

ideas, resources and best practices, the search for the most effective approaches, which will contribute to innovative development and commercialization of research results.

In the conditions of war and post-war reconstruction of Ukraine, ensuring resilience in the field of expert support of justice should be perceived as a trigger for seeking new forms of organization and management under crisis conditions. The process of ensuring resilience of forensic activities allows to optimally attract and combine resources, and external assistance, define priorities and sequence of processes, and have stable value orientations towards integration into the European Forensic Area, regardless of existing barriers.

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Skin Horn Formations from the Perspective of Toxicological Studies

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Toxicological studies have become a permanent part of the medical practice. The most common test material is blood, followed by urine (excretion) and sometimes vomit or stomach contents. Studies of skin horns are relatively rare (hair and nails). The results of the latter tests often show the presence of various substances of toxic nature.

Keywords: *hair, nails, toxicology, examination of myological material.*

Шкірні рогові утворення з точки зору токсикологічних досліджень

Ельжбета Живуцька-Козловська, Россана Бронієцька

Токсикологічні дослідження стали невід'ємною складовою медичної практики. Найпоширеніший тестовий матеріал — це кров, менш поширені — сеча (виділення) та іноді блювота або вміст шлунка. Дослідження шкірних рогов є доволі рідкісними (волосся та нігті). Результати останніх тестів часто свідчать про наявність різних речовин токсичного походження.

Ключові слова: *волосся; нігті; токсикологія; дослідження біологічного матеріалу.*

Toxicological studies are closely linked to forensic medicine and criminal sciences, in particular criminal law, criminology, criminology. The value of these results allows us to establish not only in the field of medical sciences, but also in the process of detecting and proving crimes. Suicides, in particular those committed (or attempted) under the influence of alcohol or drugs, are a separate issue. Acts of self-destruction include those in which all kinds of toxic substances were used. From the point of view of the foregoing considerations, the usefulness of these studies, which are carried out on living persons and on material taken from cadavers, cannot be overemphasised.

The most common test material is blood (presence of alcohol, psychoactive substances), hair and nails (presence of psychoactive substances, heavy metal poisons), stomach contents (vomit) — presence of poisons, alcohols, drugs, etc. The literature of the subject has described many extremely interesting cases of poisoning with various substances, including drugs [1]. Determining the presence of alcohol, drugs, psychoactive substances and toxins (including plant and animal origin) in material taken from a living person and from a corpse is of great importance in the treatment procedure (living person) and investigation procedure (determining the circumstances of death and possible involvement of other persons in the cause of death). Hair and nails are horny products of the skin, which have specific morphological characteristics, which does not raise any doubts. L. Brzezińska-Wcisło, A. Lis, G. Kamińska, D. Wcisło-Dziadecka emphasize that no other skin product is as useful for forensic medicine or toxicology as hair [2]. K. Świech, among others, agrees with this view, who, referring to numerous sources, stresses that hair, like no other biological trace, is very durable [3]. From a forensic perspective, hair is a valuable research material for individual identification purposes. Distinguishing human hair from animal hair does not pose many difficulties. B. Holyst, presenting the essence of forensic examinations of hair, stresses that it is possible to determine the location of the human body from which it came. The author writes of toxicological studies of hair, referring to the example of thallium poisoning, and of characteristic hair soiling, which “indicates the environment in which a person has recently lived” [4]. Human hair is also the biological material that allows you to determine the sex of the person from whom it comes. In the light of recent hair research, more and more new methods are used, including radioimmunoassay, which allows the determination of morphine in this biological material [4]. Hair is a research material in cases of poisoning and poisoning. In the literature of the subject there is no shortage of case studies of these horny skin products in order to determine the presence (or absence) of various substances, including psychoactive substances [5]. Sebastian Rojek, Małgorzata Kłys and Tomasz Konopka conducted segmental studies of hair collected from corpses of persons whose death was the result of intoxication with psychoactive substances. The authors state that these studies and the results obtained confirm the results of studies by other authors. Determining the presence of such substances in the hair (and their concentration), allows to identify the psychoactive agent [6].

