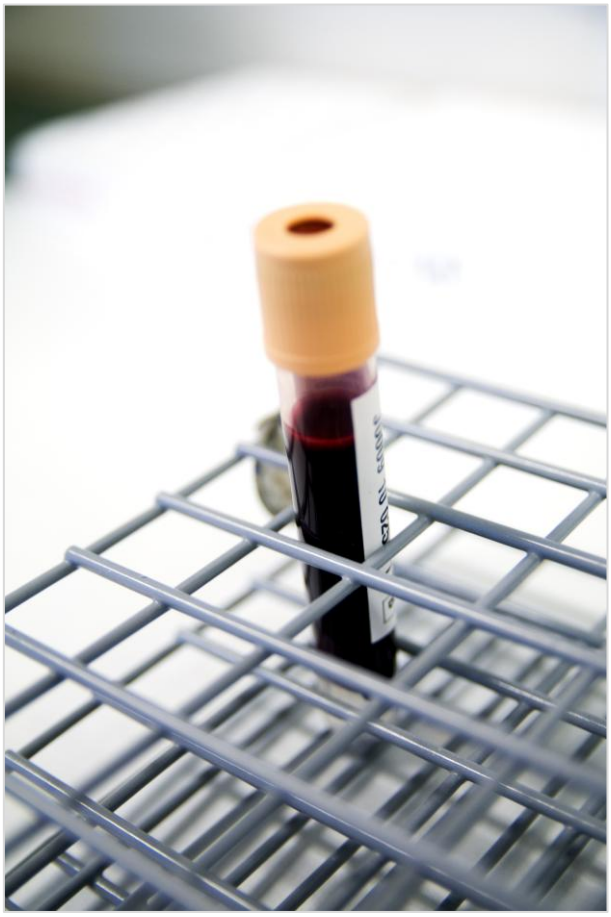

Autopsy Statistics

Findings in Blood Samples from Autopsies Conducted in 2025

Department of Forensic Sciences

OSLO UNIVERSITY HOSPITAL

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Authors:
Maximilian Vincent Røsnæs Hagelien
Stine Marie Havig
Gerrit Middelkoop
Hilde Marie Erøy Edvardsen

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https://oslo-universitetssykehus.no/fag-og-forskning/nasjonale-og-regionale-tjenester/rettsmedisinske-fag/alkohol-og-rusmidler

Foreword

This report covers autopsies in which forensic toxicological analyses were conducted at the Department of Forensic Sciences, Oslo University Hospital (OUS) in 2025 and the preceding nine years.

Autopsies performed at local hospitals for medical purposes without toxicological analyses, and autopsies where toxicological analyses were carried out at St. Olav's Hospital, are not included in this report. The purpose of the report is to provide an overview of the scope of the autopsies and the substances detected, which, among other things, reflects trends in the use of prescribed and illicit substances in Norway. Each annual report will highlight selected current trends and present findings that are discussed in greater detail than in previous years.

The cause of death is not included in this report. Concentrations of the detected substances have not been assessed, and the report therefore does not indicate whether low concentrations or high, potentially fatal concentrations were present. The detection of drugs and narcotics in blood alone cannot determine the cause of death. By linking toxicological findings from autopsies with the Cause of Death Registry or information from the autopsy report, it is possible to assess the contribution of substances to death. The department has research projects investigating this, and the results are published in scientific articles.

Oslo, August 2026

Maximilian Vincent Røsnæs Hagelien

Stine Marie Havig

Gerrit Middelkoop

Hilde Marie Erøy Edvardsen

Introduction

Approximately 95 percent of all toxicological samples from forensic autopsies in Norway are analyzed at the Department of Forensic Sciences, OUS. The remaining five percent are analyzed at St. Olav's Hospital in Trondheim and are not included in this report.

Toxicological analyses primarily include common drugs of abuse and a selection of pharmaceuticals. In most cases, approximately 100 substances are routinely analyzed. Detection limits, the analytical repertoire, and changes in substance use trends influence which substances are detected and the number of substances detected. The detection limit for each substance is set by the laboratory and indicates the lowest concentration that results in a positive finding ("detected"). Concentrations below this limit are reported as "not detected".

The analytical repertoire is continuously developed and updated. An updated overview is available here: eHåndboksdokument med prøvetakingsinstruks og analyserepertoar[1].

Trends in the prescribing of medications and the availability of illicit drugs also influence which substances are detected at autopsy. The concomitant use of multiple substances is not addressed in this report, although studies based on autopsy data show that several substances are frequently detected together.

The results are primarily presented as absolute numbers (*number* of positive cases), and not relative numbers (*proportion* of positive cases). The number of autopsies where samples are submitted for toxicological analysis has decreased over the past three years, which must be considered when interpreting trends. A decrease in *the number* of positive cases for a substance does not necessarily indicate a decrease in *the proportion* of positive cases. Nevertheless, the trends appear consistent regardless of whether results are presented as absolute or relative numbers.

As information on cause of death is not available, the findings cannot be interpreted in relation to mortality.

In this report, findings of prescription medications and illicit drugs in autopsy cases are compared with data from the Norwegian Institute of Public Health's Drug Statistics[2] and with trends from Kripos'* narcotics statistics[3] for 2025.

[1] Link to sampling instructions and analysis repertoire: https://ehandboken.ous-hf.no/document/112685
[2] Link to the Norwegian Institute of Public Health's Drug Statistics database: https://statistikk.fhi.no/lmr/kVQEwOzJ4-ArMo6deK1PITb0wg9-JWHY
* The National Criminal Investigation Service in Norway
[3] Kripos' Narcotics Statistics (Kripos' narkotikastatistikk) 2025: https://www.politiet.no/globalassets/tall-og-fakta/narkotika/narkotikastatistikk-2025.pdf

Summary

This report discusses the findings of the most common prescription medications and illicit drugs in autopsy cases analyzed during the period 2016–2025.

Figure 1 shows the total number of autopsy cases and the number of cases in which at least one drug was detected in the blood sample. In 2025, blood samples were analyzed in a total of 2,424 unique autopsy cases, a decrease of more than 100 cases from the previous year. In 1,859 of these cases, one or more substances were detected, corresponding to findings in 77% of the cases. The proportion of samples without findings has been 20–25% since 2000.

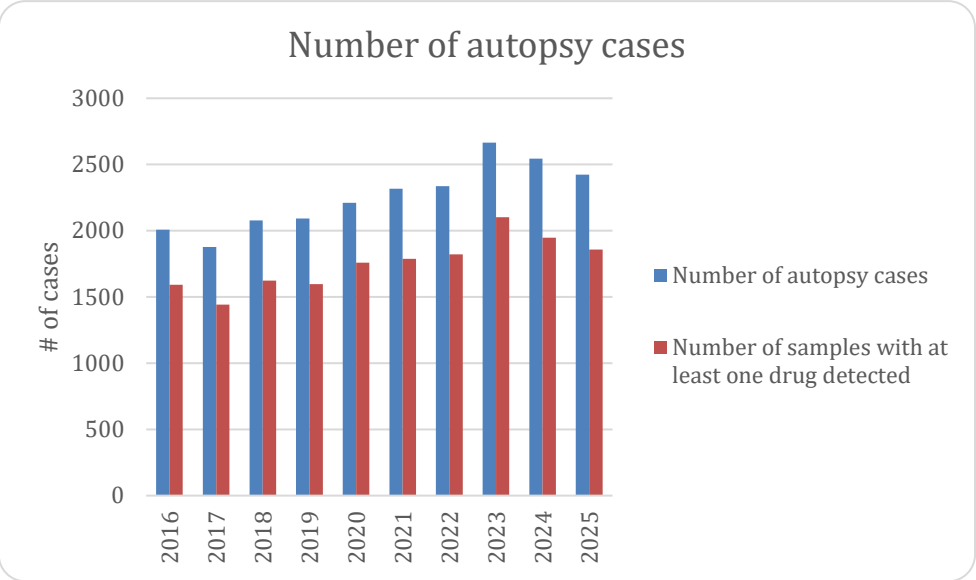

Figure 1: Total number of autopsy cases and number of cases where at least one drug was detected from 2016–2025.

Throughout the entire period, more men than women were autopsied, with men accounting for approximately 71% in 2025. The average age was 56 years and was slightly higher among women than men (58 versus 54 years). The age ranged from infants to individuals over 90 years. In the 2025-autopsy material, ethanol (alcohol), paracetamol, diazepam, morphine/codeine, and zopiclone remained among the most frequently detected individual substances in blood samples. Amphetamine continued to be markedly more prevalent than methamphetamine, accounting for nearly all detections within this category. Furthermore, cocaine, alprazolam, and ketamine showed a clear increase over time, with ketamine appearing among the 20 most frequently detected substances for the first time in 2025. Among pharmaceutical opioids, the occurrence of fentanyl, oxycodone, and tramadol remained relatively stable, with a slight increase observed for fentanyl in 2025. In addition, both pregabalin and gabapentin were frequently detected. Pregabalin in particular appeared more often in autopsy cases than would be expected based on prescription data in the population, which may indicate a substantial proportion of non-medical use.

Figure 2 shows the average annual change in detection rates for the drugs and medicinal substances that exhibited a significant change over the past ten years, measured in percentage points. The results demonstrate clear differences between substance groups.

Several substances have shown increasing detection rates, particularly the gabapentinoids (pregabalin and gabapentin), which together exhibit the greatest growth (approximately +0.43 percentage points per year). Amphetamine, second-generation antipsychotics,

cocaine, and ketamine have also increased. At the same time, certain pharmaceuticals have shown declining detection rates. This applies, among others, to antidepressants (newer types), zopiclone/zolpidem, antihistamines, and first-generation antipsychotics, all of which show moderate to marked annual decreases. Overall, the trends indicate a shift in the types of substances most frequently detected, with an increasing occurrence of newer psychoactive pharmaceutical products and certain illicit drugs, while several more traditional medications show a decline in use or detection.

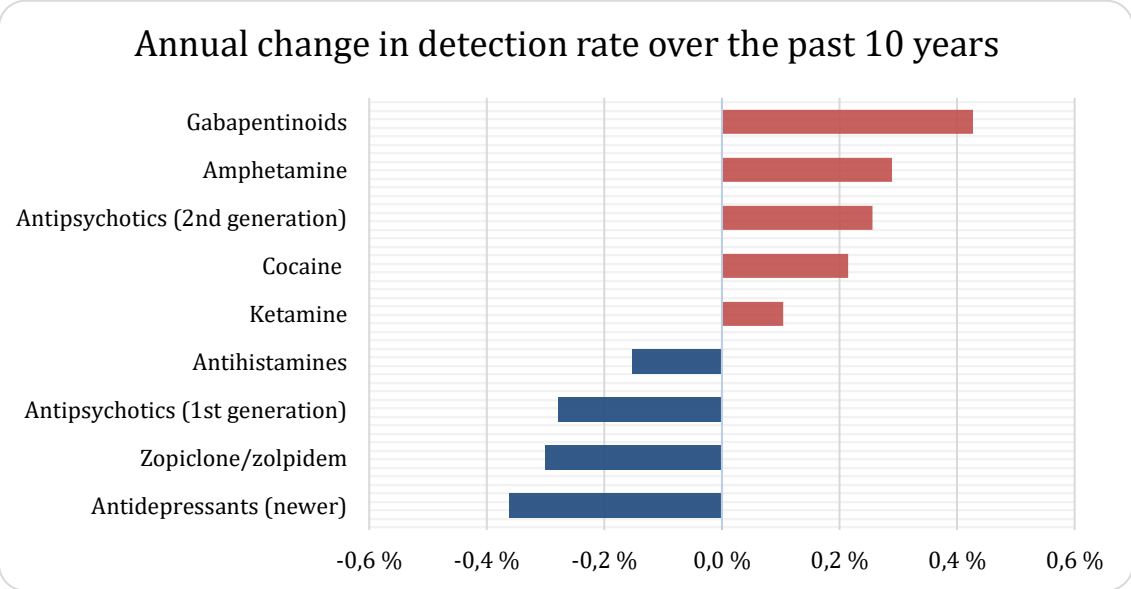

Figure 2: Estimated annual change in the proportion of autopsy cases with detected substances, 2016–2025. Only substances with a statistically significant trend ($p < 0.05$) based on linear regression are shown. N = 22,549 cases (1,876–2,664 per year).

Contents

Chapter 1: Detected Substances

Table 1 shows the 20 most common substances detected in blood samples from autopsies in 2025. A total of 2,424 autopsy cases were analyzed in 2025, compared to 2,544 in 2024. Ethanol is the most frequently detected substance in autopsy cases, and in 2025, alcohol was consumed in 19% of the cases. Most of the other substances in the table fall into two categories of medication: psychopharmaceuticals (used to treat mental disorders) and opioids (used to treat pain). Additionally, THC (the main active ingredient in cannabis), amphetamines, and paracetamol are detected. New in 2025 is that the anesthetic ketamine ranked among the 20 most frequently detected substances in autopsy cases.

Table 1: Most Commonly Detected Substances in Blood Samples from Autopsies in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	453	19
2	Paracetamol/ acetaminophen	*Panodil, Paracet, Paramax, Pinex*	241	10
3	Morphine**	*Dolcontin, Malfin, Oramorph,* heroin	238	9.8
4	Diazepam	*Stesolid, Valium, Vival*	223	9.2
5	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	210	8.7
6	THC	*Sativex,* cannabis	184	7.6
7	Zopiclone	*Imovane, Zopitin*	181	7.5
8	Alprazolam	*Xanor*	150	6.2
9	Fentanyl	*Abstral, Durogesic, Instanyl, PecFent*	143	5.9
10	Pregabalin	*Lyrica*	135	5.6
11	Quetiapine	*Seroquel, Quetiapin(e)*	129	5.3
12	Codeine***	*Altermol, Paralgin Forte, Paramax Comp, Pinex Forte*	117	4.8
13	Oxycodone	*OxyContin, OxyNorm, Reltebon, Targiniq*	107	4.4
14	Citalopram	*Cipramil, Cipralex*	101	4.2
15	Mirtazapine	*Remeron, Mirtazapin*	95	3.9
16	Tramadol	*Nobligan, Tramadol, Tramagetic*	89	3.7
17	Methadone	*Metadon*	88	3.6
18	Metoprolol	*Selo-Zok, Bloxazoc, Seloken*	88	3.6
19	Gabapentin	*Neurontin, Neurisol, Shakatin*	84	3.5
20	Ketamine	*Spravato, Ketalar, Ketanest*	81	3.3

* Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death.
** Morphine can be formed in the body after the intake of heroin, codeine, and ethylmorphine. Consumption of these substances can therefore also contribute to morphine-positive cases.
*** Codeine is found in opium/heroin and can be detected in small amounts after heroin intake.

