

## Peculiarities of Modern Expert and Forensic Studies of "Criminal Drugs", Abuse of Which Leads to Addiction

**Natalia Titova** (Head of the Materials, Substances and Products Research Department of the Luhansk Scientific and Research Expert Forensic Center of the Ministry of Internal Affairs of Ukraine, Ukraine)

\*Corresponding author: Natalia Titova

Received: December 08, 2023

Published: January 07, 2024

**Abstract.** The objective of this research was to delve into the unique aspects of the distribution and handling of psychoactive substances, often referred to as "criminal drugs," in the context of forensic and forensic pharmaceutical examinations. This study involved an in-depth analysis of the experiences of United Nations experts in relation to the rising trend of adolescent addiction, particularly focusing on the misuse of psychoactive substances that fall under various classification and legal categories, such as narcotics, psychotropics, and precursors. Special attention was given to the investigation of altered psychoactive substances that are found in combination drugs containing codeine or ephedrine. Additionally, the research examined the intricacies involved in conducting expert criminological, forensic, and pharmaceutical studies on these modified psychoactive substances that are often the

subject of forensic investigations. This included exploring the methods and techniques used in these studies, the challenges faced by experts in identifying and analyzing these substances, and the implications of their findings for legal and regulatory frameworks. By understanding these peculiarities, the research aimed to contribute to more effective strategies for managing and controlling the misuse of psychoactive substances, as well as to enhance the accuracy and reliability of forensic investigations in this area. This comprehensive approach to studying psychoactive "criminal drugs" is essential for developing a deeper understanding of their impact on society and the legal system.

**Keywords:** forensic sciences, criminology, forensic pharmacy, psychoactive substances, "criminal drugs", illegal trafficking, addiction, pharmaceutical and medical law.

**Introduction.** United Nations experts point out that it is adolescence and the transition to adulthood that is a risky period for a minor child. It is characterized by independence from parents, teachers and a desire for close ties with peers, friends and unfamiliar citizens [1]. This age range in a minor child is also characterized by: lack of life experience; the desire to experiment with the implementation of new ideas, lifestyles, solutions; by making a choice that does not always turn out to be correct and not criminal.

Experiments that become part of the life of a minor often lead to uncertain results. Encourage some of the young people to abuse psychoactive substances (tobacco products, alcoholic and energy drinks, drugs with psychoactive properties, etc.). The use of psychoactive substances of various classification and legal groups is a means of escape from situations associated with physical or psychoneurological stress [2-8]. Excessive use of psychoactive substances leads to the formation of addiction with negative consequences [8, 9]:

- many negative physiological and psychological consequences for life and health;
- continues to be a youth strategy to overcome various socio-economic, criminal and legal, medical and pharmaceutical, and psycho-emotional problems.

The conclusions mentioned by UN experts are confirmed by data in Ukraine. In recent years, a negative trend has been observed regarding the increase in the number of discovered facts of non-medical use of psychoactive drugs of certain classification and legal groups ("criminal drugs") [10-19].

At the same time, minors and young people, due to various circumstances (conflicts, injuries, gambling addiction) and diseases (covid, post-covid, long-covid), avoid official contact with certified doctors, undergo a medical examination, and make decisions about self-treatment or abuse of "criminal drugs". Abuse of psychoactive drugs – "criminal drugs" by minors and young people leads

to the spread of addiction, polydrug addiction, and crime. Abuse of psychoactive drugs is dangerous for the life and health of citizens, their rights and freedoms [20-27].

The study of the problems of drug crime, addiction, pharmacotherapy of addictions is described in the publications of Linskyi I.V., Shapovalova V.O., Sosin I.K., Shapovalova V.V., Osyntseva A.O., Negretskii S.M., Ponomarenko M.S., Gudzenko A.O., and many other scientists [6, 14-19, 23-29].

**The purpose of the study** was to carry out expert forensic and forensic pharmaceutical research of the peculiarities of the circulation of psychoactive drugs – "criminal drugs", as in modern conditions, it is becoming more and more important.

**Materials and methods.** During the research of "criminal drugs", the following methods were used:

- method of drop analytical reactions;
- method of ascending thin-layer chromatography (TLC);
- method of spectroscopy in the UV and visible range of the spectrum;
- method of liquid chromatography (LC);
- gas chromatography method with mass-selective detection (GC-MS).

