

Application of biobanking for personal identification in the Russian Federation

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Motivation and Aim: Every year in Russia the number of disappearances of people increases. According to official data, the number of missing persons in Russia in 2023 amounted to tens of thousands of people. However, most cases of unknown disappearance remain unsolved. The peculiarities of the geopolitical situation in the country and the world determine the need for the formation of proactive DNA certification of the population in order to increase the efficiency of the personal identification process – one of the main tasks of forensic medicine. The organization of a large-scale system for collecting, storing, processing and using biological material in research based on biobanks will allow not only to obtain new medical knowledge about the state of human health for scientific and therapeutic purposes, but also to use such data in forensic medical expert practice. The purpose of this study is to analyze the current state of biobanking in our country and the possibility of using its resources for DNA identification in the structure of the forensic medical service.

Methods and Algorithms: Official data regarding missing citizens was analyzed. The regulatory framework for the system of organizing and managing the processes of collecting and using genetic information in Russia has been studied. The features of the functioning of biobanks in the country and the world were studied, and the possibilities of their use within the framework of personal identification were assessed.

Results: In the field of forensic medicine, various methods of personal identification are used, among which molecular genetic research stands out as a particularly evidentiary method. Direct DNA identification, considered the most reliable technique, allows genetic material of unknown origin to be compared with a person's already known genetic profile. This process is made possible by proactive DNA recording, which involves the collection, storage and analysis of comparative biological samples. The importance of genetic registration is especially high for people whose professional activities involve an increased risk to life.

The development of genomic registration in Russia is actively supported by the Government, as reflected in Federal Law No. 242-FZ of December 3, 2008 [1], which details the principles and procedures of genomic registration, processing of biological material and genetic information, as well as control measures and supervision of the implementation of these processes. The information collected under this law is intended to be used for the purpose of preventing, detecting and investigating crimes, searching for missing people, both citizens of the Russian Federation and foreigners located in the country, identifying unidentified persons and corpses, as well as determining family ties.

State genomic registration is mandatory for certain categories of the population: convicts, persons prosecuted, as well as unidentified bodies. For other citizens, genomic registration is voluntary and is carried out for a fee, which hinders the widespread implementation of genomic certification. There are also restrictions on the period of storage of genetic information: for unidentified persons and unidentified corpses, the period is 70 years, for others – until the fact of death is established or until the age of 100 is reached in the absence of information about death. The possibility of destruction of genomic information is provided upon application by a registered person and on the basis of a court order.

Decree of the President of Russia dated March 11, 2019 No. 97 defines strategic directions for ensuring chemical and biological safety in the country [2]. The document clarifies that restrictions on personal rights and freedoms in the interests of chemical and biological safety are permitted only to the extent necessary to protect public health, their rights and interests, as well as to guarantee the defense capability and security of the state. The fundamental objectives include genetic certification of citizens in compliance with legal guarantees for the protection of information about the human genome and the creation of genetic profiles of the population. The importance of improving legislation and management mechanisms in this area is also emphasized. The key tasks within the framework of ensuring the resource base of the national chemical and biological safety system are the creation of conditions for genetic certification of the population and the development of screening technologies for the study of gene pools of humans, animals and plants.

In situations where direct DNA identification is not possible due to the lack of samples for comparison, the method of indirect DNA identification is successfully used. This method involves analyzing and comparing the genetic profiles of close relatives of a person reported missing with the genetic profile of an unidentified individual. Thus, Federal Law No. 16-FZ of February 14, 2024 [3] amends the previously existing Federal Law “On State Genomic Registration in the Russian Federation” [1]: Article 7 added a clause according to which the mandatory state genomic registration Now close relatives of persons officially recognized as missing are also subject to this.

The implementation of planned initiatives and projects requires coordinated and balanced approaches to solving a set of related and dependent tasks in various areas, including in the aspect of personal identification in forensic practice. At the same time, each of the key areas requires careful analysis and implementation of models, mechanisms, tools and methods used. One of these specific but important issues is the development of biobanking in Russia.

Human biological specimen biobanks are organizations or institutions that collect, store, and make available biological specimens such as blood, saliva, DNA, tissue, cells, etc., for research purposes. They aim to accelerate progress in scientific research and ensure high quality samples for the scientific community. There are many such biobanks around the world, with some specializing in the study of specific diseases or populations, while others support a diversity of research in a wide range of areas.

Although the creation of a specialized system for collecting, storing, processing, analyzing and utilizing genetic information in the form of a state biobank seems logical, in the Russian Federation there are obstacles that hinder its development. Challenges include the lack of clear regulations governing biobanking compared to classical institutions. According to experts, current technical standards for storing biological samples are insufficient.

Moreover, the Russian Federation has introduced GOST R ISO 20387-2021 [4], which is a national standard in the field of biotechnology and biobanking. This standard defines key terminology, establishes the basic legal and organizational principles of biobank activities, requirements for personnel, equipment, procedures for collecting and storing samples, as well as for quality control and record keeping. Despite its wide coverage, GOST does not cover standards for the disposal of biomaterials, with the exception of rules for maintaining documentation related to disposal.

The next significant obstacle to the development of biobanking is the ethical issues associated with the use of biological material and medical information of citizens for research purposes, even under conditions of anonymity. The key aspect here is the development and implementation of legal regulations regarding the processing of anonymized data, ensuring their confidentiality, protection and lawful use of human tissue in scientific work, which is a complex task.

Conclusion: The statistics of missing persons in Russia in recent years makes us think about the existing problems in society and the mechanisms for its protection. The formation of a unified state system for the collection, storage and research of human biological material, including DNA identification of an individual, is the highest priority task in our country, for the implementation of which there is sufficient potential and a scientific base. An analysis of the existing biobanking system has shown that biobanks are a key tool for the progress of modern medicine in general, including the creation of medicines and diagnostic methods, and represent the most important resource for personalized medicine and forensic identification examination. However, unlike a number of European countries, Russia does not have special laws on biobanking. Existing legal norms are “built-in” into existing fundamental regulations on public health and information protection. This state of affairs reveals the need to create and modernize the regulatory framework governing the functioning of biobanks in the Russian Federation. The development of state genomic registration, ensuring the establishment of proactive DNA certification and the creation of specialized institutions – biobanks – will increase the efficiency and speed of personal identification, the detection of crimes, the objectivity of the examinations performed, and will also ensure the safety and improve the quality of life of all citizens.

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