Chapter 2: Alcohol (ethanol)

Alcohol (ethanol) is an intoxicant that elevates mood, increases impulsivity, heightens risk-taking, impairs judgment, and reduces coordination. Alcohol intoxication increases the risk of potentially dangerous impulsive actions and/or accidents. Consciousness is diminished with increasing blood alcohol concentrations. A blood alcohol concentration around 3‰ or higher can lead to poisoning and death. The risk of fatal outcomes with alcohol increases with the simultaneous intake of other psychoactive substances (especially substances with depressant effects on the brain, such as opioids and benzodiazepines). Alcohol consumption can also have extensive harmful effects on many of the body's other organs, potentially causing disease and death.

Ethanol can be formed in the human body after death. Therefore, the detection of ethanol in blood samples from autopsies does not always indicate alcohol consumption. The simultaneous detection of the metabolites ethyl glucuronide (EtG) and/or ethyl sulfate (EtS) indicates that alcohol intake occurred before death.

Figure 3 shows the number of autopsy cases with alcohol consumption (ethanol detected along with EtG and/or EtS) during the period 2016–2025. The proportion of cases with alcohol consumption was relatively stable at around 20% throughout the period. Data from the Norwegian Cause of Death Registry[4] indicate that the number of alcohol-related deaths in Norway has increased. In 2019, there were 312 such deaths, compared with 407 in 2025. A total of 27 individuals died as a result of acute ethanol poisoning in 2025. Most deaths were due to alcoholic liver disease and mental and behavioral disorders caused by alcohol use.

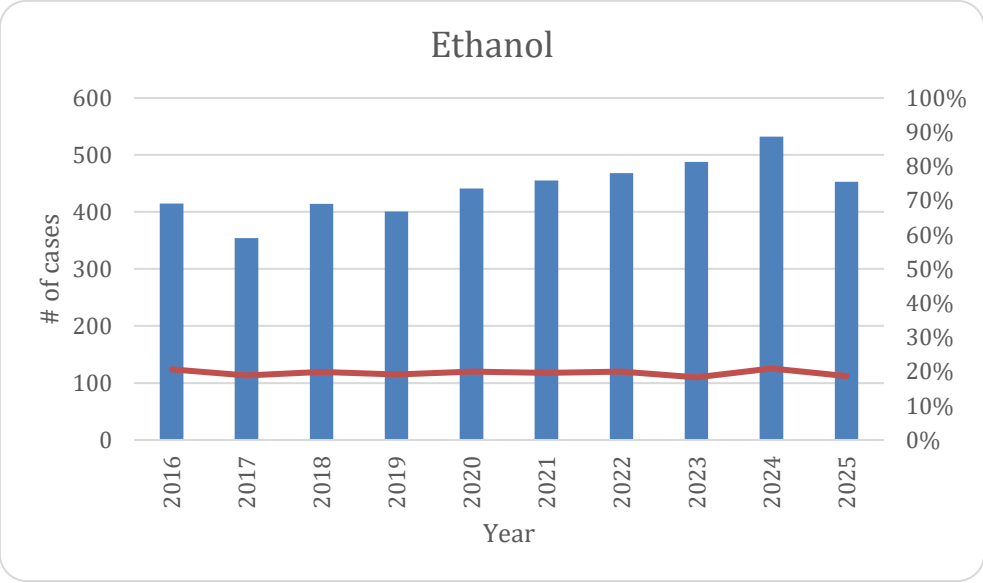

Figure 3: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of alcohol consumption (ethanol detected along with EtG and/or EtS) during the period 2016–2025.

[4] The Norwegian Cause of Death Registry's Statistics Database: Alkoholutløste dødsfall etter bofylke og dødsårsak, antall - FHI Statistikk

Chapter 3: Opioids

Opioids are pain-relieving drugs with a strong potential for abuse. These substances can be prescribed by a doctor/dentist but are also widely available on the illegal market. Taken recreationally, opioids produce a pronounced sense of well-being, accompanied by sluggishness and drowsiness. Opioids have depressant effects on the brain, which can lead to respiratory depression and death. Marked tolerance for opioids develops with frequent and regular use over some time, so that progressively higher doses are needed to achieve the same effect. After ceasing opioid use, tolerance diminishes quickly, increasing the risk of overdose if use is resumed.

Opioids include substances with morphine-like effects. Some opioids are natural and can be derived from the sap of the opium poppy (such as codeine and morphine). Semi-synthetic opioids are not found in opium but can be produced from natural opioids (such as heroin, oxycodone, and buprenorphine). Other opioids are entirely synthetic (such as fentanyl, tramadol, methadone, and ketobemidone). Besides heroin and certain synthetic derivatives (see Chapter 7 on new psychoactive substances), which are only available on the illegal market, all these substances can be prescribed as medications.

Kripos reports in its narcotics statistics that heroin seizures in 2025 amounted to only 9 kg, the lowest quantity since 2007, while the number of seizures increased slightly[3]. The purity level fell to a historically low 6%, and the trend points toward reduced availability both in Norway and in Europe, likely influenced, among other factors, by the Taliban's ban on opium production[5]. Concerns have also been raised that reduced heroin availability may lead users to switch to more potent synthetic opioids.

In the USA, the number of opioid overdoses has increased dramatically over recent decades and is described as an opioid epidemic and national crisis. According to the Centers for Disease Control and Prevention (CDC)[6], annual deaths involving opioids have risen from about 8,000 in 1999 to approximately 80,000 in 2024, and more than one million overdose deaths have occurred during these years in the USA. The age-adjusted death rate in 2024 was 23.1 deaths per 100,000 population. In comparison, the rate in Norway was 6.1 per 100,000. Fentanyls (very potent synthetic opioids), including both pharmaceutical fentanyl and related illicit substances (so-called fentanyl derivatives), have overtaken heroin as the leading cause of overdose deaths. The problems with such strong synthetic opioids also appear to be increasing in Europe. One reason for the many overdose deaths may be that users are unaware they are consuming fentanyl or fentanyl derivatives (see Chapter 7 on new psychoactive substances). Studies have shown that fentanyls are often sold as heroin or mixed into heroin. They are also sold as counterfeit medicinal products that mimic prescription tablets. Another group of highly potent opioids, called nitazenes, has emerged on the national and international drug market. These are discussed further in Chapter 7.

As described in the following subsections, the overall picture does not indicate an opioid epidemic in Norway of the kind seen in the USA, as the levels of most opioids are stable or changing only moderately. However, the situation could change rapidly if potent synthetic opioids became more widely available on the illicit market.

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[5] Global Initiative. Observatory-of-Organized-Crime-in-Europe-European-Drug-Trends-Monitor-Issue-1-GI-TOC-December-2024.v4.pdf

[6] Centers for Disease Control and Prevention: https://www.cdc.gov/nchs/data/databriefs/db549.pdf

A 20-year perspective on trends in opioid findings can be obtained by comparing Figure 3 in the report, which describes the development in the years 2000-2015 (see the 2016 annual report here) with Figures 4 and 5 in this report. From 2000 to the present, heroin and morphine appear to be partly replaced by medicinal opioids such as oxycodone and tramadol.

Heroin (Morphine, Codeine, and 6-MAM)

Heroin is an illegal drug with widespread use in Norway. After ingestion, heroin rapidly converts into 6-monoacetylmorphine (6-MAM) and morphine in the body. 6-MAM also quickly disappears from the bloodstream, so detection of 6-MAM in blood indicates heroin intake shortly before death. 6-MAM can be detected slightly longer in urine than in blood. In autopsy samples, both urine and blood are analyzed for 6-MAM to confirm heroin intake. In this report, 6-MAM has been detected in blood and/or urine. Detection of morphine alone may result from intake of heroin and/or morphine itself. Morphine can also be detected after the intake of codeine and ethylmorphine because a small amount of these substances is metabolized to morphine in the body. Codeine often appears as a contaminant in heroin. Therefore, the detection of codeine in autopsy blood samples along with morphine and 6-MAM often results from heroin intake but can also be due to the intake of the substance itself.

Figure 4 shows morphine and codeine in blood samples, as well as the metabolite from heroin, 6-MAM, in blood or urine samples from autopsies during the period 2016–2025. In 2025, morphine, codeine, and 6-MAM were detected in 10%, 5%, and 2% of the autopsy cases, respectively. The trend shows moderate fluctuations for all three opioids, with no clear indication of a substantial increase. Overall, this points to a stable level over time.

The very short detection time for 6-MAM may lead to false-negative results for heroin intake. However, studies from this decade have shown that drug users in Norway increasingly combine the intake of various drugs, including other opioids, which may have replaced some heroin use. Additionally, more opioid-dependent individuals (especially heroin users) receive opioid maintenance treatment (OMT) than before. Furthermore, morphine was included as an OMT medication in 2022, and in Bergen and Oslo, heroin is offered as treatment for patients who do not adequately benefit from standard OMT treatments[7].

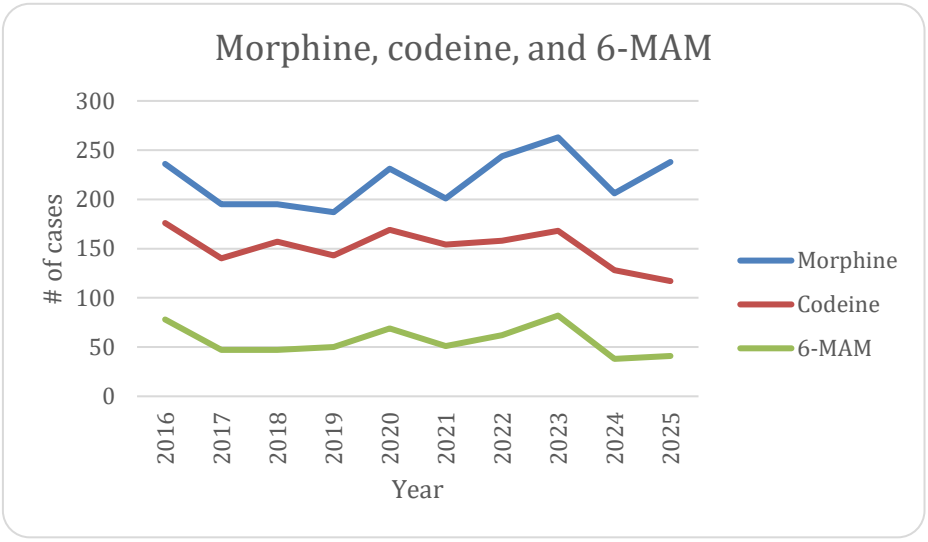

Figure 4: Number of autopsy cases with findings of morphine or codeine in blood, and 6-MAM (a heroin metabolite) in blood or urine, during the period 2016–2025.

[7] National professional guideline for opioid use disorders: https://www.helsedirektoratet.no/retningslinjer/behandling-ved-opioidavhengighet/behandling-ved-opioidavhengighet

Fentanyl, Oxycodone, and Tramadol

Fentanyl, oxycodone, and tramadol are opioids used in pain management. The recreational use of several of these substances is significant.

Fentanyl is about 100 times as potent as morphine. It is used in emergency medical treatment, for instance after severe accidents, and during surgeries, where it is administered intravenously as an injection/infusion. Fentanyl is also used in the treatment of chronic and severe pain, often in the form of transdermal patches. Oxycodone is roughly as potent as morphine and is used both intravenously and in tablet form. Tramadol is significantly less potent than morphine and is only available in tablet form (also discussed in Chapter 8 on paracetamol).

Figure 5 shows the number of cases in which fentanyl, tramadol, and oxycodone were detected in blood samples from autopsies conducted during the period 2016–2025. In 2025, fentanyl was detected in 5.9% of autopsy cases, while oxycodone was detected in 4.4% and tramadol in 3.7% of the cases. In many of the cases where fentanyl was detected, it is reasonable to assume that it was administered as pain relief shortly before death; however, some cases are likely attributable to non-medical use. The proportion of cases with fentanyl detected in blood samples increased in 2025 compared to 2023 and 2024. Oxycodone has seen an increase in the number of prescription users, from 47,251 in 2016 to 87,030 in 2025[2]. By comparison, 224,449 individuals used tramadol in 2025, and the number of individuals prescribed this drug has remained relatively stable over the past ten years[2]. Despite substantially lower prescription rates, fentanyl and oxycodone are more frequently detected in autopsy cases, which may be due to different patterns of use and/or higher toxicity.