During the generalization of the obtained results, documentary, legal, retrospective, and systematic methods of analysis were used.

**Results and discussion.** According to the forensic and pharmaceutical monitoring data provided in the Regional Comprehensive Program for the Prevention of Addictions and Their Social Consequences among Children in the Dnipropetrovsk Region for 2022-2026, it was noted that [30, 31]:

- ✓ every third drug crime is committed in Dnipropetrovsk region;
- ✓ the cities of Dnipro, Kryvyi Rih, Ternivka, and Pavlograd are particularly dangerous;
- ✓ conducted anonymous survey of students of grades 7-11 shows that the first consumption of narcotics occurs at the age of 12-13, and by the age of 14-15 it develops into physiological and mental dependence;
- ✓ in fact, the formation of physiological and mental dependence becomes a driving force for the commission of drug and other crimes in the future;
- ✓ in recent years, the number of minor users of narcotic drugs and psychotropic substances from completely prosperous families has been increasing;
- ✓ on average, the increase in the number of users of psychoactive substances is 2-5% per year;
- ✓ cases of sale of narcotic drugs and psychotropic substances in educational institutions of I-III degrees, including elite ones, became not isolated.

Regular, dangerous use of psychoactive substances among adolescents and young people can lead to [32-35]:

- problems in education, at work;
- socio-economic problems;
- legal (criminal) problems;
- physical or mental dependence (hangover, addiction);
- unwanted, unplanned and unprotected sexual activity;
- physical and sexual violence;
- increased risk of suicides and murders;
- traffic accidents (domestic injuries), bodily injuries of various degrees of severity;
- problems with memory, vision, hearing, blood circulation, heart, liver, behavioral, mental reactions;
- poisoning of varying degrees of severity according to forensic medical assessment
- disability.

Forensic pharmaceutical practice of objects sent for research to the Department of Materials, Substances and Products of the Research Expert Forensic Center of the Ministry of Internal Affairs of Ukraine in the east of the country shows the wide spread among minors and young people of new types of prohibited psychoactive narcotic drugs and psychotropic substances [36, 37]. New types of

banned psychoactive narcotics and psychotropic substances are obtained by recovery (modification, synthesis) from "criminal drugs" (pharmacy) using vinegar, gasoline, window cleaners, pipe cleaners, and precursors [38-44].

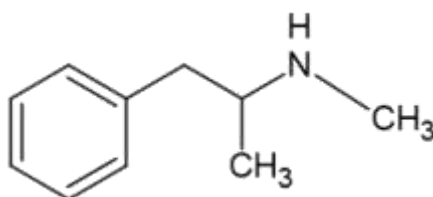
Among the modified psychoactive substances from "criminal drugs" we will define [5, 42-43]:

- desomorphine ("crocodile") – by recovering codeine from psychoactive combined drugs (sedalgin, coderpin IS, pengalgin H, codepsin, cofex, codelac, etc.);
- pervitin and ephedrone – by modifying ephedrine from psychoactive combined drugs (broncholitin, theophedrine, etc.).

The easy availability of psychoactive "criminal drugs" for purchase at a pharmacy without a doctor's prescription is combined with the relative ease of their modification. In particular, desomorphine is modified from psychoactive combination drugs with codeine. According to forensic pharmaceutical monitoring, the spread of desomorphine addiction has been widespread in recent years. The action of desomorphine is comparable to the action of heroin. However, desomorphine is 15 times more toxic than heroin, it is very dangerous, as addiction states quickly arise [45, 46]. According to the classification and legal, clinical and pharmacological characteristics of desomorphine:

- narcotic analgesic;
- analgesic effect is similar to that of heroin, morphine;
- has greater narcotic potential than heroin, morphine;
- the minimum lethal dose for a person is 200 mg.

Illegally produced in drug laboratories [3] by an artisanal (self-made) method, desomorphine is extremely dangerous for human life and health, as it contains a whole complex of toxic compounds. Among the derivatives of phenylethylamine there are synthetic substances that have a very strong physiological effect – amphetamine (phenamine) and methamphetamine (pervitin) [2, 47, 48].



