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Law

Peculiarities of the Identification, Examination, and Forensic Expertise of Narcotic Substances

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Abstract. This study examines the specific challenges associated with the identification, examination, and forensic analysis of narcotic substances. Rapid on-site identification of such substances is of paramount importance for law enforcement officers conducting proactive operational-search activities. Currently, the seizure of suspected illicit substances from detained individuals, residential premises, or other locations creates significant procedural and logistical difficulties for operational units. These challenges are heavily compounded by the substantial time required to transport samples to specialized chemical laboratories and await formal forensic conclusions. Consequently, the forensic examination of narcotic substances represents a critical and multifaceted domain. Effective practical implementation requires the integration of methodologies that ensure both rapid identification and rigorous, comprehensive analysis. This process is especially vital given that narcotics-related offenses are frequently intertwined with organized and transnational crime. Furthermore, as perpetrators continually evolve their methods, law enforcement agencies must adopt increasingly adaptive technological approaches and innovative operational tactics.

Keywords: narcotic substances, forensic examination, drug identification, forensic science, law enforcement, analytical methods

Introduction

Identification of narcotic substances: theoretical and practical foundations. Historically, the detection and primary assessment of narcotic substances were based on visual observation and elementary chemical tests. Identifying substances on-site using chemical reagents that produce color reactions allows an operational officer to understand issues regarding the region of origin, the sales market, and manufacturing methods. In addition to on-site identification, the officer must ensure that a more accurate chemical analysis is conducted, since on-site testing has several limitations. These tests provide qualitative rather than quantitative results, meaning that the concentration of the suspected drug cannot be determined. Furthermore, the results obtained are only preliminary and presumptive, whereas a scientific chemical analysis provides the most reliable confirmation of the substance's nature. A negative test result does not necessarily exclude the possibility that a drug is present, and a positive result does not conclusively establish the actual presence of a drug.

Modern identification. Modern substance identification is a comprehensive process that begins

with a visual assessment of the suspicious material, followed by the strategic use of rapid chemical tests conducted on-site. For definitive results, the methodology requires advanced laboratory techniques, specifically spectroscopic, chromatographic, and mass-spectrometric analyses. The process also includes the screening of biological samples – such as saliva, urine, and blood – as well as specialized research on plant materials. Importantly, as stipulated by articles 144-149 of the Criminal Code of Georgia (1999), this initial testing does not legally replace formal expertise, but serves solely to establish the necessary foundation for further research. Importantly, **primary testing does not replace expertise** (Criminal Code of Georgia, 1999, art. 144-149) but only creates the basis for further research.

Rapid On-Site Identification of Narcotic Substances: Advantages and Limitations

In the context of rapid on-site identification of narcotic substances, primary field diagnostics – such as color and spot tests – play an indispensable role when proactive measures must be taken within highly restricted timeframes. This need arises mainly because operational-search activities occur in dynamic environments where there is an imminent risk of evidence being destroyed, requiring law enforcement officers to make immediate, critical decisions. Furthermore, as noted by the United Nations Office on Drugs and Crime (UNODC, 2020), the window of opportunity for successfully transporting volatile or unstable samples to a specialized chemical laboratory is often strictly limited. This operational landscape is further complicated by rapid changes in the international drug scene, particularly the increasing diversity of synthetic compounds and the continual emergence of New Psychoactive Substances (NPS), both of which directly challenge the diagnostic capabilities of traditional field-identification methods.

Problems with rapid tests. Despite their practical utility, rapid on-site tests are limited by several critical diagnostic vulnerabilities. First, they provide only preliminary, presumptive data rather than conclusive scientific proof. Second, their outcomes are binary, presenting results as either categorically positive or negative, without accommodating nuance. The reliability of these field diagnostics is further compromised by the frequent expiration of chemical reagents. Moreover, contemporary challenges such as New Psychoactive Substances (NPS) often do not respond to standard chemical color reactions. Finally, as emphasized by guidelines from the Scientific Working Group for the Analysis of Seized Drugs, these tests operate purely at a qualitative level and fail to indicate the concentration or purity of the examined substance (SWGDRUG, 2022).