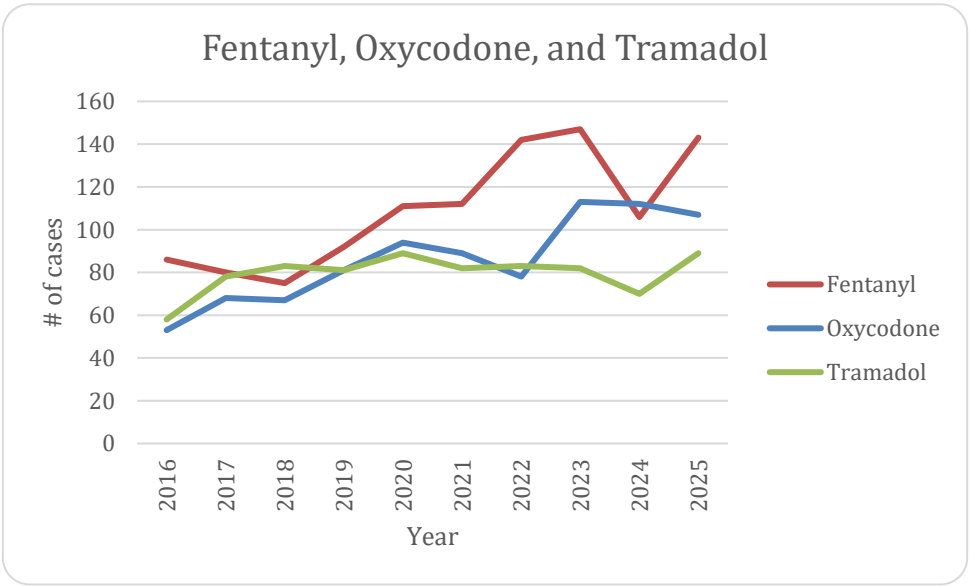

Figure 5: Number of autopsy cases with findings of the most common opioids during the period 2016–2025.

Methadone and Buprenorphine

Methadone and buprenorphine are primarily used in opioid maintenance treatment (OMT) but can also be used for pain management. Buprenorphine, in particular, is extensively used in pain management. Additionally, these substances are available on the illegal market and used without a prescription. Methadone is more potent than buprenorphine and carries a higher risk of fatal overdose.

Figure 6 shows the number of cases in which methadone and buprenorphine were detected in blood samples from autopsies conducted during the period 2016–2025. In 2025, methadone and buprenorphine were detected in approximately 3.6% and 2.2% of autopsy samples, respectively, which is close to the average over this 10-year period (3.5% for methadone and 3.0% for buprenorphine). The detection of these substances in samples likely reflects both prescribed and illegal use.

Methadone is currently used by 28% of OMT patients, while the majority receive buprenorphine[8]. Patients receiving methadone are generally an older group who have used the medication for many years. Consequently, findings of methadone in autopsy cases may increasingly represent individuals with deteriorating health who die with, rather than from, methadone. It is also conceivable that there is a growing proportion of deaths among individuals treated with these drugs for chronic pain, who are not OMT patients.

Kripos reports that buprenorphine accounts for 14% of opioid seizures and methadone for 6%, suggesting that there is a market for illicit or non-medical use[3].

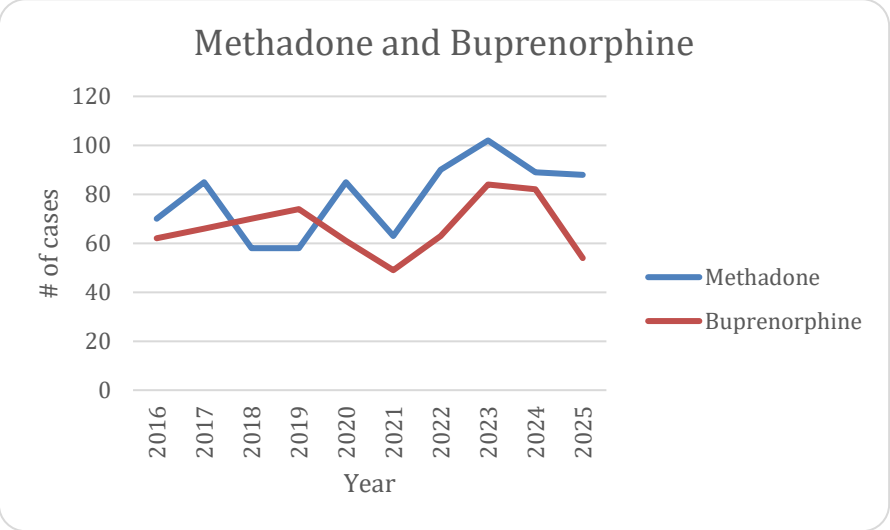

Figure 6: Number of autopsy cases with findings of methadone and buprenorphine during the period 2016–2025.

[8] Norwegian Centre for Addiction Research. Status Report for 2024: https://www.med.uio.no/klinmed/forskning/sentre/seraf/publikasjoner/rapporter/2025/seraf-rapport-nr-5-2025-statusrapport-2024.pdf.pdf

Chapter 4: Benzodiazepines

Benzodiazepines are used medically as anxiolytics, sedatives, muscle relaxants, hypnotics (sleep-inducing), and in the treatment of epilepsy. These substances are also extensively used as recreational drugs and can, among other effects, elevate mood. Intake can additionally lead to impairment of various skills, such as attention and memory. Experimental studies have shown that use of several benzodiazepines can be accompanied by increased aggression when provoked, even at low doses. The risk of poisoning from intake of a benzodiazepine alone is considered low, but it increases when combined with other psychoactive substances (especially depressants, such as opioids and alcohol), if the individual falls asleep in an unfavorable position that compromises or obstructs the airway, or in cases of severe lung disease.

Oxazepam and diazepam are the most frequently prescribed benzodiazepines in Norway, with 136,882 and 76,393 individual users, respectively, in 2025[2]. Nitrazepam, alprazolam, clonazepam, and flunitrazepam have significantly fewer users. Illicit distribution of these substances is widespread.

Following changes in prescription category, deregistration, and the shutdown of an illegal Rohypnol (flunitrazepam) source in the mid-2000s, the number of cases involving flunitrazepam has decreased significantly. In 2021, an illegal Rivotril (clonazepam) factory in Hungary was shut down, which likely affected the availability and detection of clonazepam. Both substances have been extensively used as recreational drugs in Norway; however, in recent years, alprazolam has dominated the illicit market. According to Kripos' narcotics statistics for 2025, approximately 1.5 million benzodiazepine tablets were seized in 2025, roughly the same amount as the previous year, but with 24% fewer seizures, representing the lowest level in the past decade[3]. Alprazolam and diazepam dominate both in the number of seizures and in the quantities seized, while clonazepam is also present. In addition, European law enforcement operations have revealed that criminal networks in Serbia produce and distribute large quantities of illicit benzodiazepines, which are subsequently smuggled to the Nordic countries[9].

[9] European Union Agency for Criminal Justice Cooperation: https://www.eurojust.europa.eu/news/main-organisers-large-scale-drug-transports-nordic-countries-arrested-serbia

Figure 7 shows the most commonly occurring benzodiazepines detected in blood samples from autopsies during the period 2016–2025. In 2025, diazepam was detected in 9.2% of autopsy cases, alprazolam in 6.2%, clonazepam in 2.6%, oxazepam in 1.8%, and nitrazepam in 1.5%. Other benzodiazepines are rarely detected (0.4% of cases) and include, among others, benzodiazepines without marketing authorization in Norway (lorazepam and bromazepam), along with flunitrazepam.

Figure 7 shows that diazepam was the most frequently detected benzodiazepine throughout the entire period, with a clear increase from around 2018 and a peak in 2023, followed by a slight decline in 2025. Alprazolam exhibited the most pronounced increase, particularly from 2020 to 2023, during which it was detected at levels nearly as high as diazepam, before also declining in 2024–2025. Clonazepam showed a clear downward trend over time, with a markedly lower prevalence from 2021 onwards compared to the early years of the 10-year period. It appears that alprazolam has partly replaced clonazepam. The proportion of cases with any benzodiazepine detected fell modestly, from 27% in 2024 to 22% in 2025. For alprazolam and clonazepam, the decreases were 2.3 and 1.0 percentage points, respectively. Nevertheless, the proportion of autopsy cases with detected alprazolam was 2.5 times higher in 2025 compared with 2018.

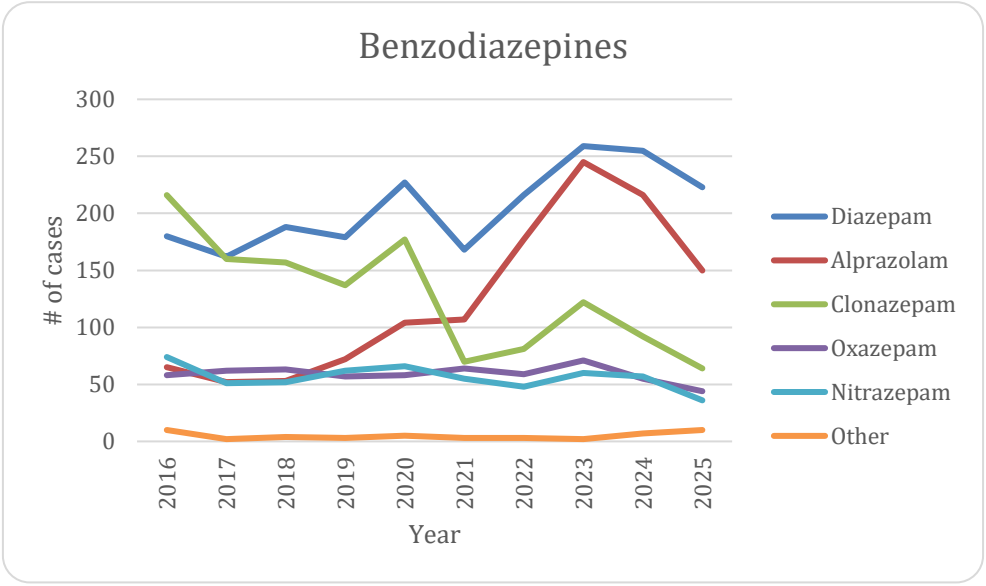

Figure 7: Number of autopsy cases with findings of benzodiazepines during the period 2016–2025. "Others" represents findings of bromazepam, flunitrazepam, and/or lorazepam.

Designer Benzodiazepines

Designer benzodiazepines are illegally manufactured benzodiazepines. Continuous efforts are made to develop analytical methods to detect new variants of designer benzodiazepines in blood and urine samples.

Figure 8 shows the detection of designer benzodiazepines in blood samples from autopsies during the period 2016–2025. In 2018 and 2019, diclazepam predominated, while etizolam/ alpha-OH-etizolam was most common in 2021. From 2022 onwards, bromazolam has been the most frequently detected substance within this group. The number of bromazolam detections increased from two cases in 2022 to 21 in 2023 and 23 in 2024, with 2024 having the highest overall number of designer benzodiazepine detections in the entire observation period (35 cases). In 2025, the number of detections declined markedly to a total of 14, of which seven involved bromazolam. This decline coincides with the inclusion of bromazolam on the narcotics list on 15 October 2024, following a decision by the United Nations Commission on Narcotic Drugs. Kripos confirms that bromazolam was the most frequently seized designer benzodiazepine in Norway during the period 2023–2025, although seizure quantities were substantially lower in 2025[3]. Of particular concern is that designer benzodiazepines are often detected in combination with highly potent and potentially lethal nitazenes (see Chapter 7 for further information on nitazenes).

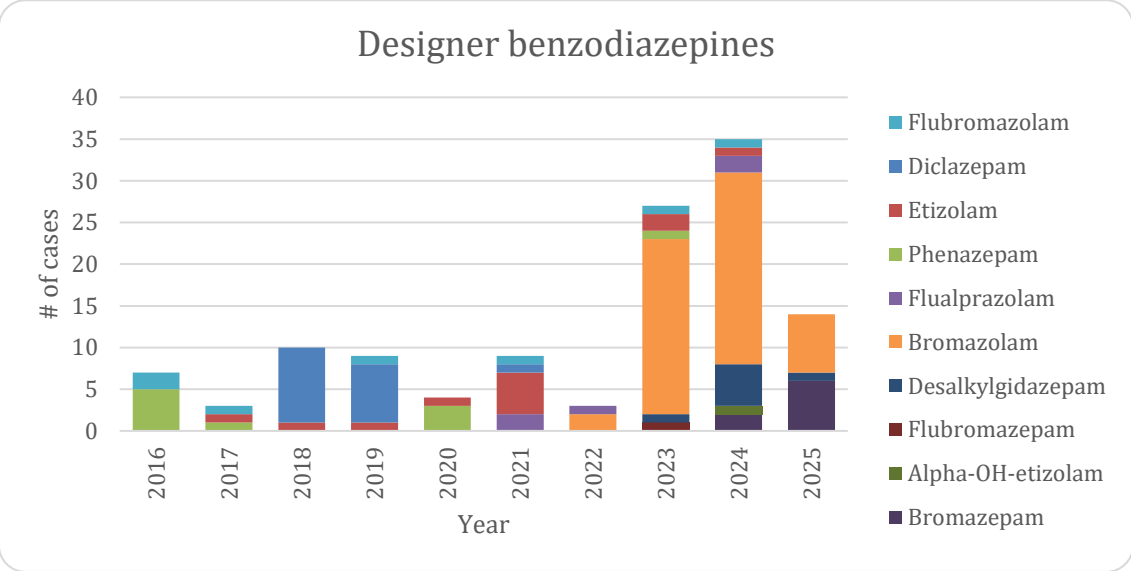

Figure 8: Number of autopsy cases with findings of designer benzodiazepines during the period 2016–2025.

Zopiclone and Zolpidem (Z–hypnotics)

Zopiclone and zolpidem are medications frequently prescribed for insomnia. These substances have potential for misuse and generally resemble benzodiazepines but have a shorter duration of action.

Figure 9 shows the number of cases in which zopiclone and zolpidem were detected in blood samples from autopsies conducted during the period 2016–2025. In 2025, zopiclone was detected in 7.5% of the autopsy cases and zolpidem in 1.6%. This may correspond with the fact that more than three times as many individuals in the general population were prescribed zopiclone (254,498) than zolpidem (76,088)[2].