**Fig. 1.** Chemical structure of the methamphetamine molecule. The gross formula is C<sub>10</sub>H<sub>15</sub>N.

Synthesis of methamphetamine (Fig. 1) based on hydroiodic acid and red phosphorus is carried out as follows: 1) heating ephedrine or pseudoephedrine with red phosphorus and hydroiodic acid; 2) the reaction mixture is filtered, alkali is added and extracted with a solvent; 3) the resulting methamphetamine base is an oily liquid, "methamphetamine oil"; 4) methamphetamine hydrochloride is crystallized from this liquid using ether or acetone and hydrochloric acid. D-pervitin, shows a stronger stimulating, euphoric effect. L-pervitin has a lower pharmacological effect. Therefore, D-pervitin is valued higher on the "black drug market" and is more popular among drug users.

Experts face the following tasks during the pre-trial investigation [49]:

- establishing the fact of the presence of a controlled psychoactive substance in the facility;
- detection of layers containing controlled psychoactive substances on the carrier object;
- establishing the identity of psychoactive substances that have the same identification characteristics.

In the process of researching narcotic drugs, psychotropic substances, precursors, diagnostic and identification issues are mostly resolved. Approximate list of issues to be resolved:

- ❖ Do the objects presented for research contain narcotic drugs, psychotropic substances or precursors? If so, which ones exactly, what is their mass (volume)?
- ❖ Do narcotic drugs, psychotropic substances or precursors seized in different places or from persons have a common source of origin?
- ❖ Are the plant samples (plants) provided for research drug-containing plants?

- ❖ Are there narcotic drugs, psychotropic substances, precursors on the presented objects (subjects)? If so, which ones and what is their weight?
- ❖ Do the layers on the objects contain narcotic drugs, psychotropic substances or precursors?
- ❖ Is it possible to manufacture (synthesize) narcotic drugs or psychotropic substances according to the schemes and descriptions of their production, which are set out in the interrogation protocol?

Based on the results of the meeting of the VI Working Group on the Research of Psychoactive Substances within the framework of the project "DIIA-EU: EU measures to combat illegal drug trafficking and organized crime, intensive cooperation and capacity building to combat organized crime in the field of drug trafficking along the "heroin route" were discussed question [50]:

- ✓ strategy of the state policy on drugs until 2030;
- ✓ draft of an order of the Ministry of Health of Ukraine regarding the inclusion of new psychoactive substances discovered in Ukraine as analogues of narcotic drugs, psychoactive substances and precursors.

Today, the practice of conducting forensic examinations of controlled psychoactive substances requires:

- preparation of scientifically based conclusions;
- use of proven research methods;
- ensuring the validity, reliability, completeness, comprehensiveness and reproducibility of examination results.

**Conclusions.** A review of the peculiarities of the circulation of psychoactive "criminal drugs" was carried out in the course of expert forensic and forensic pharmaceutical research. Attention is focused on the experience of UN experts regarding the growth of adolescent addiction when abusing psychoactive substances of classification and legal groups (narcotic, psychotropic, precursors). The data of forensic pharmaceutical monitoring for the period of 2022-2026 were analyzed. The consequences of abuse among teenagers and young people are given. Mentioned about modified psychoactive substances from combined drugs with codeine, ephedrine. Peculiarities of conducting of expert and criminological, forensic and pharmaceutical studies of psychoactive modified objects of forensic examinations have been studied. The need to fulfill the requirements of the current medical and pharmaceutical legislation regarding the circulation of psychoactive drugs based on the principles of medical and pharmaceutical law was noted.

**Conflict of interests.** The author certify that the obtained data and research were conducted in compliance with the requirements of moral and ethical principles based on medical and pharmaceutical law, and in the absence of any commercial or financial relationships that could be interpreted as a potential conflict of interest.