Sampling and Methodological Standards

Prior to discussing the subject, it is essential to consider certain characteristic features inherent to narcotic substances: narcotic substances can be liquid, powder, or solid. Powders may be mixed with other substances or placed in capsules. In this context, the operational officer must consider that the substance may be opened to extract the powder. For the purpose of identification, the officer may crush a tablet into powder or divide it into two parts. To identify the raw material, samples may be taken from several different sections.

The sampling of narcotic substances is a critical stage, and its incorrect execution may lead to unreliable laboratory conclusions, loss of evidence; contamination of substances, and violation of legal procedures (Caddy, 2010).

Sampling principles include representative sampling from different points, sampling of capsules and tablets, adherence to sterility, following rules for packaging, sealing, and labeling, and documentation according to “chain of custody” procedures (UNODC, 2019).

Safety rules – professional risk management. In the course of an operational officer's activities for the purpose of drug identification, significant importance is attached to the observance of safety measures. Some chemical reagents used include acids capable of causing skin burns and irritation. Furthermore, certain commercial analysis kits utilize glass ampules, which may shed small fragments upon opening. Consequently, analysis should be performed while wearing gloves; however, if working without them, the operational officer must clean their hands immediately.

Both the operational and laboratory stages necessitate strict adherence to safety protocols. Consequently, the following measures are essential: use of gloves, protective goggles, and masks; safe reagent storage (utilizing airtight containers and maintaining temperature control); exercising caution when opening glass ampoules, thorough disinfection of the workspace, and disposal of biological waste in accordance with specialized regulations.

Handling highly toxic synthetic opioids (e.g., fentanyl analogs) is associated with exceptional risk, as they pose a significant threat to personnel even in minute doses (WHO, 2022).

Appointment of Investigation and Expertise and Laboratory Stages

To obtain a competent, legally binding conclusion regarding substances seized from illicit circulation, the evidence must be formally submitted for specialized examination in accordance with Articles 144–148 of the 2009 Criminal Procedure Code of Georgia. This critical investigative phase requires a multidisciplinary approach, drawing on specialized expert groups depending on the nature of the inquiries. These essential examination categories include criminalistic analysis to evaluate physical trace evidence, biological and pharmaceutical assessments to determine substance properties and plant profiles, and medical evaluations to assess the physical health impacts. Psychiatric expertise is also integrated when it is necessary to assess an individual's cognitive control and volitional capacity in relation to the offence.

To ensure a scientifically rigorous and definitive evaluation of suspected evidence, the laboratory study stage employs a multi-tiered array of analytical methods. Foremost among these is chromatography, which includes both High-Performance Liquid Chromatography (HPLC) and Gas Chromatography (GC) to separate complex chemical mixtures. This is systematically paired with mass spectrometry, an essential technique that provides precise molecular identification of the target mixture components. The diagnostic process also integrates infrared and ultraviolet spectroscopy to map the unique structural profiles of the compounds. When dealing with raw organic exhibits, specialized botanical expertise is used to identify plant materials, including cannabis, opium poppy, and coca leaves. Biological expertise covers the determination of the presence of substances in the body (ENFSI Drugs Working Group, 2021; Saferstein, 2018).

International practice and standards. Within the framework of international practice and standards, guidelines developed by global institutions play a crucial role in harmonizing forensic methodologies. The United Nations Office on Drugs and Crime (UNODC) provides recommended methods for forensic expertise, while the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) establishes baseline standards for drug identification. European laboratories align their procedures with the European Network of Forensic Science Institutes (ENFSI) regulations. To comply with these global frameworks, several key operational requirements must be strictly enforced. These include the mandatory use of two or more independent analytical methods to verify findings, systematic standardization of chemical reagents, and strict adherence to chain of custody protocols. As emphasized by Tsvetkov (2014), all laboratory workflows must fully comply with international

calibration standards to ensure the legal and scientific validity of results.