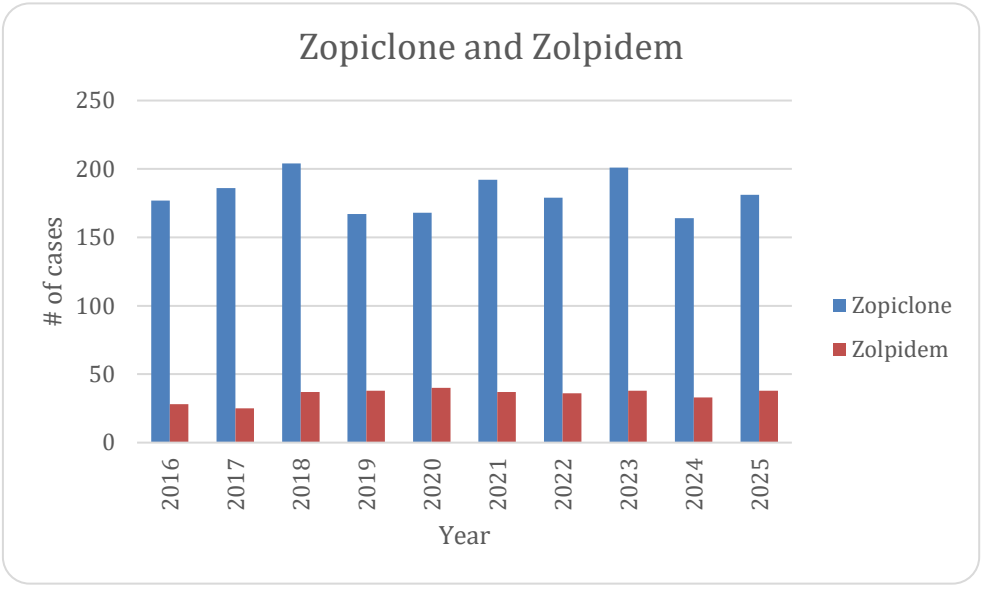

Figure 9: Number of autopsy cases with findings of zopiclone and zolpidem during the period 2016–2025.

Chapter 5: Cannabis

Tetrahydrocannabinol (THC) is the main active ingredient in products made from the cannabis plant, collectively referred to as "cannabis." This compound is also found in the medication Sativex. Cannabis typically appears as marijuana (dried plant parts), hashish (cannabis resin), or cannabis oil. Among other effects, THC is sedative and reduces attention and memory. THC can also cause anxiety and psychosis-like symptoms in some cases (including affecting the brain's processing of visual and auditory impressions). The risk of acute poisoning from cannabis use is low, but some cardiac deaths have been linked to cannabis use.

Sativex and medical cannabis are rarely prescribed in Norway. In 2025, Sativex had 972 individual users, an increase from 326 people in 2016[2]. The number of users of “medical cannabis” is likely even lower (although it can be prescribed by physicians in Norway, it must be imported to pharmacies from abroad). Detection of THC therefore mostly represents illicit use.

Figure 10 shows that both the number and proportion of autopsy cases with detected THC increased gradually from 2016-2023, with a particularly pronounced peak in 2023. This was followed by a marked decline in both the number of cases and proportion of positive samples in 2024 and further in 2025. It is important to note that the detection limit in our laboratory was raised in September 2023. As a result, a relatively higher THC concentration in the sample is required to report a positive finding. This increase in the detection threshold can likely explain part of the decrease in the number of positive THC cases. Because the change only came into effect in September, the figures for 2023 are less affected than those for 2024 and 2025.

Kripos reports that in 2025, record-high quantities of cannabis products were seized despite a 7% decrease in the number of seizures compared to the previous year[3]. In particular, seizures of marijuana and cannabis plants increased to 2,144 kg, approximately double the amount in 2024. Hashish, marijuana, and cannabis plants accounted for 41% of all drug seizures, and potency levels were significantly higher than before, with average THC concentrations of 34% in hashish and 18% in marijuana. Seizures also included cannabis seeds, THC products, and semi-synthetic cannabinoids.

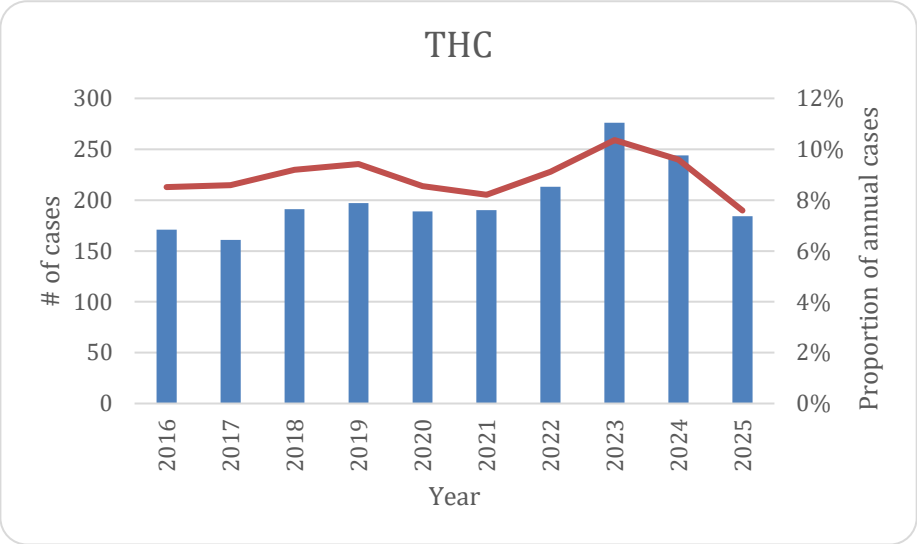

Figure 10: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of THC during the period 2016–2025.

Chapter 6: Stimulants

Amphetamine and Methamphetamine

Amphetamine and methamphetamine are central nervous system stimulants with very similar effects. The body metabolizes a small portion of ingested methamphetamine into amphetamine. Methamphetamine can be found mixed with amphetamine in illegal powdered substances sold under the name "amphetamine." Amphetamine is also the active ingredient in some medications (e.g., Elvanse and Attentin), which are prescribed for the treatment of ADHD. The number of people prescribed amphetamine-containing medications in Norway has risen to more than 70,000 users in 2025, up from about 20,000 in 2020[2]. Methamphetamine is not registered as a medication in Norway. Amphetamine and methamphetamine are widely used as recreational drugs, which likely represents the largest share of findings in blood samples from autopsies.

Intake of amphetamines in recreational doses can elevate mood, increase self-esteem, reduce critical judgment, suppress the need for sleep, and cause restlessness. Confusion, thought disturbances, sensory distortions, and other psychosis-like symptoms can also occur, usually after more pronounced use. Physical effects of amphetamines include increased heart rate, blood pressure, and body temperature. Additionally, motor restlessness, agitation, and tremors are observed. During the waning effects of the drug and after repeated intakes, lethargy and sleepiness can characterize the experience.

Figure 11 shows the occurrence of amphetamine and methamphetamine in blood samples from autopsies during the period 2016–2025. "Amphetamine" represents cases where amphetamine was detected alone, while "methamphetamine" refers to cases where methamphetamine was detected alone or together with amphetamine. In 2025, amphetamines were detected in 8.7% of the autopsy cases. Previously, methamphetamine findings dominated, but since 2018, amphetamine has been more prominent.

Kripos reports that 470 kg of amphetamine and methamphetamine were seized in 2025, with amphetamine clearly dominating and accounting for 96% of seizures and 97% of the quantities[3]. At the same time, the total quantity was somewhat lower than in 2024, and the number of seizures was 11% lower than the previous year. The potency of amphetamine remained stable at 23%, while methamphetamine showed both lower potency in powder form (28%) and very high potency in crystalline form (90–100%), which was seized in increasing quantities.

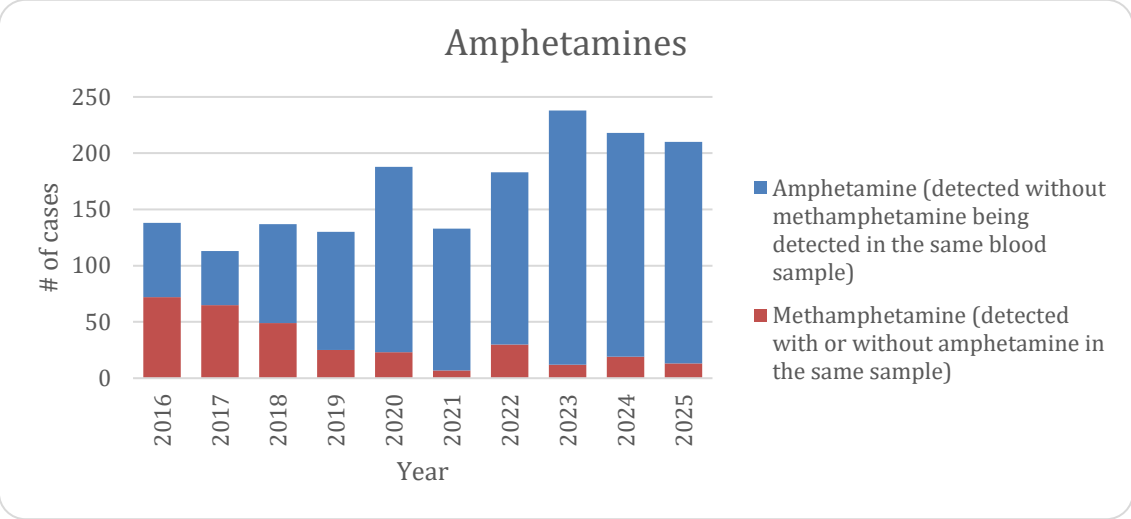

Figure 11: Number of autopsy cases with findings of amphetamine (detected without methamphetamine in the same blood sample) and methamphetamine during the period 2016–2025.

MDMA

Methylenedioxymethamphetamine (MDMA), also known as Ecstasy, is a drug with central stimulant and mild hallucinogenic effects. MDMA's effects resemble those of amphetamines, but it produces a greater sense of euphoria and empathy and can induce hallucinations. MDMA is not registered as a medication in Norway.

Figure 12 shows that both the number and proportion of autopsy cases with MDMA increased markedly, reaching a pronounced peak in 2020 when MDMA was detected in approximately 36 cases, accounting for around 1.7% of all cases. Following this peak, a decline was observed in 2021, followed by a more moderate increase again in 2022–2024. In 2025, MDMA was detected in 19 cases, corresponding to approximately 0.8% of autopsy cases. Despite the variations during the period, the levels throughout the 10-year period remained clearly higher than around 2010–2012, when MDMA was nearly absent from the autopsy material.

In 2025, both the number of MDMA seizures and the total quantities were among the lowest observed in the past decade, according to Kripos[3], with levels once again comparable to the situation in 2022–2023. Potency levels showed greater variation than previously, with an average of 76% MDMA in seized powder and 174 mg per tablet. The variability ranged from 15–92% in powder and 134–200 mg per tablet.

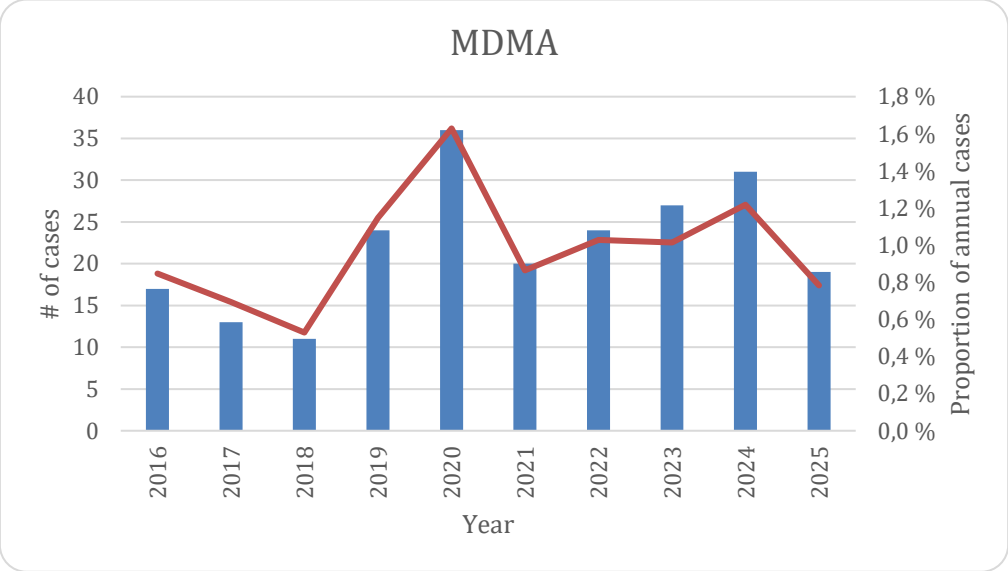

Figure 12: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of MDMA during the period 2016–2025.

Cocaine

Cocaine is a stimulant drug with effects similar to those of amphetamines, but the "high" is more intense and sets in faster, which increases the risk of developing addiction. Cocaine also has local anesthetic and vasoconstrictive (blood vessels constrict) effects and is used as a medication for some surgeries in the ear, nose, and throat area. Cocaine breaks down quickly in the body and can be detected in blood for only a short time after intake, which can result in significant underestimations of cocaine use before death.

Figure 13 shows a clear increase in both the number and the proportion of autopsy cases with detected cocaine throughout the period 2016–2025, with a particularly marked rise from 2021 onwards. In 2024, cocaine reached its highest level in the series, with approximately 63 cases and a proportion of around 2.7%. In 2025, the level remained high, with 54 cases and a proportion of about 2.2%, representing a slight decline from the peak year, yet still substantially higher than earlier in the period. The figure thus demonstrates a clear and sustained increase over time in both the number and proportion of cases involving cocaine, despite a modest reduction in the most recent year. The EUDA reports that cocaine is now the second most commonly used illicit drug[10], and according to Kripos, the number of cocaine seizures increased by approximately 10% in 2025, with levels among the highest recorded, except for the peak year 2023[3]. Cocaine now accounts for 11% of all seizures nationally and as much as 18% in Oslo, which also shows significantly higher levels of use than other Norwegian and Nordic cities. Potency remains very high, with an average of 73% and variations ranging between 30% and 95% purity in the products.