**Funding.** The authors state that this research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors

### References.

1. Substance abuse. UN. 14.11.2023. URL: <https://www.un.org/development/desa/youth/world-programme-of-action-for-youth/substance-abuse.html>
2. Shapovalov V. Interdisciplinary legal, forensic and pharmaceutical, forensic and chemical, forensic and narcological, forensic and toxicological, criminal and legal study of the illegal trafficking of Amphetamine. SSP Modern Law and Practice. 2023. Vol.3. No.3. P.1-14. URL: <https://doi.org/10.53933/sspmlp.v3i3.108>
3. Shapovalov V. Illegal drug laboratories: forensic and pharmaceutical, forensic and expert, forensic and toxicological, forensic and chemical, criminal and legal examination to combat drug trafficking, illegal circulation of prohibited psychoactive substances, morbidity. SSP Modern Law and Practice. 2023. Vol.3. No.2. P.1-19. URL: <https://doi.org/10.53933/sspmlp.v3i2.100>
4. Shapovalov V., Veits O. Forensic and pharmaceutical, criminal and legal, social and economic study of the conditions, that cause bribery corruption in the system of legal relations "doctor-patient-investigator-lawyer". SSP Modern Law and Practice. 2022. Vol.2. No.3. P.1-16. URL: <https://doi.org/10.53933/sspmlp.v2i3.57>

5. Shapovalov V. Forensic pharmacy, organization of pharmaceutical business, drug technology, medical, pharmaceutical, and criminal law: the state system of combating the illegal circulation of narcotic drugs and psychotropic substances and their abuse in pandemic condition. *SSP Modern Law and Practice*. 2022. Vol.2. No.3. P.1-35. URL: <https://doi.org/10.53933/sspmlp.v2i3.66>
6. Osyntseva A. Polydrug addiction: multidisciplinary forensic and pharmaceutical, organizational and legal, and technological study of factors of formation and development. *SSP Modern Pharmacy and Medicine*. 2022. Vol.2. No.4. P.1-14. URL: <https://doi.org/10.53933/ssppmp.v2i4.72>
7. Shapovalova V. The ICD-11 for the twenty-first century: the first view from the organizational, legal, clinical and pharmacological aspects. *SSP Modern Pharmacy and Medicine*. 2022. Vol.2. No.1. P.1–13. URL: <https://doi.org/10.53933/ssppmp.v2i1.37>.
8. Lo T.W., Yeung J.W.K., and Tam C.H.L. Substance abuse and public health: a multilevel perspective and multiple responses. *Int. J. Environ. Res. Public Health*. 2020. Vol. 17. No. 7. P. 2610. DOI: <https://doi.org/10.3390/ijerph17072610>.
9. Sinha R. Chronic stress, drug use, and vulnerability to addiction. *Ann. N.Y. Acad. Sci.* 2008. Vol. 1141. P. 105-130. DOI: <https://doi.org/10.1196/annals.1441.030>.
10. Tkachenko V. Forensic and pharmaceutical, chemical and toxicological analysis of medical drugs and substances in illegal circulation in Ukraine. *SSP Modern Pharmacy and Medicine*. 2023. Vol. 3. No 4. P. 1-10. URL: <https://doi.org/10.53933/ssppmp.v3i4.117>.