Forensic expertise is commissioned following the discovery of a suspected narcotic substance from an accused person, pursuant to Article 144 of the Criminal Procedure Code of Georgia. (An expert conclusion is a written document compiled in accordance with procedural requirements. It comprises introductory and research sections, as well as definitive responses to the forensic inquiries posed) (Mamniashvili, 2024).

The report is formalized in writing and validated by the expert's signature. It must be emphasized that a forensic criminalist's certificate identifying a substance as a narcotic does not constitute a sufficient legal basis for criminal prosecution and does not obviate the necessity for a formal forensic examination.

The analytical findings and the expert conclusion serve as primary evidentiary basis for the decision-making process regarding criminal prosecution. Within the scope of forensic examination, the following objectives are addressed including determining whether a substance qualifies as a narcotic drug and identifying its specific type; establishing the weight, volume, or quantity of the substance; detecting traces of narcotic substances on various related objects and accurately identifying the substance involved; determining the common group affiliation of homogeneous narcotic substances through the analysis of precursors, synthesis methods, storage conditions, and other diagnostic characteristics; assessing whether narcotic substances seized from different individuals originated from the same bulk quantity; identifying a common source of origin based on the location and method of manufacture; individualizing particular masses of narcotic substances through comparative analysis of their constituent components; and identifying the manufacturing methods, chemical technologies, and other characteristics of illicitly produced narcotic substances.

Biological expertise (forensic examination): Determination of the botanical taxon of a plant or its constituent parts; evaluation of timelines for sampling temporary properties, vegetative phases, etc., as well as determination of objectives associated with the cultivation site of narcotic-producing flora.

Pharmaceutical expertise. Assessment of the compliance of chemical composition, quality, and pharmacological properties of narcotic preparations (pharmaceuticals) with state regulatory standards.

When submitting evidence for forensic examination, a number of questions should be posed to the expert. These include whether the submitted botanical material possesses the necessary chemical characteristics to be used as a precursor in the illicit manufacture of narcotic substances; whether the examined plant material constitutes a byproduct or residue resulting from a clandestine narcotic production process; whether the chemical composition of the substance seized from the accused corresponds to that of products manufactured at a particular chemical-pharmaceutical enterprise; and whether narcotic substances are present in biological samples obtained from the accused, such as saliva, urine, or blood, and, if so, which specific narcotic compounds can be identified.

The accused shall be subjected to a comprehensive (medical and psychiatric) evaluation and **the expertise has to answer the following questions:** Is the individual currently in a state of narcotic intoxication or experiencing abstinence syndrome (withdrawal)? Which specific narcotic substance has been consumed by the examinee? Does the examinee suffer from a substance use disorder (narcotic addiction), and if so, what is the clinical classification of the condition? Was the individual capable of exercising cognitive control and volitional management of their actions at the time of the alleged offense? Does the individual require compulsory clinical treatment? and are there medical contraindications to the adminis-

tration of compulsory treatment? (Janashia & Pitskhelauri, 2024).

Existing Problems in Georgia and Visions for Solutions

An analysis of the current forensic and investigative landscape in Georgia reveals several significant technical and systemic challenges that require targeted strategic approaches. Firstly, there is a marked shortage of technical and material resources, evident in outdated laboratory equipment, insufficient quantities of essential reagents, and limited local production capacity. Secondly, urgent personnel training needs have arisen, as the wide variety of modern drugs demands a very high level of technical expertise from law enforcement and laboratory staff. This issue is closely linked to the challenge posed by New Psychoactive Substances (NPS), which evolve rapidly at the molecular level, making it difficult for standard field tests to keep pace with their identification. Additionally, procedural vulnerabilities exist in relation to chain of custody breaches, including instances where the sealing or storage of evidence is not properly documented. Finally, the system faces specific legal gaps, as some newly introduced substances are not incorporated into national drug regulations promptly.

