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THE IMPORTANCE OF PSYCHOTROPIC SUBSTANCES IN FORENSIC MEDICINE PRACTICE

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ABSTRACT: This article examines the significance of psychotropic substances in forensic medicine, their effects on the human body, their role in the assessment of death and bodily injuries, and methods for their detection during forensic examinations. It also considers the diagnostic challenges encountered in cases involving psychotropic substances and explores potential solutions.

Keywords: forensic medicine, psychotropic drugs, toxicology, forensic medical examination, intoxication, laboratory diagnostics.

Psychotropic substances are substances that affect the central nervous system and change a person's mental state, behavior, and consciousness. In addition to their use for medical purposes, they are also widespread in illegal circulation. The involvement of psychotropic substances in crimes, suicides, and accidents is of great importance in forensic medical practice.

On a global scale, the problem of psychotropic substances is regulated at the international level. For example, according to the World Health Organization (WHO), the consumption of psychoactive substances poses a serious threat to public health. Reports from the United Nations Office on Drugs and Crime (UNODC) also note an increase in crimes and deaths related to psychoactive substances.

Types of psychotropic substances and their mechanism of action:

Psychotropic substances are divided into the following main groups:

- sedatives and tranquilizers;
- antidepressants;
- neuroleptics;
- psychostimulants;
- hallucinogens.

They act by altering the exchange of neurotransmitters in the central nervous system. When taken in excess of the norm, severe complications can occur, such as the weakening of the respiratory center, heart rhythm disorders, and loss of consciousness.

Significance in forensic medicine:

In the practice of forensic medicine, psychotropic agents are of great importance in the following cases:

- Determining the cause of death. In cases of acute intoxication, toxicological analyses play a key role.
- In assessing injury cases. Under the influence of psychotropic substances, an individual's motor coordination and perception decrease, which can lead to accidents.

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• In criminal cases. In some cases, the mental state and degree of intoxication of the person who committed the crime are assessed.

• In the examination of living persons. Laboratory tests are important in determining narcological status and conducting mandatory examinations.

Toxicological research methods:

In modern forensic practice, chromatography and mass spectrometry methods are used to detect psychotropic substances in blood, urine, hair, and other biological media. These methods allow for the approximate determination of the substance's type, quantity, and time of intake.

In general, the threat posed by psychotropic and narcotic substances to global security cannot be measured by anything. According to the British magazine Lancet, more than 200 million people worldwide use drugs at least once a year. Typically, a substance must meet the following three criteria to be considered a narcotic:

It should be noted that the circulation of certain psychotropic substances is restricted in the Republic of Uzbekistan, which include:

Aminorex (Menocil, Apiquel, Aminoxafen, McN-742) is a psychostimulant and appetite-stimulating drug. It is a structural analogue of amphetamine. This drug was withdrawn from the market after it was found to cause pulmonary hypertension.

Aminorex exerts a stimulating effect on the central nervous system in a manner characteristic of amphetamines. It relieves fatigue, reduces the need for sleep, and promotes mental and physical arousal. Upon prolonged use, psychosis may occur, often accompanied by seizures and visual and auditory hallucinations. Other effects include increased blood pressure and heart rate, elevated body temperature, irritability, depression, confusion, aggression, and mood swings. It creates a moderate degree of emotional attachment, but does not create a physical attachment. In 1962, Edward John Hurlbert synthesized aminorex. Studies have shown that its use caused a significant loss of appetite in rats. In 1965, the drug began to be widely used as an appetite suppressant in Austria, Switzerland, and Germany. In pharmacy chains, it was sold under various names, such as "Menocil," "Apikvel," "Aminoxafen," and "McN-742." Subsequently, it was established that treating obesity with this drug leads not only to weight loss but also to the formation of dependence. Furthermore, an increase in blood pressure in the pulmonary circulatory system—pulmonary hypertension—was observed in 0.2% of patients. Therefore, starting from 1972, the use of "Aminorex" in clinical practice was discontinued. Deaths have also been recorded.

Aminorex was intended to be used as an appetite suppressant or almost completely eliminating agent. As a result, a person begins to consume significantly less food and rapidly loses body weight.

A person who starts taking "Aminorex" not only loses excess weight but also feels a significant increase in physical strength. His mood lifts, as if he becomes capable of solving any problem with ease. Due to psychological dependence on this substance, people soon lose the ability to enjoy anything without chemical "stimulation." Without the next pill, they become depressed and their productivity drops sharply.

In the event of a violation of prescribed dosages, aminorex soon leads to irreversible changes within the central nervous system. This condition manifests as a severe mental disorder that is clinically difficult to distinguish from depression and schizophrenia. Additionally, the drug negatively affects the cardiovascular and musculoskeletal systems and undermines the immune system.