11. Non-medical use of medicines: health and social responses. EMCDDA. 20.10.2021. URL: [https://www.emcdda.europa.eu/publications/mini-guides/non-medical-use-of-medicines-health-and-social-responses\\_en](https://www.emcdda.europa.eu/publications/mini-guides/non-medical-use-of-medicines-health-and-social-responses_en)
12. Shapovalov V.V. (Jr.), Shapovalova V.A., Shapovalov V.V. Development of forensic and pharmaceutical researches within the organization of pharmaceutical business, drug technology and pharmaceutical law in Ukraine concerning the turnover of controlled drugs and substances. *Health of Society*. 2021. Vol.10. No.3. P.98-106. URL: <https://doi.org/10.22141/2306-2436.10.3.2021.246351>.
13. Shapovalov (Jr.) V., Gudzenko A., Shapovalova V. et al. Forensic and pharmaceutical analysis of addictive morbidity because of the use of narcotic psychoactive substances in Ukraine (retrospective aspect). *International Journal of Pharmaceutical Sciences and Research*. 2018. Vol. 3. Is.3. July 2018. P.22-25. URL: <http://www.pharmacyjournal.net/archives/2018/vol3/issue3>
14. Shapovalov V. (Jr.), Gudzenko A., Shapovalova V. et al. Concerning the importance of forensic and pharmaceutical researches to improve patients' accessibility to medicines. *Pharmacia*. 2017. Vol.65. No.2. P.23–29. URL: <http://bsphs.org/wp-content/uploads/2017/07/Shapovalov.pdf>.
15. Sosin I.K., Chuev Yu.F., Artemchuk A.P. et al. *Narcology: national textbook*. Kharkiv, Ukraine: Kolegium. 2014. 948 p.
16. Shapovalova V.A., Sosyn I.K., Butenko G.M. et al. *Pharmaceutical law in narcology*. Kharkov: "Fact". 2004. 800 p.
17. Osyntseva A. Organizational and legal study of the state of formation, development and distribution of polydrug addiction in the world and in Ukraine. *SSP Modern Pharmacy and Medicine*. Vol. 1 No. 2 (2021): Volume 1 No. 2 (2021). DOI: <https://doi.org/10.53933/ssppmp.v1i2.26>
18. Shapovalov V.V., Gudzenko A.A., Zbrozhek S.I. et al. Forensic and pharmaceutical analysis of addictive morbidity because of the use of psychotropic psychoactive substances in Ukraine (retrospective aspect). *Annals of Mechnikov Institute*. 2018. N. 3. P. 41–44. DOI: 10.5281/zenodo.1456544. URL: [http://www.imiamn.org.ua/journal/3\\_2018/PDF/9.pdf](http://www.imiamn.org.ua/journal/3_2018/PDF/9.pdf).
19. Shapovalov V.V. (Jr.) Forensic and pharmaceutical study of abuse and developing the principles of reducing the demand for psychoactive substances of different classification and regulatory groups. *Pharmaceutical Journal*. 2019. No. 2. P. 39-47. URL: <https://pharmj.org.ua/index.php/journal/article/view/300>.
20. Shapovalova V.A., Shapovalov V.V., Agapov D.A. Forensic pharmacy: review of the measures to counter the spreading of the psychoactive substances over the Internet. *Pharmaceutical Journal*. 2019. No.3. P.18-21. URL: <https://pharmj.org.ua/index.php/journal/article/view/511/479>.