To effectively address the identified systemic vulnerabilities and modernize the forensic framework, a series of comprehensive strategic recommendations must be implemented. First, upgrading laboratory infrastructure is essential, particularly through the introduction of advanced Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Mass Spectrometry (LC-MS) systems in regional laboratories. Second, institutional capabilities should be enhanced by incorporating international staff training and systematically integrating specialized UNODC and ENFSI training frameworks for personnel. Third, rapid test quality control must be improved by strictly monitoring the expiration dates and operational viability of field-testing kits. Fourth, the development of a centralized National NPS Monitoring Platform is strongly recommended to systematically track, analyse, and identify emerging new synthetic drugs. Fifth, to prevent procedural vulnerabilities, a Digital Chain of Custody System should be established, implementing secure electronic documentation to track all substance movements. Sixth, international laboratory cooperation must be expanded to facilitate formal consultations with foreign experts on highly complex or atypical forensic cases. Finally, strong emphasis should be placed on prevention and early diagnostics by actively increasing public awareness and improving the overall accessibility of diagnostic testing.

Conclusion

The identification and expertise of narcotic substances is a multidisciplinary process requiring modern technology, international standards, and professional competence. Rapid tests are only the initial stage; the final legal assessment relies on thorough laboratory research and expertise. Current challenges in Georgia and abroad indicate a need to modernize technical, legal, and human resources by the system.

სამართალი

ნარკოტიკული ნივთიერებების იდენტიფიკაციის, გამოკვლევისა და კრიმინალისტიკური ექსპერტიზის თავისებურებები

შ. ფიცხელაური

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წინამდებარე ნაშრომში შესწავლილია ნარკოტიკული ნივთიერებების იდენტიფიკაციასთან, ექსპერტიზასა და კრიმინალისტიკურ ანალიზთან დაკავშირებული სპეციფიკური გამოწვევები. აღნიშნული ნივთიერებების სწრაფ იდენტიფიკაციას უშუალოდ შემთხვევის ადგილზე უდიდესი მნიშვნელობა აქვს სამართალდამცავი ორგანოების თანამშრომლებისთვის, რომლებიც პროაქტიულ ოპერატიულ-სამძებრო საქმიანობას ახორციელებენ. ამჟამად, დაკავებული პირებისგან საცხოვრებელი შენობებიდან ან სხვა ადგილებიდან სავარაუდო უკანონო ნივთიერებების ამოღება მნიშვნელოვან პროცედურულ და ლოგისტიკურ სირთულეებს უქმნის ოპერატიულ ქვედანაყოფებს. ამ გამოწვევებს კიდევ უფრო ამწვავებს ის დრო, რომელიც საჭიროა ნიმუშების სპეციალიზებულ ქიმიურ ლაბორატორიებში ტრანსპორტირებისთვის და ოფიციალური სასამართლო-კრიმინალისტიკური დასკვნის მოლოდინისთვის. შესაბამისად, ნარკოტიკული ნივთიერებების კრიმინალისტიკური ექსპერტიზა წარმოადგენს კრიტიკულ და მრავალწახნაგოვან სფეროს. მისი ეფექტიანი პრაქტიკული იმპლემენტაცია მოითხოვს ისეთი მეთოდოლოგიების ინტეგრაციას, რომლებიც უზრუნველყოფენ როგორც სწრაფ იდენტიფიკაციას, ისე მკაცრ, ყოვლისმომცველ ანალიზს. ეს პროცესი განსაკუთრებით სასიცოცხლოა იმის გათვალისწინებით, რომ ნარკოტიკებთან დაკავშირებული დანაშაულები ხშირად უკავშირდება ორგანიზებულ და ტრანსნაციონალურ დანაშაულს. გარდა ამისა, დამნაშავეები მუდმივად სრულყოფენ თავიანთ მეთოდებს, რაც სამართალდამცავი სააგენტოებისგან ადაპტირებადი ტექნოლოგიური მიდგომებისა და ინოვაციური ტაქტიკის გამოყენებას მოითხოვს.

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