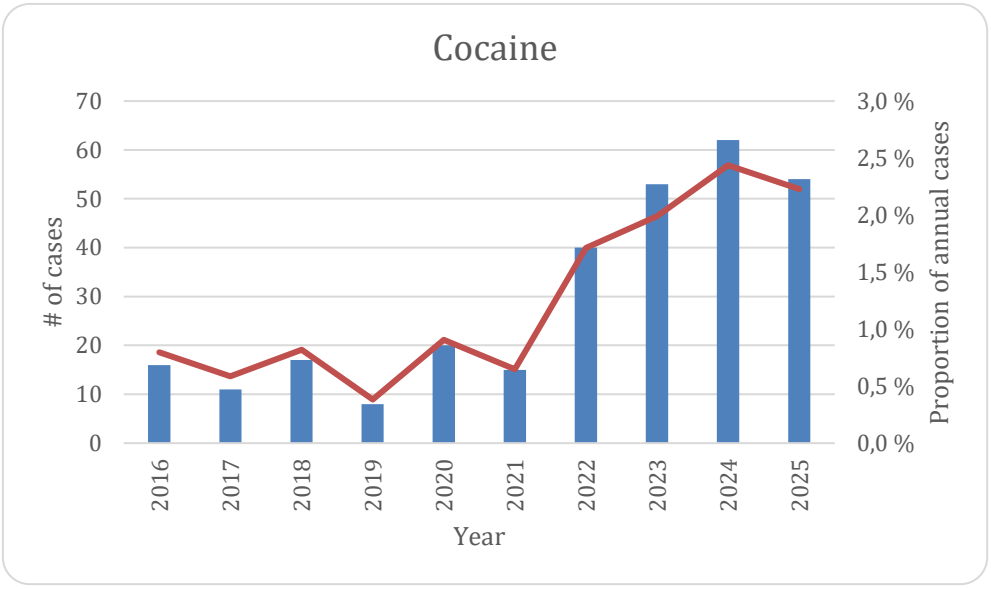

Figure 13: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of cocaine during the period 2016–2025.

[10] The European Union Drugs Agency (EUDA): https://www.euda.europa.eu/publications/european-drug-report/2025/cocaine_en

Chapter 7: New Psychoactive Substances (NPS)

NPS is a collective term for new drugs that are not regulated under international drug control conventions and are considered to be as harmful to health as other psychoactive drugs. These substances are also known as "designer drugs" and are often chemical imitations of traditional drugs. NPS are produced to circumvent drug legislation and are often termed "legal highs." These substances are commonly purchased over the internet. For many NPS, the effects and dangers are unknown, as they have not been systematically tested in humans. NPS do not constitute a uniform group of drugs and include substances with sedative, hallucinogenic, and/or stimulant effects. Many NPS primarily have one of these properties, while others may produce multiple effects. This can lead to unpredictable and dangerous reactions, and such poisonings can be difficult to treat. NPS include some extremely potent substances that can cause severe psychological reactions and, in the worst cases, fatal poisonings.

As mentioned in Chapter 3, new highly potent synthetic opioids have led to a large number of serious poisonings and deaths in Europe and the USA over the last decade. The first wave of deaths was due to fentanyl-like substances, while the latest wave, from around 2019, also involves nitazenes. Fentanyl-like substances and nitazenes are sold as such, but what is particularly concerning is that they are often found mixed with other drugs or sold under the guise of being something else. The fact that these substances are extremely potent and are consumed without the user's knowledge, poses a significant risk of severe and fatal poisoning.

Efforts are continuously made to develop new analytical methods to detect new variants of NPS in blood and urine samples. Therefore, the analytical repertoire varies somewhat from year to year. There may also be underreporting, partly because some NPS are so potent that they are present in the blood in such minute amounts that they can be challenging to detect. Consequently, we have no overview of the true prevalence of NPS.

In this report, we have chosen to focus primarily on designer benzodiazepines (Chapter 4), nitazenes, and fentanyl-like substances for NPS. However, the Department of Forensic Sciences also analyzes for a significant range of other NPS[11]. Besides the NPS groups mentioned above, the following substances were detected in 2025: HHC (hexahydrocannabinol), a semi-synthetic cannabinoid; diphenidine, a dissociative substance (see explanation in Chapter 15); mitragynine (an opioid-like alkaloid from the kratom tree); and the hallucinogenic substances 2-MMC (2-methylmethcathinone) and 4-CMC (4-chloromethcathinone). In addition, the following hallucinogenic and dissociative substances were detected in blood samples from autopsy cases in 2025: 4-OH-DMT (psilocin, found in Psilocybe mushrooms), LSD (lysergic acid diethylamide), and phencyclidine (PCP, also known as “angel dust”).

Nitazenes

Nitazenes (2-benzylbenzimidazoles) are a group of morphine-like substances (opioids) that were developed by the Swiss pharmaceutical company CIBA in the 1950s. They were intended to be used as pain relievers but were never approved for marketing. Nitazenes appeared on the illegal drug market in Europe and the USA in 2019. Since 2023, nitazenes have been included in the narcotics regulation. A characteristic of nitazenes is their high potency, meaning that a very small amount is highly effective. Depending on the specific

[11] Analysis of New Psychoactive Substances (NPS) at Oslo University Hospital

nitazene, these substances are 100–1000 times stronger than morphine, and 10–100 times stronger than fentanyl. Therefore, nitazenes can quickly cause respiratory arrest and death if used carelessly. Intoxications ("overdoses") caused by nitazenes must be immediately treated with the antidote naloxone, requiring higher doses and longer periods of monitoring than overdoses with heroin. Nitazenes have already caused a significant number of fatal poisonings in Europe and the USA. In Norway, the first nitazene-related death occurred in 2021. During 2025, nitazenes were detected in fewer than five autopsy cases, representing a substantial decrease from 18 cases in 2024. Metonitazene is currently the most frequently detected nitazene in Norway.

According to Kripos, seizures of these highly potent substances remain limited, but they pose a significant risk of overdose and death[3]. The substances occur in various forms, including tablets, powders, capsules, and liquids. However, Kripos has so far not documented that potent synthetic opioids have been mixed into other illicit drugs or medicinal products. Kripos recorded six seizures of nitazenes in 2025: metonitazene, etonitazepyne, N,N-dimethylaminoetonitazene, isotonitazepyne, and one nitazene that has not yet been verified[3].

Fentanyl Derivatives

Opioids that resemble the medication fentanyl are called fentanyl derivatives and can be 50-10,000 times more potent than morphine. Fentanyl derivatives were detected in Norway for the first time in October 2016. In Norway, there have been few deaths linked to fentanyl derivatives, but there may be underreported cases because these substances are taken in very low doses and are therefore difficult to detect. Poisonings caused by fentanyl derivatives, similar to nitazenes, can be treated with the antidote naloxone, but require higher doses and longer periods of monitoring compared to heroin overdoses.

No fentanyl-like NPS were detected in 2025.

Kripos reports that the number of NPS seizures was at its highest during the period 2012–2015, followed by a significant decline, likely due to both national and international regulations[3]. In 2025, NPS accounted for around 1% of all seizures, distributed across 40–50 different substances, each occurring in small quantities. Kratom was the most common substance, but there were also some seizures of designer benzodiazepines (particularly bromazolam), cathinones such as 3-CMC and 4-CMC, and the semi-synthetic cannabinoid HHC.

Chapter 8: Paracetamol

Paracetamol (also known as acetaminophen) is a medication with analgesic (pain-relieving) and antipyretic (fever-reducing) effects. The substance has no psychoactive effects, but it can be taken in high doses with suicidal intent. Paracetamol is toxic to the liver even in moderate doses. A single over-the-counter package contains enough paracetamol to cause serious poisoning and death. Toxic doses can be even lower in children and adults with various diseases/conditions. Subacute poisonings can also occur if slightly higher than recommended doses are taken over some time.

Liver damage occurs in cases of paracetamol poisoning if adequate treatment with an antidote is not administered early enough. Unfortunately, many underestimate the toxic potential of paracetamol and are unaware that poisoning causes few or no symptoms in the first 10–20 hours after ingestion. After this, the effectiveness of the antidote is minimal. Despite several hundred hospital admissions per year with paracetamol poisoning, the number of fatal poisonings in Norway is fortunately low.

Paracetamol can be purchased over the counter at pharmacies, and since November 2003, it has also been available for sale in grocery stores with a license. Paracetamol can be prescribed by a doctor both alone and in combination preparations with opioids, such as codeine and tramadol. The risk of poisoning increases with prescriptions, as these patients may have chronic pain and use paracetamol in high doses over a long period.

Most concentrations of paracetamol detected in blood samples from autopsies fall within a so-called normal range, where toxic effects are not expected. However, paracetamol poisoning cannot always be ruled out, as the concentration may have been significantly higher at an earlier time point. In such cases, it is the findings from the autopsy rather than the toxicological results that determine whether poisoning with paracetamol could have contributed to death.

Figure 14 shows the development in the number of autopsy cases in which paracetamol was detected in blood samples during the period 2016–2025. The cases are divided into four categories: paracetamol without codeine and tramadol, paracetamol in combination with codeine (without tramadol), paracetamol in combination with tramadol (without codeine), and paracetamol in combination with both codeine and tramadol. The total number of cases with detected paracetamol generally increased from 2016 and reached a peak in 2023, followed by a decline in 2024 and 2025. Throughout the period, the largest proportion consists of cases in which only paracetamol was detected, while combinations with codeine and/or tramadol account for a relatively smaller share. In 2025, paracetamol was detected in approximately 10% of all autopsy cases, representing a slight increase compared with 2016, when the proportion was 9.1%.

In autopsy cases where paracetamol and codeine are detected in the same sample, it is reasonable to assume that a combination product was ingested, as codeine is rarely prescribed alone in Norway. The increase in the proportion of cases with paracetamol detected alone could possibly reflect the increased use of prescription paracetamol in the Norwegian population. Population-adjusted over-the-counter sales have remained stable over the past ten years, while prescription sales have increased markedly during the same period. According to the Norwegian Institute of Public Health (NIPH), 10.6 million packages of paracetamol were sold in 2024, of which 71% were prescription-based[12].

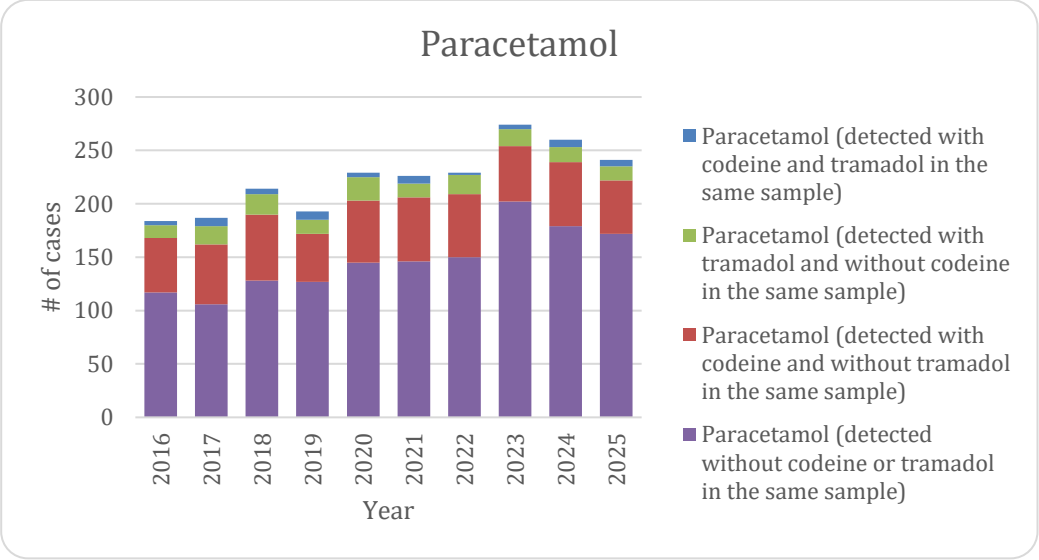

Figure 14: Number of autopsy cases with findings of paracetamol during the period 2016–2025.

[12] Norwegian Institute of Public Health: Over-the-counter drug sales in 2024: https://www.fhi.no/he/legemidler/omsetning-utenom-apotek/reseptfritt-salg-av-legemidler/

Chapter 9: Antidepressants

Antidepressants are used in the treatment of various mental disorders, primarily depression. These medications can cause a range of undesirable side effects, which may vary among the different groups of antidepressants. Tricyclic antidepressants (TCAs), such as amitriptyline, are effective but also highly toxic. Poisoning with TCAs can lead to cardiac arrhythmias, seizures, and depressant effects on the brain (drowsiness and potential respiratory depression).

Newer antidepressants, such as selective serotonin reuptake inhibitors (SSRIs) (e.g., citalopram) and serotonin-norepinephrine reuptake inhibitors (SNRIs) (e.g., venlafaxine), are less toxic and are therefore often preferred as first-line treatment. Additionally, there are several other newer antidepressants on the market (e.g., mirtazapine, mianserin, bupropion, and vortioxetine).

Serotonin syndrome is a potentially lethal condition that can occur with high doses of antidepressants or when multiple drugs and/or substances that affect the brain's serotonergic system are taken simultaneously. Symptoms usually appear quickly, and in severe cases, pronounced muscle rigidity, coma, and high body temperature can occur. Without adequate treatment, this condition can lead to death.

Tricyclic Antidepressants

The detection of tricyclic antidepressants in autopsy samples is important because they are considered the most toxic within the large group of psychopharmacological medications.

Figure 15 shows the most commonly detected tricyclic antidepressants in blood samples from autopsies over the period 2016–2025. The category labeled "others" includes cases in which doxepin, clomipramine, and/or trimipramine were detected in the sample. In 2025, amitriptyline was detected in 2.0% of autopsy cases, nortriptyline (without amitriptyline) in 0.2%, and “others” in 0.4% of cases. These proportions have remained relatively consistent throughout the ten-year period. Approximately 17% of autopsy cases with antidepressants in 2025 involved a tricyclic antidepressant. Data from the Norwegian Institute of Public Health show an increase in the number of users of these medications, from 69,403 in 2016 to 98,452 in 2025, with amitriptyline accounting for nearly 90% of the use[2]. This is reflected in our findings.