21. Shapovalova V. Forensic and pharmaceutical risks in the organization of pharmacotherapy of covid, post-covid and long-covid disorders. COVID-19 and vaccination practice standards. SSP Modern Pharmacy and Medicine. 2022. Vol. 2. No.4. P.1-24. DOI: <https://doi.org/10.53933/ssppmpm.v2i4.69>.
22. Shapovalova V.A., Musoiev S.M., Shapovalov V.V. Pharmaceutical law: the UN and the development of international legal norms for the control of narcotic drugs. Problems of continuing medical education and science. 2012. No. 2. P. 71-74. URL: [http://nbuv.gov.ua/UJRN/Psmno\\_2012\\_2\\_17](http://nbuv.gov.ua/UJRN/Psmno_2012_2_17)
23. Shapovalov V. V., Linskiy I. V. Evidence-based pharmacy: definition of the control regime for the medicines in the pharmaceutical correction schemes of the opioid dependence. Pharmaceutical Journal. 2013. No.3. P. 35-40. URL: <https://pharmj.org.ua/index.php/journal/article/view/399>
24. Shapovalov V.V., Linsky I.V. Forensic pharmacy, forensic narcology: scoring method of the predisposing to psychical and behavioral frustrations health by reason of psychoactive substances abusing. Pharmaceutical Journal. 2010. No. 1. P. 36-41. URL: <https://pharmj.org.ua/index.php/journal/article/view/864>
25. Shapovalov V.V., Linsky I.V. Forensic and pharmaceutical study of the pharmacotherapy of opioid withdrawal syndrome among patients-offenders with different levels of opium addiction on a base of evidence based pharmacy. Pharmaceutical Journal. 2012. No.1. P. 20-27. URL: <https://pharmj.org.ua/index.php/journal/article/view/546>
26. Shapovalov V.V., Linsky I.V. Influence of the genetic and environmental components on the addictive dependence development of the drug addicted patients with deviant behavior (forensic and pharmaceutical aspects). 2011. No.5. P. 30-34. URL: <https://pharmj.org.ua/index.php/journal/article/view/585>
27. Shapovalov V., Bondarenko V., Shapovalova V. Forensic pharmacy: expert providing of quality of psychoactive substances which are return from non-legal turn. Pharmaceutical Journal. 2008. No.2. P.54-58. URL: <https://pharmj.org.ua/index.php/journal/article/view/1171>
28. Shapovalova V., Osyntseva A., Shapovalov V. et al. Pharmacognostic, forensic and pharmaceutical, organizational and legal, clinical and pharmacological multidisciplinary study with an assessment of peculiarities of circulation (use) of smoking mixtures of spices and entheogens of amanita muscaria mushroom. SSP Modern Pharmacy and Medicine. 2023. Vol. 3. No 3. P. 1-13. DOI: <https://doi.org/10.53933/ssppmpm.v3i3.105>.
29. Ivanishyn-Hayduchok L., Shapovalova V., Shapovalov V. ICD-11: Organizational and legal, medical and pharmaceutical, social and economic issues of implementation of the program of state guarantees of medical care in 2022 in Ukraine, based on the fundamental principles of the European Union. SSP Modern Pharmacy and Medicine. 2022. Vol.2. No.2. P.1-14. URL: <https://doi.org/10.53933/ssppmpm.v2i2.53>.
30. Regional comprehensive program for the prevention of addictions and their social consequences among children in the Dnipropetrovsk region for 2022-2026. Official website of the Dnipropetrovsk Regional Council. 2022. URL: <https://oblrada.dp.gov.ua/rishennia/%D0%BF%D1%80%D0%BE-%D1%80%D0%B5%D0%B3%D1%96%D0%BE%D0%BD%D0%B0%D0%BB%D1%8C%D0%BD%D1%83-%D0%BA%D0%BE%D0%BC%D0%BF%D0%BB%D0%B5%D0%BA%D1%81%D0%BD%D1%83-%D0%BF%D1%80%D0%BE%D0%B3%D1%80%D0%B0%D0%BC%D1%83-2/>
31. Koptev O. In the Dnipropetrovsk region, the results of the work on combating child drug addiction were summed up and the composition of the coordination council was updated. OpenTVMedia. 24.04.2023. URL: <https://opentv.media/ua/na-dnipropetrovshhini-pidbili-pidsumki-roboti-z-protidiyi-dityachij-narkomaniyi-ta-onovili-sklad-koordinatsijnoyi-radi>
32. Shapovalov V. Suicide among young people in Ukraine and Estonia: interdisciplinary study of the problem in the system of legal relations "doctor-patient-pharmacist-lawyer". SSP Modern Pharmacy and Medicine. 2023. Vol.3. No.3. P.1-16. URL: <https://doi.org/10.53933/ssppmpm.v3i3.106>