The second horny product of the skin (sometimes called appendage) is the nail. An extremely interesting issue is the change in the appearance of a man's nail after the use of certain drugs. Danuta Kaczmarek and Piotr Brzeziński described yellow nail syndrome after carbamazepine use. In the present article, they pointed out the dependence of the occurrence of YNS symptoms on the use of this drug [7]. The appearance of nails can therefore be a valuable clue as to the existence of diseases, as well as taking certain medications, which are available only with a doctor's prescription. Nails and hair are a biological material that is described as very durable (compared to soft tissues). Both of these horny skin products deposit chemical compounds that may be important to determine the cause of poisoning or death. They are also useful for determining the living environment (also profession, workplace) of the person from whom they come. A classic and well-known example is the accumulation in the hair of chemicals absorbed from the environment (aromatic carbon compounds). There is nothing revealing about it, because it has long been known that some professions leave their mark on the human body. Perhaps the most famous are the «lungs

of a hairdresser», «lungs of a metallurgist (miner)» and «hands of a carpenter». In the first of the above-mentioned examples, there are microscopic hair fragments in the lungs, in the second, the most common cases are coalconiosis and emphysema, and in the third, cavities of the distal parts of the hands. Toxicological studies (usually blood) have permanently entered the canon of modern forensic toxicology and forensic medicine sensu largo. These tests are also performed by analyzing hair and nails. The literature on the subject does not lack descriptions of such studies, the results of which allowed the identification of various compounds and poisons that led to human death [8]. Marzena Sykutera, Ewa Pufal, Elżbieta Bloch-Bogusławska state that the toxicological analysis of biological material, including nails, is a valuable source of knowledge in the case of suicides, because it allows to determine whether before death, the victim of this act took phenothiazine derivatives such as and tricyclic antidepressants. According to the authors, in the studied biological material (blood, hair and nails), in some cases the presence of drugs from this group was detected [9]. It is impossible not to notice that in hair and nails the longest persist not only above substances, but also others, including drugs and boosters, as well as alcohols, although the latter are extremely rarely isolated from horny products of the skin. However, it is worth paying some attention to the most common drugs in forensic and medical practice in Poland. Cocaine is one of the drugs that, like amphetamine, marijuana and morphine, is on the list of substances identified in forensic trials. The most frequently mentioned are detected in blood, but also in urine, hair and nails. In the light of toxicological studies, these substances are successfully detected in dermal horn products, where they may persist for up to several months [10]. At this point, it should be stressed that toxicological testing of hair and nails is of particular importance in cases of sudden deaths of unknown cause, as well as after a prolonged period of time since death. Sometimes the collection of material for examination takes place after the removal of the corpse from the grave, which is not common in law enforcement practice. Drug-induced homicides are very rare in investigative practice. This is described by Elżbieta Bloch-Stanisławska, Ewa Wolska, Piotr Engelgardt and Ewa Pufal. The authors present findings on the cause of death of a man whose mummified corpse was found in an apartment (the corpse was hidden) in a specially built brick structure. As a result of forensic examinations it was established that the man's death was the result of criminal ergot poisoning [11]. In practice, poisoning occurs (with different effects) with other agents, including acids, alkalis, chlorine, ammonia, sodium hypochlorite, sodium hydroxide, phenol or non-food alcohols, not excluding from this catalog also dopants, which for several years have been the causative factor of acute poisoning and death. In the literature of the subject it is emphasized that in toxicological studies the basic test material is "whole blood". „I.e. one which contains all the forms and non-formants, as well as serum and plasma. In the case of sectional blood, it is only possible to test whole blood with haemolysed blood cells. The blood sample is routinely used for the analysis of drugs and other xenobiotics" [12]. In forensic medicine, there are such cases when, despite great care and research meticulousness, it is difficult to determine the cause of death of a person. Then the chance is a toxicological study of horny skin products. Forensic toxicology belongs to forensic science to the same degree as Thanatology or Pathomorphology. Anatomy is a fundamental field, which is the foundation of knowledge about the structure of the human body. It is relatively rare (compared to blood) to examine nails or hair to detect exosubstances. Traces of drugs, drugs, boosters or poisons remain the longest in the horny skin formations. Even many years after death, it is possible to detect poison in the hair, sometimes in the nails Only hair and nails are so durable, so morphologically specific that they do not decompose at the same rate as other tissues of the human body.

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Identification of Human Corpses (Remains) Based on Bone Fragments

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The process of identifying remains as well as human corpses is a complex research procedure. It all depends on the state of the biological material. Today, the genetic method is most often used, which is considered the most accurate. However, this does not mean that other studies have gone down in history. Bone-specific testing methods also work well.

Keywords: human remains, bones, bone fragments, identification.