Nortriptyline is both a separate medication and a metabolic product of amitriptyline. The detection of nortriptyline alone is assumed to be due to the intake of a medication containing only nortriptyline.

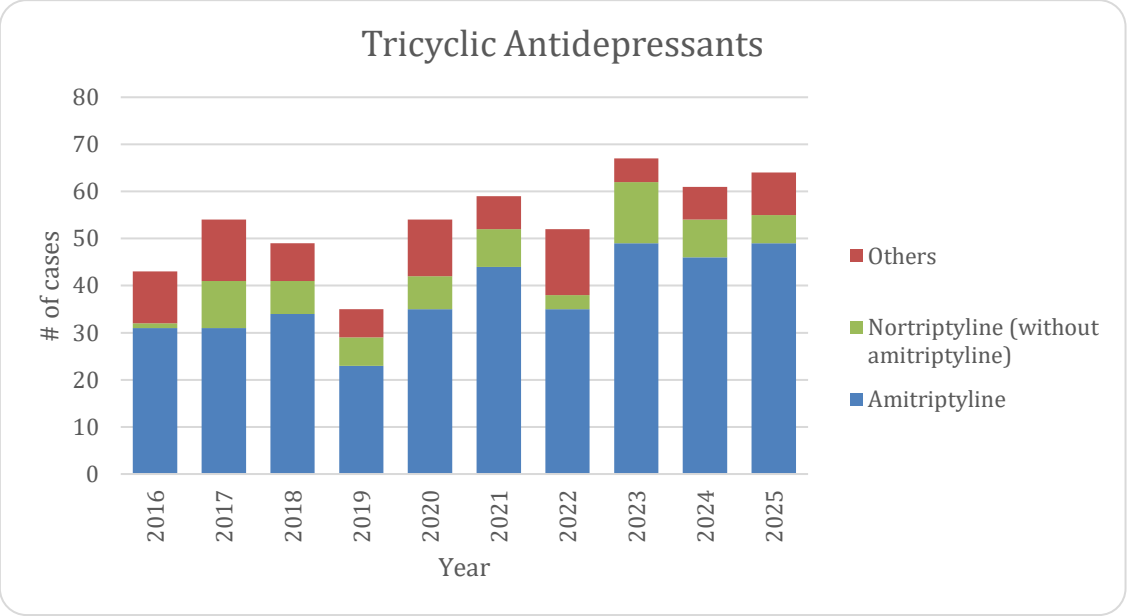

Figure 15: Number of autopsy cases with findings of tricyclic antidepressants during the period 2016–2025. «Others» includes findings of doxepin, clomipramine, and/or trimipramine.

Newer Antidepressants

Among autopsy cases where antidepressants were detected, SSRIs (escitalopram/citalopram, fluoxetine, paroxetine, and sertraline) constituted the largest group, with about 40% of the cases in 2025. In a few cases, multiple antidepressants or SSRIs were detected simultaneously, so the figure may be imprecise.

Figure 16 provides an overview of other antidepressants (excluding tricyclics) detected in blood samples from autopsies during the period 2016–2025. The category "others" includes cases in which bupropion, duloxetine, fluoxetine, and/or paroxetine were detected. The figure shows that findings of newer antidepressants in autopsy cases have increased moderately over time, with a clear peak around 2022–2023, followed by a slight decline in 2024–2025. The overall pattern is dominated by citalopram, mirtazapine, and venlafaxine, which accounted for by far the largest proportions throughout the period, while sertraline and mianserin contributed to a moderate extent. Vortioxetine was introduced to the Norwegian market in 2015, and detections in autopsy cases have remained at a stable and low level throughout the entire 10-year period. Overall, newer antidepressants were detected in approximately 13% of cases and were dominated by more established medications rather than the more recent additions.

Data from the Norwegian Institute of Public Health show a 24% increase in the number of users of newer antidepressants from 2016 to 2025, with approximately 372,000 users in 2025[2]. Citalopram had the highest number of prescription users (126,785 in 2025), followed by mirtazapine (68,511 in 2025)[2]. This distribution does not fully correspond with our findings from autopsy samples, where the number of cases involving each of these substances is nearly equal. Sertraline was the third most commonly used newer antidepressant, with 65,054 unique users in 2025[2].

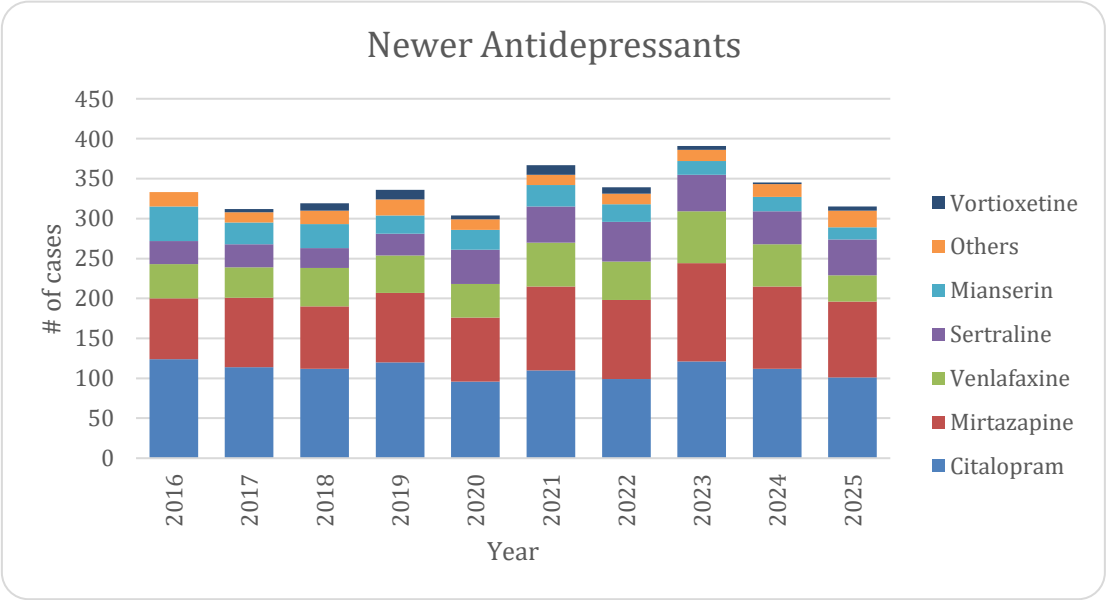

Figure 16: Number of autopsy cases with findings of newer antidepressants during the period 2016–2025. "Others" includes findings of bupropion, duloxetine, fluoxetine, and/or paroxetine.

Chapter 10: Antipsychotics

Antipsychotics are medications used for mental illnesses characterized by hallucinations and delusions. There are two main types of antipsychotics: first-generation antipsychotics (e.g., levomepromazine) and second-generation antipsychotics (e.g., olanzapine). First- and second-generation antipsychotics differ in their effects on various receptor systems in the brain and have somewhat different side effect profiles.

First-generation antipsychotics are known to cause so-called extrapyramidal side effects, which include trembling, uncontrolled movements, and unclear speech (akin to "parkinsonism"). With the use of second-generation antipsychotics, these side effects are less common, but they have stronger sedative effects on the brain and a greater likelihood of weight gain and metabolic side effects. In general, there is a wide range of side effects that can occur with the use of antipsychotics, and effects on heart rhythm and blood pressure, as well as an increased risk of seizures/epilepsy-like attacks, are not uncommon. Malignant neuroleptic syndrome is a rare but severe side effect that can occur with the use of all types of antipsychotics. Characteristics include high body temperature, muscle rigidity, fluctuating blood pressure and pulse, and skeletal muscle damage.

There are significant individual differences in the doses of various antipsychotic medications that can cause side effects, acute toxicity, and mortality.

First-Generation Antipsychotics

Figure 17 shows the first-generation antipsychotics most frequently found in blood samples from autopsies during the period 2016–2025. The "others" category includes cases where flupentixol, haloperidol, perphenazine, prochlorperazine, and/or zuclopenthixol were detected. Throughout this decade, there has been a clear decrease in the number of cases where first-generation antipsychotics were detected. As the total number of cases has significantly increased during the same period, this demonstrates a substantial decrease in the proportion of cases involving these substances. The number of findings in 2025 suggests that these drugs were present in 1.3% of autopsy cases. This represents a 65% decrease since 2016. However, this percentage might be overestimated if the deceased was using multiple such drugs concurrently.

Drug Statistics from the Norwegian Institute of Public Health indicate that there were 157,969 users of antipsychotic medications in Norway in 2025, representing a 33% increase since 2016[2]. Among first-generation antipsychotics, chlorprothixene was the most prescribed, with 8,165 users[2]. Except for haloperidol, which has remained stable in the number of prescription users, the number of prescription users of first-generation antipsychotics has declined since 2016[2].

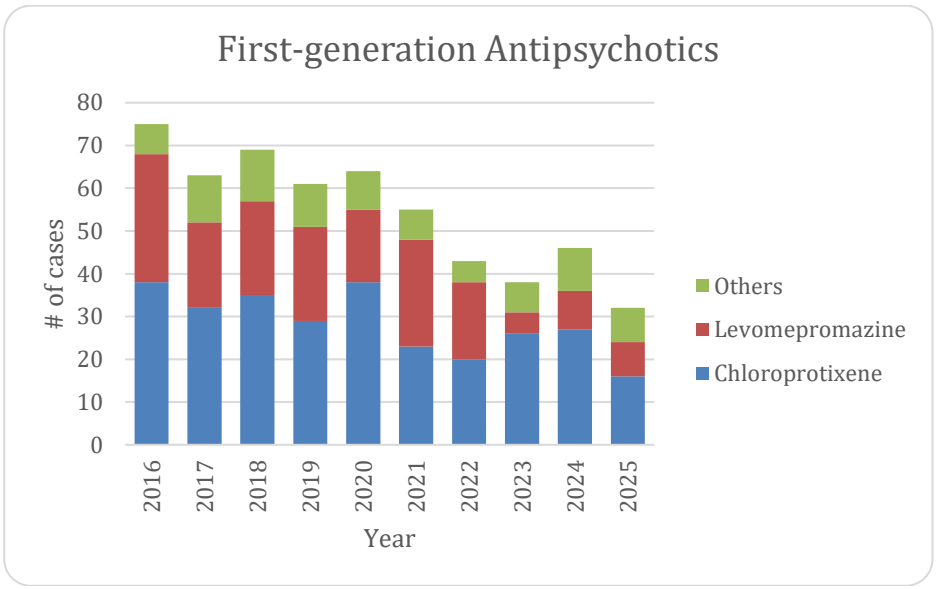

Figure 17: Number of autopsy cases with findings of first-generation antipsychotics during the period 2016–2025. "Others" includes findings of flupentixol, haloperidol, perphenazine, prochlorperazine, and/or zuclopenthixol.

Second-Generation Antipsychotics

Olanzapine and quetiapine are by far the most common antipsychotic drugs detected in autopsy cases. Together, these two substances accounted for approximately 77% of all cases involving antipsychotics in 2025, but the estimate may be inaccurate because a small number of individuals may have used multiple antipsychotics.

Figure 18 shows the second-generation antipsychotics most frequently found in blood samples from autopsies during the period 2016–2025. The category labeled "others" includes cases in which aripiprazole, clozapine, and/or risperidone were detected in the autopsy sample. There has been nearly a doubling in findings of second-generation antipsychotics over this 10-year period, while the number of cases involving first-generation antipsychotics has decreased (see Figure 17). Quetiapine appears to account for the majority of this increase, showing an approximately doubled occurrence during the period and representing the largest share of the growth. However, the overall proportion has remained relatively unchanged, as second-generation antipsychotics have been detected in approximately 9% of autopsy samples throughout the ten-year period.

Drug Statistics from the Norwegian Institute of Public Health show that quetiapine accounted for 64% of all users of antipsychotic medications in Norway in 2025, with 100,520 individuals having received at least one dispensation of this drug from a pharmacy[2]. The number of quetiapine users has doubled from 2016 to 2025, increasing from 47,815 users in 2016. By comparison, there were 22,183 users of olanzapine in 2025, making it the second most frequently dispensed drug in this category. This indicates that the relative difference between these drugs is greater in autopsy cases than in the general population.

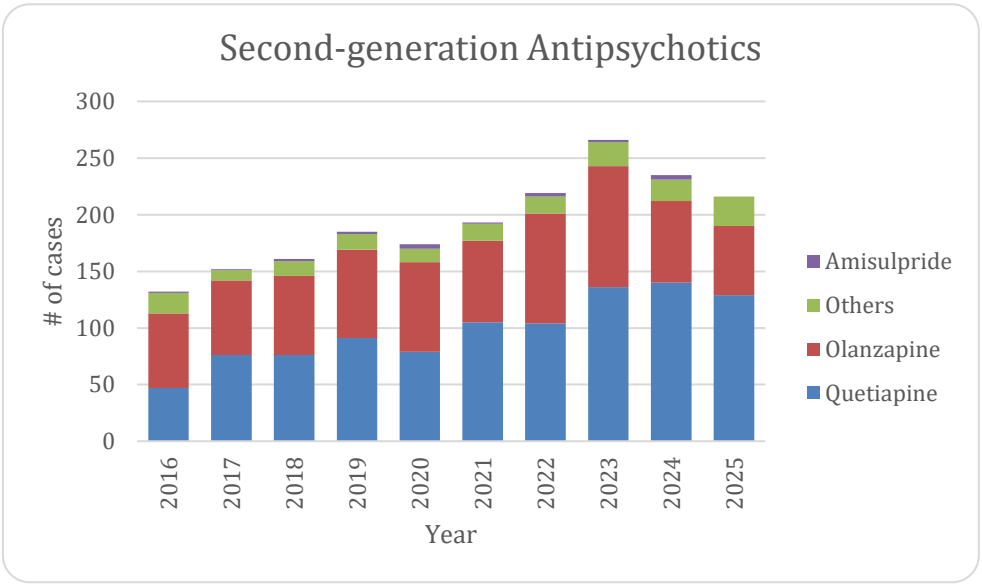

Figure 18: Number of autopsy cases with findings of second-generation (atypical) antipsychotics during the period 2016–2025. "Others" includes findings of aripiprazole, clozapine, and/or risperidone.