To obtain aminorex, a reaction occurs between 2-amino-1-phenylethanol and bromosianide:

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Levometamphetamine - Systematic name: (2R) -1-phenylpropan-2-amine Traditional names: levamphetamine, l-amphetamine, (-) - (R) -α-phenylethylamine Chemical formula: C9H13N Levometamphetamine, L-methamphetamine, 33817-09-3 l-Methylamphetamine, (-) - Methamphetamine, (-) -Deoxyhephedrine, Levometamphetamine, R (-) -N-methylamfetamine, l-1-phenyl-2-methylaminopropane, NSC 6084, (R) -N-methyl-1-phenylpropan-2-amine, (-) - methyl (alpha-methylphenethyl) amin, l-1-phenyl-2-methylaminopropane, Benzoletamine, N, alpha-dimethyl-, (R) -CHEMBL1927030, Viki, (R) -deoxyhephedrine, (R) -methylamfetamine, Benzoletamine, N, alpha-dimethyl-, (R) -L-deoxyheph

Levoamphetamine (L-amphetamine) is a left-polluting isomer of amphetamine and is a psychostimulant. In small doses, it exhibits a stronger stimulating effect than its right-tailed isomer (dextroamphetamine) due to its interaction with norepinephrine receptors. At high doses, it acts less strongly on the central nervous system and more strongly on the peripheral nervous system compared to dexamfetamine.

Levomethamfetamine acts as a selective agent that allows for the release of norepinephrine across the blood-brain barrier (it practically does not affect the release of dopamine). Although it affects the central nervous system, its effect does not differ qualitatively from that of dextromethamphetamine. Dextromethamphetamine does not induce euphoria or addiction. Its physiological effects include narrowing blood vessels, which is why it is useful for cleansing the nose. The half-life of levomethamfetamine is 13.3–15 hours, while that of dextromethamfetamine is approximately 10.5 hours. Levometamphetamine is an active metabolite of the antiparkinsonism drug selegilin. Selegilin is a selective monoamino oxidase β (MAO B) inhibitor that, in small doses, converts levomethamfetamine into levoamphetamine during metabolism, yielding a positive result when tested for amphetamines. Selegilin itself has neuronal protective and restorative properties, but due to concerns about the neurotoxicity of levomethamphetamine, alternative MAO B inhibitors such as Rasagilin have been developed that do not produce toxic metabolites. Side effects: When nasal decongestants are taken in excess, levomethamfetamine, like other sympathomimetic drugs, may have the following side effects: hypertension (high blood pressure), tachycardia (high heart rate), nausea, abdominal pain, dizziness, headache, sweating, muscle tension, and tremors. Side effects affecting the central nervous system include anxiety, insomnia, and anorexia (loss of appetite).

Use for non-medical purposes. In a study studying the psychoactive effects of levomethamphetamine, intravenous administration of 0.5 mg/kg (but not 0.25 mg/kg) to recreational methamphetamine users induced a degree of "addiction," but this effect lasted shorter. Oral administration of levomethamfetamine has not been tested. Levomethamfetamine can be detected in urine analysis as methamphetamine, amphetamine, or both, depending on the subject's metabolism and dosage. L-methamphetamine is converted to L-amphetamine after a certain period of time.

The method for determining amphetamines in urine is based on liquid-to-liquid extraction, followed by derivatization using derivatizing agents: trifluoroacetyl anhydride (TFAA) or pentafluoropropionic anhydride (PFPA). Phenylalkylamine derivatives formed with TFAA or PFPA are determined by chromatography-mass spectrometry. Sample preparation: Add 2 ml of sodium hydroxide solution (1 M) to 2 ml of urine, 5 ml of distilled water, 20 ml of dichloromethane, and stir in a shaker for 30 minutes. The organic layer is filtered through anhydrous sodium sulfate, 50 µl of hydrochloric acid in methanol is added to the extract, evaporated to a dry residue at room temperature, and analyzed using chromatography-mass spectrometry. Chromato-mass spectrometry: Research is conducted using a Agilent 6890 gas chromatograph and a Agilent Technologies 5973 mass-selective detector chromato-mass

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spectrometer. Chromatograph column: quartz based on methylphenylsilicon, capillary (30 m x 0.25 mm). The initial temperature of the column is 70°C. The holding time at the initial temperature is 1 minute. The carrier gas (helium) velocity is 1.0 ml/min. The temperatures of the injector, source, and quadrupole are 280°C, 230°C, and 150°C, respectively.

In the forensic chemistry department, the determination of peaks observed on the chromatogram is performed using a separate ionic scanning method. In this process, electron beam mass spectra, ion mass chromatograms, and mass spectral databases are used.

In conclusion, it should be noted that psychotropic substances are of great importance in forensic practice and are one of the main factors in determining the cause of death, assessing the circumstances of a crime, and analyzing a person's mental state. The application of modern toxicological research methods and the improvement of the regulatory framework serve to improve the quality of forensic medical examinations. The study of cases related to psychotropic substances based on a comprehensive approach is of great importance in the adoption of fair judicial decisions.

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