33. Shapovalov V.V., Shapovalova V.O. Forensic pharmacy, evidentiary pharmacy and pharmaceutical legislation as components of pharmaceutical law in the program of implementation of state policy in the field of combating crime and violations of the rules of circulation of psychoactive substances for 2011-2017: materials VII International. science and practice conf. (November 19-20, 2010, Kharkiv). Kharkiv. 2010. 190 p.
34. Shapovalova V.O., Shapovalov V.V., Khalin M.M. et al. Pharmaceutical legislation: education. manual with the seal of the Ministry of Education and Culture of Ukraine (series: Pharmaceutical law). Kharkiv. 2010. 142 p.
35. Shapovalova V.V., Shapovalov V.V., Vasina Ju.V. et al. Legislation in pharmacy, forensic pharmacy and evidence-based pharmacy: Study book (series: Pharmaceutical law). Kharkiv. 2011. 160 p.
36. Resolution of the Cabinet of Ministers of Ukraine dated May 06, 2000 No. 770 "On approval of the list of narcotic drugs, psychotropic substances and precursors". Verkhovna Rada of Ukraine. URL: <https://zakon.rada.gov.ua/laws/show/770-2000-%D0%BF#Text>.
37. Order of the Ministry of Health of Ukraine dated August 1, 2000 No. 188 "On approval of tables of small, large and especially large sizes of narcotic drugs, psychotropic substances and precursors that are in illegal circulation". Verkhovna Rada of Ukraine. URL: <https://zakon.rada.gov.ua/laws/show/z0512-00#Text>.
38. Shapovalova V.O., Shapovalov V.V., Lebedeva T.O. Forensic Pharmacy: study of the control regime of medicinal products containing Codeine. Pharmaceutical Journal. 2012. No.6. P.30-38. URL: [http://nbuv.gov.ua/UJRN/pharmazh\\_2012\\_6\\_6](http://nbuv.gov.ua/UJRN/pharmazh_2012_6_6)
39. Shapovalov V.V., Shapovalova V.O., Komar L.O. Forensic and pharmaceutical study peculiarities of circulation of controlled medicinal products with Codeine on the basis of pharmaceutical and medical law. Ukrainian Journal of Psychoneurology. 2015. Vol.23. Iss.4(85). P.131-135. URL: <https://uvnpu.com.ua/arkhiv-nomeriv/2015/tom-23-vipusk-4-85/sudovo-farmatsevtichne-vivchennya-osoblivostey-ob-gu-kont-rolovanikh-l-karskikh-zasob-v-z-kode-nom-n>
40. Shapovalova V., Zamoshets O., Galavan Z. et al. Subject, objects and tasks of forensic chemical and pharmaceutical examination of narcotic drugs, psychotropic substances and precursors. Pharmaceutical Journal. 2006. No.1. P.48–52.
41. Shapovalov V.V., Shapovalova V.O., Zamoshets O. Peculiarities of the study of narcotic drugs, psychotropic substances and precursors in the format of express tests. Liky Ukraine. 2006. Vol.14. Iss.2. P.143–144.
42. Bron A.N., Zavyalova N.E., Zavyalov O.S. Study of a particularly dangerous drug - desomorphine by gas chromatography with mass-selective detection: methodical sheet. Kyiv: DNDEKTS of the Ministry of Internal Affairs of Ukraine. 2013. 13p. URL: <https://expertize-journal.org.ua/normativnie-documenti/7827-nakaz-ministerstva-yustitsiji-ukrajini-vid-08-05-2018-1467-5-pro-zatverdzhennya-perelikiv-rekomendovanoji-naukovo-tekhnichnoji-ta-dovidkovoji-literaturi-shcho-vikoristovuetsya-pid-chas-provedennya-sudovikh-ekspertiz>
43. Linyuchev G.V., Ostapyuk Yu.M., Prystupa V.V. Possibilities of applying special knowledge in the field of physics and chemistry in the detection and investigation of crimes: an information guide. Kyiv: DNDEKTS of the Ministry of Internal Affairs of Ukraine. 2006. 36 p.
44. Shapovalova V. Alcoholic Hepatitis: An experimental meta-analysis. SSP Modern Pharmacy and Medicine. 2023. Vol.3. No.1. P.1-11. DOI: <https://doi.org/10.53933/ssppmp.v3i1.77>.
45. Kotyurgin A.O. What is desomorphine? Rehabilitation Center "Chance". 2023. URL: <https://www.shans-centr.com.ua/uk/shho-take-dezomorfin/>
46. Shapovalov V.V., Shapovalova V.O., Lebedeva T.O. et al. Forensic pharmaceutical study of the problem of desomorphine addiction in Ukraine (forensic aspects). Forensic medical examination. 2012. No. 6. P. 49-54. URL: [http://nbuv.gov.ua/UJRN/sme\\_2012\\_6\\_14](http://nbuv.gov.ua/UJRN/sme_2012_6_14)
47. Pavlyukh V. In Transcarpathia, a gram of the methamphetamine drug costs up to a thousand hryvnias. Transcarpathia online. 21.03.2011. URL: <https://zakarpattya.net.ua/News/80709-Na-Zakarpatti-hram-narkotyka-metamfetamin-koshtuie-vzhe-do-tysiachi-hryven>

48. Methamphetamine. Wikipedia. 31.10.2023. URL: <https://en.wikipedia.org/wiki/Methamphetamine>
49. Bugaichuk K.L., Savchenko O.O., Pribytkova N.O. Peculiarities of pre-trial investigation of illegal production, manufacture, purchase, storage, transportation, forwarding or sale of narcotic drugs, psychotropic substances. Scientific and methodological recommendations. Kharkov National University of Internal Affairs Institutional Repository. 2015. 99 p. URL: <https://core.ac.uk/reader/187222290>
50. Meeting of the VI Working Group on the Research of Psychoactive Substances. Kyiv Research Institute of Forensic Expertise. 14.04.2021. URL: <https://kndise.gov.ua/zasidannya-vi-robochoyi-grupy-z-doslidzhennya-psyhoaktyvnyh-rechovyn/>