Chapter 11: Pregabalin and Gabapentin

Pregabalin and gabapentin were originally classified as "newer antiepileptics," a term used for medications introduced after the year 2000 for the treatment of epilepsy. These drugs aim to stop, prevent, or reduce the frequency of epileptic seizures (convulsions) and/or absences (brief loss of consciousness) caused by disturbed electrical activity in the brain. As clinical experience has shown that these drugs are now primarily used to treat neuropathic pain (pain originating in the nervous system), they were reclassified in 2023 as gabapentinoids (under the category of other analgesics). The medications are also used for other conditions, and pregabalin has documented effectiveness for anxiety disorders. These drugs are usually taken in tablet/capsule form or as an oral solution.

The most common side effects of pregabalin are dizziness and drowsiness, weight gain, swelling, dry mouth, and constipation. Gabapentin has side effects including reduced alertness and concentration, coordination disorders, tremors, speech disturbances, visual disturbances, and double vision. Additionally, gabapentin use can cause upper gastrointestinal discomfort, swelling, reduced production of white blood cells, and itching.

Serious intoxications and fatalities from these medications alone are rare. However, concurrent use of multiple types of medications (including other analgesics, antiepileptics, or sedatives) can lead to interactions. Such reactions can cause serious and potentially fatal side effects. For example, the risk of respiratory depression (potentially respiratory arrest) is markedly increased when gabapentin and/or pregabalin are combined with alcohol and/or other depressants. Additionally, there have been reports of increased incidence of suicidal thoughts and related behavior associated with the use of this group of medications. Misuse and addiction to pregabalin and gabapentin occur, partly because these drugs can enhance the intoxicating effects of other substances taken simultaneously.

Treatment with gabapentinoids requires careful medical follow-up to achieve optimal pain relief and reduce side effects. The effect varies considerably between individuals, and it is therefore common to try different dosages or preparations before identifying the optimal treatment for each patient.

Figure 19 shows the prevalence of pregabalin and gabapentin in blood samples from autopsies during the period 2016–2025. Pregabalin and gabapentin were together detected in about 9.0% of autopsy cases in 2025. Combination intake can occur, so the number may be somewhat overestimated.

Pregabalin has been the most frequently detected substance in this group in autopsy cases since 2012, being found in 5.6% of cases in 2025 compared with 3.6% in 2016. The proportion of cases with gabapentin has also risen, from 1.6% in 2016 to 3.5% in 2025.

Drug Statistics from the Norwegian Institute of Public Health show that there were a total of 120,095 prescription users of these medications in 2025, representing a twofold increase from 2016, when 61,265 individuals had received at least one dispensation through a pharmacy[2]. Throughout the entire period, more individuals received gabapentin than pregabalin on prescription, and this difference has gradually increased. In 2016, there were 1.8 times as many prescription users of gabapentin as pregabalin, whereas by 2025, the difference had increased to 2.8 times[2]. Figure 19 shows an inverse relationship between the substances, which may indicate a degree of non-medical or illicit use of pregabalin.

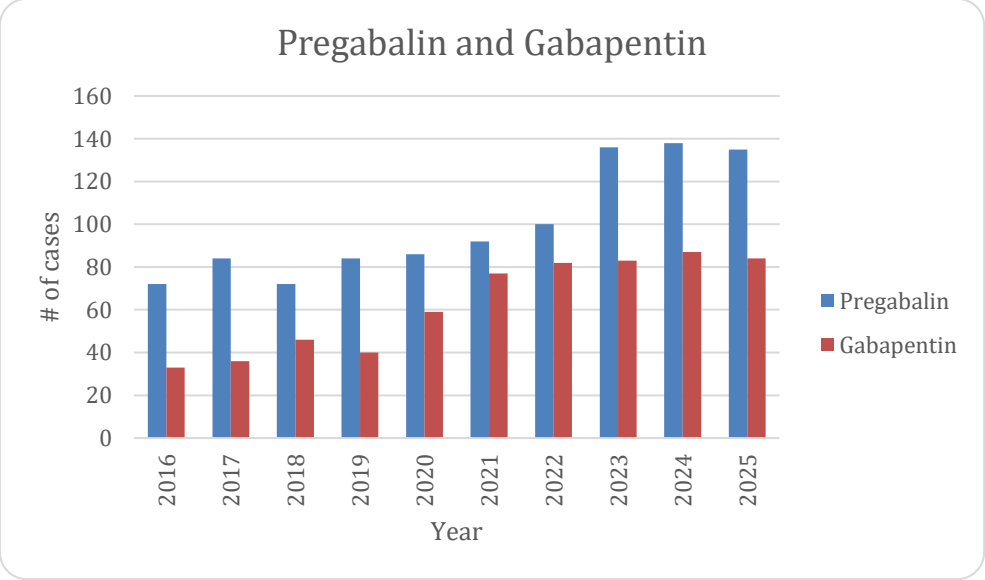

Figure 19: Number of autopsy cases with findings of pregabalin and gabapentin during the period 2016–2025.

Chapter 12: Antihistamines

Antihistamines are medications primarily used for allergies. They counteract symptoms such as itching, sneezing, and a runny nose and watery eyes. Antihistamines can be administered locally, in the form of nasal sprays or eye drops, but these only affect nasal and eye symptoms. The medications can also be administered systemically (to the whole body) in the form of tablets, oral solutions, or injections. In this form, they also address other more general symptoms, such as allergic asthma, itching of the throat, and hives (itchy skin swellings).

Regarding systemic use, it is common to differentiate between first-, second-, and third-generation antihistamines. Examples of first-generation antihistamines are alimemazine, dexchlorpheniramine, and promethazine, while examples of second-generation antihistamines are cetirizine, loratadine, and ebastine. Third-generation antihistamines include desloratadine and levocetirizine. The primary difference between these groups is the degree of central nervous system effects. First-generation antihistamines have pronounced effects on the brain, typically causing sedation or drowsiness. This occurs to a lesser extent with second-generation antihistamines and to a negligible extent with third-generation antihistamines. First-generation antihistamines, in particular, can therefore affect driving ability. In some allergic conditions, this sedative side effect may be desirable, for example in children who cannot sleep due to itching. First-generation antihistamines also affect other systems in the brain, leading to side effects such as dry mouth, constipation, and dizziness. These side effects, however, make antihistamines (especially first-generation) useful for other conditions, such as nausea, motion sickness, and sleep difficulties. Because of their more pronounced side-effect profile, this report focuses primarily on first-generation antihistamines.

Concurrent use of alcohol, medications, and/or other substances with sedative effects on the brain will enhance the sedative effect of antihistamines.

In 2025, 921,157 individuals in Norway received at least one prescription for an antihistamine in tablet or oral solution form[2].

First-Generation Antihistamines

At Oslo University Hospital (OUS), alimemazine, dexchlorpheniramine, and promethazine (first-generation antihistamines) are routinely analyzed in autopsy samples.

Figure 20 shows findings of alimemazine, dexchlorpheniramine, and promethazine in blood samples from autopsies during the period 2016–2025.

Alimemazine is mainly prescribed for sleep disorders, anxiety, alcoholism, and substance abuse. Following the withdrawal of the medicinal product Vallergan (alimemazine) on 1 January 2021, a clear decrease in detections in autopsy cases was observed, with proportions of 2.4% in 2021 and 2.3% in 2022, compared with a previous level of 3–4% over the decade. After a new alimemazine product (Alimemazine Evolan) was reintroduced on 27 March 2023, the prevalence increased somewhat in 2023 and 2024. In 2025, the proportion returned to 2.4%. The proportion of cases with detected promethazine has remained largely unchanged over the past decade and was below 0.5% in 2025.

In 2025, alimemazine was dispensed to 44,486 individuals, while promethazine had 15,212 prescription users and dexchlorpheniramine had 1,977 prescription users[2]. Of these, only promethazine has shown an increase in the number of users since 2016, when 6,798 individuals collected at least one dispensation from a pharmacy[2].

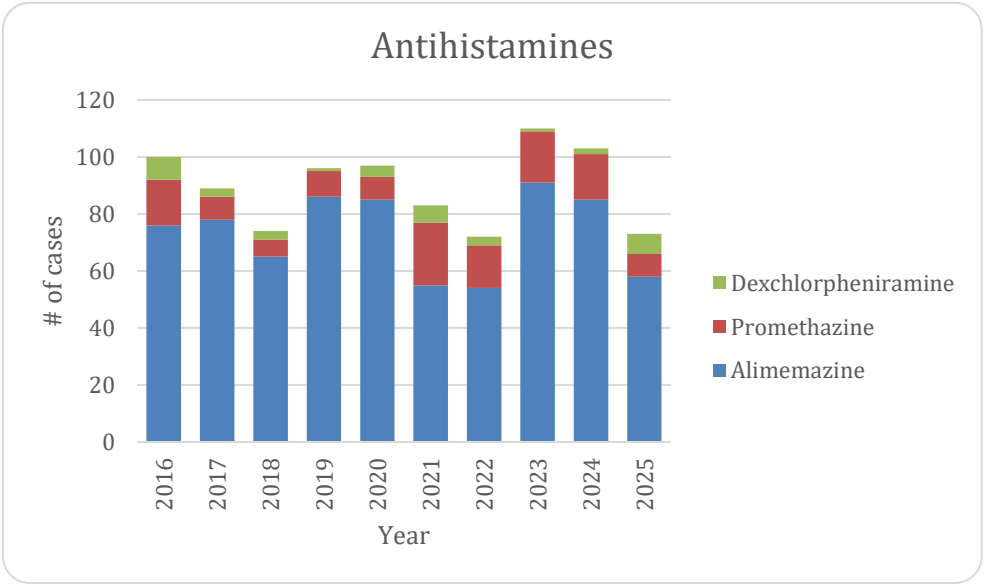

Figure 20: Number of autopsy cases with findings of antihistamines during the period 2016–2025.

Chapter 13: Metoprolol (beta-blocker)

Beta-blockers are medications used for various conditions affecting the heart and blood vessels, such as high blood pressure, angina pectoris ("chest pain"), arrhythmias, heart failure, and post-heart attack care. They are also used for other conditions like essential tremor (shaking). There are several medications within the beta-blocker group. Over the past nine years, the Department of Forensic Sciences has routinely analyzed for metoprolol and propranolol. Propranolol is very rarely detected and is not further discussed.

Beta-blockers reduce the effects of several signaling substances released during stress responses. Since these medications counteract certain bodily reactions to nervousness and stress, misuse of these substances can occur. The World Anti-Doping Agency (WADA) still includes beta-blockers on its most recent update of the Prohibited List as of January 1, 2026. These medications are thus prohibited both in and out of competition in certain sports and are considered doping agents in that context.

The side effects of using beta-blockers often depend on the dose and can vary between individuals. Some of the most common side effects include cold hands and feet, low pulse, fatigue, sleep disturbances, nausea, and diarrhea.

In autopsy cases where metoprolol is detected, it is often assumed that this is a result of prescribed medication use and not necessarily relevant to the cause of death. However, poisoning with beta-blockers can occur. Symptoms of poisoning typically include low pulse and low blood pressure. If the poisoning is severe, it can lead to circulatory failure (the circulation does not meet the body's needs). The risk of poisoning is particularly dependent on health status and underlying heart disease. The type and amount of medication taken also matter. For example, metoprolol is considered less toxic than propranolol.

Figure 21 shows the number and proportion of cases in which metoprolol was detected in blood samples from autopsies conducted during the period 2016–2025. In 2025, metoprolol was detected in 88 autopsy cases, corresponding to 3.6% of cases. Over the past ten years, the number of individuals prescribed metoprolol has remained stable at approximately 300,000 annually[2].

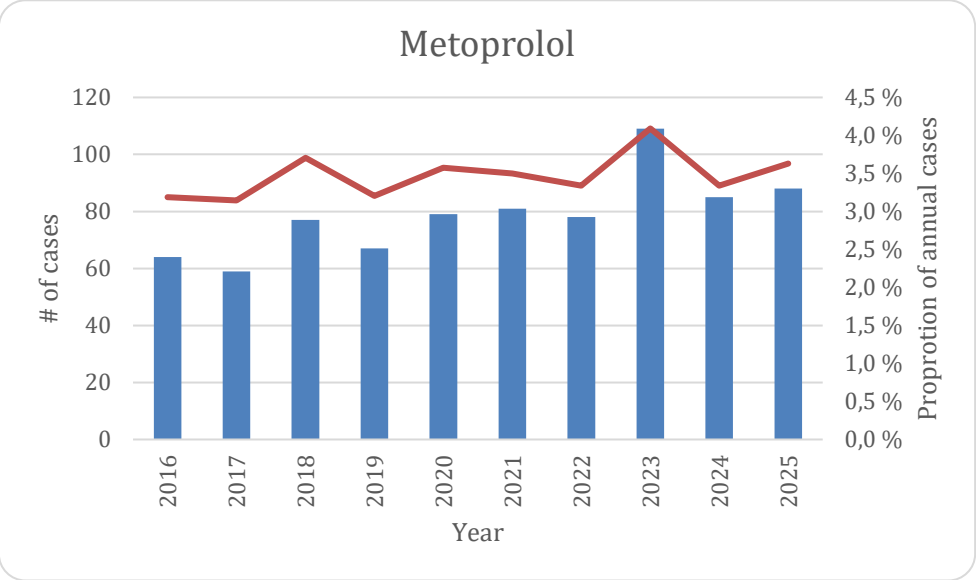

Figure 21: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of metoprolol during the period 2016–2025.

