



# **A METHOD FOR OBTAINING PRECIPITATING SERUMS FOR THE DETECTION OF HUMAN SEMINAL FLUID USED IN THE STUDY OF PHYSICAL EVIDENCE IN FORENSIC BIOLOGICAL LABORATORIES**

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<b>Article history:</b>		<b>Abstract:</b>
<b>Received:</b>	December 8 <sup>th</sup> 2022	Serological research methods, while being considered highly effective, are affordable in comparison with morphological methods for studying semen stains on physical evidence and do not require large financial costs. In this work, on the basis of scientific research, a new scheme for obtaining precipitating sera that specifically reacts to human seminal fluid, intended for use in forensic laboratories, obtained by hyperimmunization of animal producers, has been developed.
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Currently, increased attention to human rights and increased requirements for judicial proceedings in Uzbekistan have led to a more responsible attitude to the evidence base of administrative and criminal acts. In turn, these factors contribute to an increase in the number of examinations, the bulk of which are examinations of physical evidence.

Investigations of cases concerning sexual inviolability due to the peculiar nature of the spots of human secretions is the reason for the seizure of a large amount of physical evidence at the scene of the incident, which is associated with a large amount of research to determine the seminal fluid in the studied objects.

In the interval before the discovery and seizure of physical evidence at the crime scene, traces of biological origin, in particular sperm, are destroyed or significantly destroyed under the influence of environmental factors (light, temperature, precipitation, high humidity, etc.) [6]. Part of the examinations of physical evidence are carried out after traces of biological origin on them are purposefully destroyed (erased, washed away). In addition, rapists are increasingly experiencing cases of oligospermia and azospermia. In this regard, the determination of the presence of sperm on physical evidence when using traditional laboratory research methods developed for a long time in expert practice causes certain difficulties [5,6]. Modern forensic medical literature [2,8] emphasizes the need for more sensitive methods for determining seminal fluid and other secretions of the human body. Precipitating serums are also widely used in clinical laboratories for the diagnosis of various diseases [3,4,7].

Today, morphological and chromatographic methods of detecting spermatozoa in seminal fluid are the most common in all forensic biological

departments of the Republican Scientific Medical Center of Forensic Medical Examination and its regional branches to determine the presence of sperm [1,5].

Among the forensic medical examinations performed in sexual crimes, it is especially important to establish the fact of sexual intercourse. However, methods for detecting and examining semen stains have not been sufficiently developed to date, which dictates the need to develop new effective and affordable methods for determining the presence of sperm on physical evidence [3,4].

Based on scientific research, a new scheme has been developed for "Obtaining precipitating serums specifically reacting to human seminal fluid intended for use in forensic laboratories", obtained by hyperimmunization of animal producers.

## **THE PURPOSE OF THE WORK**

Obtaining specific hyperimmune serums for the detection of seminal fluid on physical evidence by serological methods.

## **MATERIAL AND METHODS**

The work was carried out on the basis of the Khorezm branch of the Republican Scientific and Practical Center of Forensic Medical Examination. The research material is the immune serum of rabbits. 40 Chinchilla rabbits weighing 2.5-3 kg were used as producers of this serum. The animals that passed the veterinary examination were kept in quarantine for 45 days. Nutrition and maintenance did not differ from the requirements of the maintenance of these types of producers. To quickly involve a large number of lymph nodes in immunogenesis, the antigen was injected into several places, the injection points were located in the inguinal and axillary regions near the lymph nodes.



After making sure that these antibodies were absent in the blood of the producers, the producers were subcutaneously injected with antigens in the form of human seminal fluid.

The rabbits were divided into 4 groups of 10 individuals each. Animals of each group were immunized with different schemes. Rabbits of the 1st group were immunized with antigens with an interval of 15 days. The amount of antigen was 2 ml /kg. The 2nd group was immunized with antigens with an interval of 15 days. The amount of antigen was 2 ml/kg, but with the additional use of an antibiotic (ampicillin). The antigen was administered to group 3 animals every 5 days in increasing doses of 1; 1.5; 2; 2.5 ml/kg. Group 4 animals were also injected with antigen, every 5 days in increasing doses of 1; 1.5; 2; 2.5 ml /kg, but with additional use of an antibiotic (ampicillin). In immunized animals, blood was taken from the jugular vein every 5 days to titrate blood serum for the presence of human seminal fluid antigen. After four-fold immunization, 7 days later, blood was taken from the heart cavity. Method of investigation: the amount of specific antibodies formed (titer) was determined by the precipitation reaction according to the Chistovich –Ulengut method in a modified version and by the Oukhterloni method. In the future, after four-fold immunization, the nature of titer formation was studied. Separated rabbit serums were examined for specificity using animal and human antigens in the form of blood plasma at a dilution of 1:100.

## RESEARCH RESULTS

As shown by the study of the titer of antibodies in the blood serum, all 40 rabbits formed specific antibodies to human seminal fluid after immunization, only with a different titer. Postinjection abscesses were observed in 8 animals of group 1 and 7 of group 3 during immunization. The animals of the 2nd and 4th groups who received antibiotics had no abscesses. In rabbits with postinjection abscess, the antibody titer did not exceed 1:100. The intensity of antibody formation in group 1 was relatively low, only in 2 animals of this group the antibody titer was higher than 1:500. The intensity of the formation of the above antibodies in group 3 was higher than in group 1: at the end of immunization, the titer exceeded 1:500 in 5 rabbits.

In the 2nd group of animals, immunized with an interval of 15 days, a titer of 1:500 was formed only in 6. A titer above 1:500 was in 8 animals.

Serums obtained from rabbits of all groups were tested for specificity by antigens in the form of serum from cattle, poultry and humans. The antigens used were in a 1:100 dilution, the Chistovich – Ulengut and Oukhterloni methods were used. In the study with

these antigens, precipitation rings and precipitation bands were not formed within an hour.

The obtained serums with a titer above 1:500 were used to determine seminal fluid on physical evidence. The objects in which spermatozoa were found during the Seropyan method (morphological method) were studied. In all cases, positive results were obtained.

## CONCLUSIONS

1. The use in forensic medical practice of serological research methods in the form of precipitation reaction with the help of precipitating sera to detect seminal fluid expands the possibilities of forensic biological laboratories in the examination of physical evidence. Серологические методы исследования, считаясь высоко эффективными, являются более доступными, чем морфологические методы и не требуют больших финансовых затрат.

2. The use of antibacterial drugs in the immunization of animals simultaneously with antigens prevents the formation of abscesses, which further makes it possible to obtain relatively large titers of antibodies in the serum of animals. Преципитирующие сыворотки, используемые для определения наличия спермы и семенной жидкости с титром не менее 1:500 со специфическим воздействием, пригодны для выявления спермы на вещественных доказательствах в судебно-биологических отделах.

3. The proposed method of hyperimmunization of animals makes it possible to obtain precipitating serums that react specifically to human seminal fluid with a titer of at least 1:500. This, in turn, makes it possible to determine the presence of human sperm fluid by serological method.

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