in peripheral blood and vitreous humour.
- UV-Visible spectrometry for determination of COHb in whole blood with EDTA or heparin.
- · Headspace gas chromatography with flame ionisation detection (HS-GC-FID).
- Ultra performance liquid chromatography in tandem with mass spectrometry (UPLC-MSMS).

All reported results for drugs and psychotropic drugs have been confirmed by analytical techniques based on mass spectrometry.

Analytical results for ethanol were obtained with a method validated internally by the laboratory using a double column for confirmation. Results are always checked against certified reference materials and the inter-laboratory exercises in which they take part.

Analytical results for drugs of abuse have always been obtained using methods tested with certified reference material and the inter-laboratory exercises in which they take part.

The IVML participated in the following intercomparison exercises in 2024:

- Blood and Plasma Ethyl Alcohol Intercomparison Exercise (EIAS). Organiser: INTCF Seville. Frequency: four-monthly. Parameters/samples: ethyl alcohol and other volatile compounds in blood and plasma.
- Toxicology Programme. Organiser: LGC Standards. Frequency: monthly. Parameters/ samples: quantification of COHb, ethanol and paracetamol in blood.
- Programme: Forensic Blood Toxicology Proficiency Testing (Quartz). Organiser: LGC Frequency: quarterly. Parameters/samples: identification and quantification of drugs of abuse and psychotropic drugs in blood
- Drugs of Abuse in Urine (DAU) Programme. Organiser: LGC Standards. Frequency: quarterly. Parameters/samples: screening of drugs of abuse in urine using immunoassay and chromatography techniques.

#### 4. INSTITUTE OF LEGAL MEDICINE AND FORENSIC SCIENCES OF ARAGON

#### 4.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- Headspace sampler gas chromatography and flame ionisation detection (HS-GC-FID).
- Gas chromatography with mass spectrometry detection (GC-MS).

The IMLA laboratory participated in the following intercomparison exercises in 2024:

 Blood Ethyl Alcohol Intercomparison Exercise (BAIE) organised by the INTCF Seville Department.

#### 5. INSTITUTE OF LEGAL MEDICINE AND FORENSIC SCIENCES OF MURCIA

#### 5.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- · Headspace gas chromatography with flame ionisation detection (HS-GC-FID).
- Gas chromatography coupled with mass spectrometry (GC-MS).

The IMLCFM participated in the following intercomparison exercises in 2024:

 Blood Ethyl Alcohol Intercomparison Exercise (BAIE) organised by the INTCF Seville Department.

#### 6. INSTITUTE OF LEGAL MEDICINE AND FORENSIC SCIENCES OF THE BALEARIC ISLANDS

#### 6.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- · Enzyme immunoassay.
- Headspace gas chromatography with flame ionisation detection (HS-GC-FID), detection and quantification of ethanol.
- Gas chromatography coupled with mass spectrometry (GC-MS), detection and quantification of drugs of abuse and psychotropic drugs.

The IMLCFIB carried out the following intercomparison exercises in 2024:

- Blood Ethyl Alcohol Intercomparison Exercise (BAIE) organised by the INTCF Seville Department.
- UNODC ICE PROGRAMME: Interlaboratory Exercise on Psychoactive Substances in Urine (2024-BS).
- FTC-B 2024 Forensic Toxicology, Criminalistics Programme organised by the College of American Pathologists: Interlaboratory Exercise on Psychoactive Substances in Blood.

#### 7. INSTITUTE OF LEGAL MEDICINE AND FORENSIC SCIENCES OF VALENCIA

#### 7.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- · Enzyme immunoassay.
- · Headspace gas chromatography with flame ionisation detection (HS-GC-FID).

The IMLCFV carried out the following intercomparison exercises in 2024:

Blood Ethyl Alcohol Intercomparison Exercise (BAIE). Organiser: INTCF Seville. Frequency: four-monthly. Parameters/samples: ethyl alcohol and other volatile compounds in blood and plasma.

#### 8. LUIS CONCHEIRO FORENSIC SCIENCES INSTITUTE (INCIFOR)

#### 8.1. Analytical techniques used and participation in intercomparison exercises

#### Analytical techniques used

- · Thermo Fisher Indiko Plus enzyme immunoassay.
- Agilent headspace gas chromatography with flame ionisation detection (HS-GC-FID) for the detection and quantification of ethanol.
- High-performance liquid chromatography with diode-array detector (HPLC-DAD) for the detection and quantification of drugs of abuse and psychotropic drugs.
- Gas chromatography coupled with mass spectrometry (GC-MS) for the detection and quantification of drugs of abuse and psychotropic drugs.

INCIFOR regularly takes part in the following intercomparison exercises:

- Three INTCF intercomparison exercises per year. Controls are for the determination of ethanol, methanol and other volatiles in blood and plasma samples.
- Two intercomparison exercises per year for the determination of ethanol/methanol and other volatiles in blood by LGC, accredited according to ISO/IEC 17043.
- An annual LGC urine ethanol intercomparison exercise, accredited according to ISO/ IEC 17043.

#### 9. STATISTICAL DATA ANALYSIS AND PROCESSING

Data received in each request (date of accident, date of death, role, age, sex, type of vehicle, autonomous region, province, requesting body, issuing body, etc.), as well as data from the toxicological studies obtained by the INTCF, were recorded in the INTCF LIMS Labware (Laboratory Information Management System) information management system.

LIMS queries were performed with various searches using the Data Explorer module and data were exported to a standardised Microsoft Excel template.

Data were cross-checked with those recorded independently by the DGT and cases were selected.

Analytical data received from the different IMLCFs and INTCF departments were all compiled in the same standardised Microsoft Excel template.

Statistical data and final figures were obtained manually by using filters and creating charts in Excel, as well as by using the advanced analytics tool Qlik Sense.

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