Chapter 14: Carbon Monoxide (CO)

Carbon monoxide (CO) is a highly toxic gas that is colorless, odorless, and tasteless. CO is produced by the combustion of carbon-containing materials. In an enclosed space with no or limited ventilation, the concentration of CO will increase, leading to poisoning that may go unnoticed. Potential sources of CO poisoning include cigarettes, fires, propane-powered devices, exhaust fumes, and charcoal grills.

CO poisoning occurs because hemoglobin (Hb) in red blood cells, which transports oxygen in the blood, binds to CO instead, forming carboxyhemoglobin (COHb). The severity of the poisoning is determined by the proportion of hemoglobin's oxygen-binding capacity that is blocked by CO. There are also several other complex mechanisms behind the toxic effects of CO.

COHb is considered present when the proportion exceeds 5% in the blood. Severe and fatal poisonings have been reported at COHb levels of 40% or higher. COHb levels of 10–35% will result in poisoning reactions but are usually not considered fatal. However, individuals with lower tolerance for CO (infants, pregnant women, the elderly, and those with heart/lung disease) can experience life-threatening and fatal poisonings at lower levels.

Previously, COHb was only analyzed when CO poisoning was suspected, but since 2020, it has been routinely analyzed in all autopsy cases at the Department of Forensic Sciences. This is to detect any unknown CO sources. In cases without suspicion of CO poisoning where a high level of COHb is detected, the requesting party is promptly notified of the analytical finding to prevent further poisonings from the same CO source.

COHb was detected in 41 cases, representing 1.7% of autopsy cases, in 2025 (Figure 22).

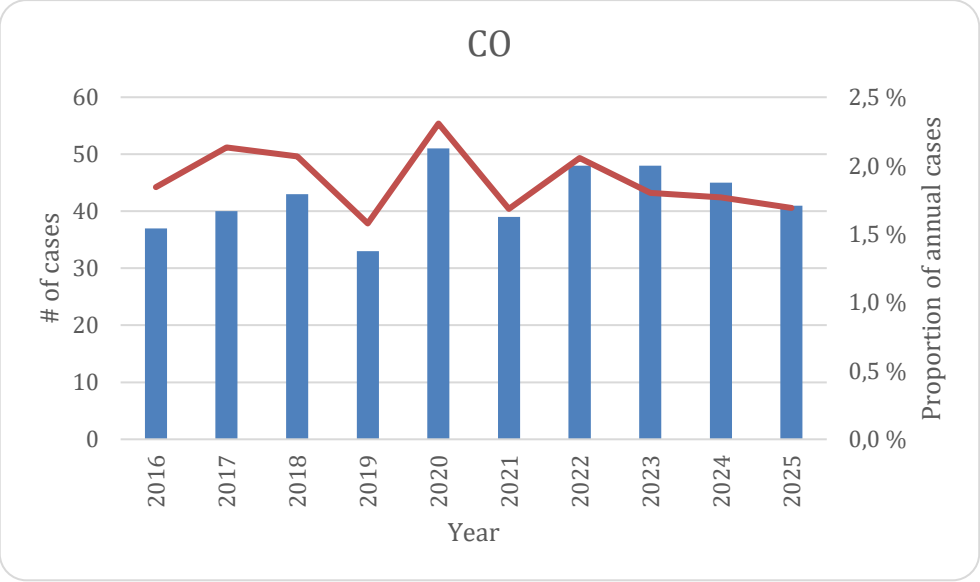

Figure 22: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of CO during the period 2016–2025. Note that carbon monoxide has been analyzed in all autopsy cases since 2020, whereas before then it was only analyzed when CO poisoning was suspected.

Chapter 15: Ketamine

Ketamine is a dissociative anesthetic agent, meaning it induces a state of detached consciousness, characterized by a sense of separation from one's body, senses, or environment. It has both analgesic (pain-relieving) and anasthetic properties. The substance has been used as a medicinal anesthetic for several decades. Unlike most other general anesthetics, ketamine causes minimal respiratory depression and tends to preserve cardiovascular stability, including maintaining blood pressure. These characteristics make it particularly valuable in emergency medical settings. In recent years, there has been increasing interest in the use of ketamine for the treatment of psychiatric disorders. In 2025, the Norwegian Decision Forum for New Methods approved the use of ketamine within specialist health services for patients with treatment-resistant depression. A nasal spray containing esketamine (one of the two enantiomers [mirror-image forms] of ketamine, has held marketing authorization in Norway for the treatment of depression since 2020.

Ketamine also possesses properties that contribute to its recreational use. At low doses, its effects may resemble those of alcohol, including sedation and mild euphoria. At higher doses, ketamine produces more pronounced dissociative effects, often accompanied by hallucinogenic experiences and sensations of detachment from the body. At very high doses, the drug can induce profound dissociation, during which the user may become unresponsive to external stimuli (commonly referred to as a "K-hole"). As of 1 January 2026, both ketamine and esketamine are listed as controlled substances under the Norwegian narcotics regulation (narkotikaforskriften).

The adverse effects of ketamine are dose-dependent and include increased heart rate and blood pressure, elevated intracranial pressure, hallucinations, confusion, nausea, and increased salivation. With repeated and frequent use over time, cognitive impairments may develop, including reduced memory and concentration. Long-term misuse is also associated with urinary tract complications, including ketamine-induced cystitis, characterized by pain, frequent urination, and, in severe cases, irreversible damage to the bladder wall. The risk of fatal poisoning from ketamine alone is considered low compared with opioids and many other substances; however, the risk increases significantly when combined with other central nervous system depressants. Ketamine use may also lead to dependence.

Figure 23 presents the number and proportion of cases in which ketamine was detected in blood samples from autopsies during the period 2016–2025. Ketamine was detected in 3.3% of autopsy cases in 2025. The number of cases with detected ketamine has approximately doubled from 2016 to 2025, while the proportion has increased from 2.2% to 3.3% of all autopsy cases. Kripos reports that, in recent years, ketamine has been seized with increasing frequency and in larger quantities in Norway[3]. The European Union Drugs Agency (EUDA) also reports increasing availability of ketamine in Europe, suggesting that the substance may have become an established recreational drug in certain environments[13].

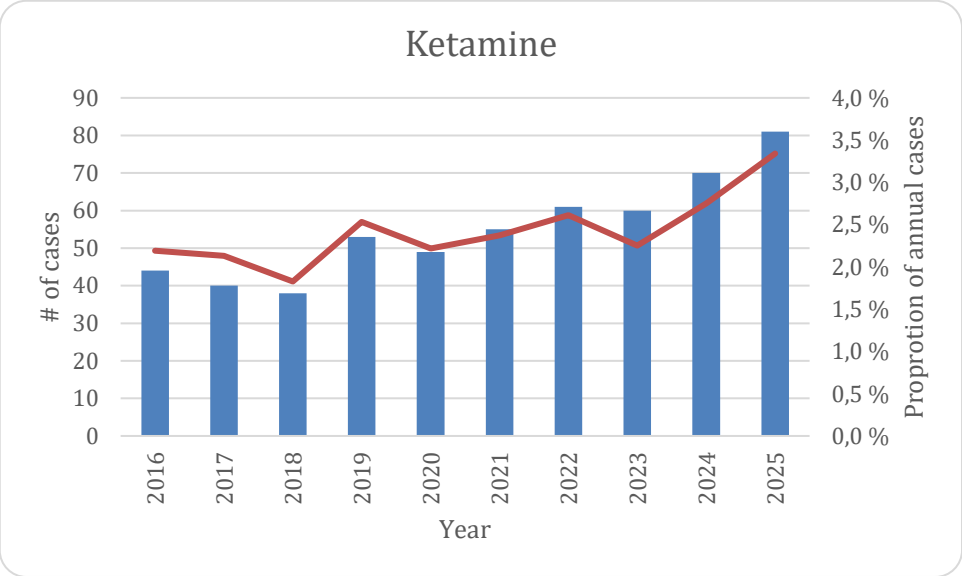

Figure 23: Number of autopsy cases (bars) and proportion of annual autopsy cases (line) with findings of ketamine during the period 2016–2025.

[13] Other drugs – the current situation in Europe (European Drug Report 2025): https://www.euda.europa.eu/publications/european-drug-report/2025/other-drugs_en

Chapter 16: Regional overview

Below is an overview of the ten most frequently detected substances in blood samples from autopsies conducted in 2025 across various regions of Norway. Ethanol tops the list in all regions. Furthermore, diazepam, paracetamol, and THC are among the most commonly detected substances in every region.

Oslo (n = 1,436)

Table 2: Most common substances detected in blood samples from autopsies from Oslo in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	275	19
2	Morphine**	*Dolcontin, Malfin, Oramorph*, heroin	157	11
3	Diazepam	*Stesolid, Vival, Valium*	146	10
4	Paracetamol	*Paracet, Panodil, Paramax, Pinex*	137	9.5
5	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	136	9.5
6	THC	Tetrahydrocannabinol, cannabis, *Sativex*	120	8.4
7	Zopiclone	*Imovane, Zopitin*	109	7.6
8	Fentanyl	*Abstral, Durogesic, Instanyl, PecFent*	99	6.9
9	Alprazolam	*Xanor*	96	6.7
10	Codeine***	*Altermol, Paralgin Forte, Paramax Comp, Pinex Forte*	84	5.8

* Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death. ** Morphine can be formed in the body after the intake of heroin, codeine, and ethylmorphine. Consumption of these substances can therefore also contribute to morphine-positive cases. *** Codeine is found in opium/heroin and can be detected in small amounts after heroin intake.

Bergen (n = 292)†

Table 3: Most common substances detected in blood samples from autopsies from Bergen in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	56	19
2	Paracetamol	*Paracet, Panodil, Paramax, Pinex*	33	11
3	Morphine**	*Dolcontin, Malfin, Oramorph*, heroin	31	11
4	Diazepam	*Stesolid, Vival, Valium*	28	9.6
5	Zopiclone	*Imovane, Zopitin*	22	7.5
6	Alprazolam	*Xanor*	21	7.2
7	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	20	6.8
8	Pregabalin	*Lyrica*	18	6.2
9	Quetiapine	*Seroquel, Quetiapin(e)*	18	6.2
10	Methadone	*Metadon*	17	5.8

* Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death. ** Morphine can be formed in the body after the intake of heroin, codeine, and ethylmorphine. Consumption of these substances can therefore also contribute to morphine-positive cases. †We have summarized figures and proportions from the Gades Institute and the Department of Pathology at Haukeland University Hospital; therefore, the data may be subject to minor inaccuracies.

Stavanger (n = 243)

Table 4: Most common substances detected in blood samples from autopsies from Stavanger in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	41	17
2	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	26	11
3	Diazepam	*Stesolid, Vival, Valium*	22	9.1
4	Phosphatidylethanol (PEth 16:0/18:1)****	Direct biomarker used to detect and assess alcohol consumption over the past 2–4 weeks	22	9.1
5	Alprazolam	*Xanor*	21	8.6
6	Quetiapine	*Seroquel, Quetiapin(e)*	20	8.2
7	THC	Tetrahydrocannabinol, cannabis, *Sativex*	16	6.6
8	Morphine**	*Dolcontin, Malfin, Oramorph*, heroin	15	6.2
9	Paracetamol	*Paracet, Panodil, Paramax, Pinex*	15	6.2
10	Pregabalin	*Lyrica*	15	6.2

* Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death. ** Morphine can be formed in the body after the intake of heroin, codeine, and ethylmorphine. Consumption of these substances can therefore also contribute to morphine-positive cases. ****Not routinely performed but can be carried out upon specific request from the referring forensic pathologist.

Tromsø (n = 155)

Table 5: Most common substances detected in blood samples from autopsies from Tromsø in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	39	25
2	THC	Tetrahydrocannabinol, cannabis, *Sativex*	18	12
3	Paracetamol	*Paracet, Panodil, Paramax, Pinex*	17	11
4	Morphine**	*Dolcontin, Malfin, Oramorph*, heroin	16	10
5	Diazepam	*Stesolid, Vival, Valium*	14	9.0
6	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	12	7.7
7	Zopiclone	*Imovane, Zopitin*	10	6.5
8	Quetiapine	*Seroquel, Quetiapin(e)*	8	5.2
9	Codeine***	*Altermol, Paralgin Forte, Paramax Comp, Pinex Forte*	7	4.5
10	Metoprolol	*Selo-Zok, Seloken, Bloxazoc*	7	4.5

* Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death. ** Morphine can be formed in the body after the intake of heroin, codeine, and ethylmorphine. Consumption of these substances can therefore also contribute to morphine-positive cases. *** Codeine is found in opium/heroin and can be detected in small amounts after heroin intake.

Bodø (n = 95)

Table 6: Most common substances detected in blood samples from autopsies from Bodø in 2025.

	Substance	Examples of *Norwegian medication names*/drugs	Total number in 2025	Proportion in 2025 (%)
1	Ethanol*	Alcohol	15	16
2	Amphetamines	*Attentin, Elvanse, Aduvanz, Balidax,* meth(amphetamine)	11	12
3	Paracetamol	*Paracet, Panodil, Paramax, Pinex*	11	12
4	THC	Tetrahydrocannabinol, cannabis, *Sativex*	10	11
5	Zopiclone	*Imovane, Zopitin*	9	9.5
6	Metoprolol	*Selo-Zok, Seloken, Bloxazoc*	8	8.4
7	Fentanyl	*Abstral, Durogesic, Instanyl, PecFent*	7	7.4
8	Pregabalin	*Lyrica*	7	7.4
9	Alprazolam	*Xanor*	6	6.3
10	Diazepam	*Stesolid, Vival, Valium*	5	5.3

*Detection of ethanol together with metabolites EtG and/or EtS indicates alcohol consumption before death.

OSLO UNIVERSITETSSYKEHUS
91 50 27 70
www.oslo-universitetssykehus.no
E-post: post@oslo-universitetssykehus.no
Postadresse: Oslo universitetssykehus HF,
Postboks 4950 Nydalen, 0424 OSLO