

# **INVITATION LECTURES**

## **4. FORENSIC PATHOLOGY**



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## Qualification of the body injure

## Confidence of the methods for time estimation since death

**KEYWORDS:** Body injure; Qualification

**KEYWORDS:** Time of death; Body temperature

Qualification of the body injure in a trial process is one of the main task of the forensic experts. Medical forensic qualifications of the body injure mean using the knowledge and experience from all medical branches and is very important in delivering final verdict in court cases. A large number of the issued medical certificates qualifying the body injure and firstly court expert results are not used as evidence in delivering final court sentence. Criterion body injure - Qualification of the body injure is published in Criminal Low of R. Macedonian article 130 - body injure and article 131 - hard body injure. The purpose of this assignment is to explain the criterion to perform qualification of the body injure in Criminal Low of R. Macedonia.

The confidence of the expert giving the possible time of death is the most important in many cases. There are many methods in use, but they vary in the confidence and accuracy. The time of death is analyzed on the basis of the appearance of the rigor and livores mortis, temperature of the body, rectal and hepatic, electro activity of the facial muscles and reactivity of the eye on chemical excitations. Measuring the body temperature is the most valuable method, but for the early time since death the reaction of the pupilla and electro excitation of the facial muscles gives more precise results. The time since death is most appropriate to be expressed in a broad interval of hours or days. The more time has passed since death the larger the interval must be.



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## Reliability of the routine diagnosis of a sudden cardiac death

**KEYWORDS:** Sudden cardiac death; Forensic medicine

The sudden cardiac death is a remarkable medical problem all around the world, including the high developed countries, too. In these countries there is a problem of a precise and detailed postmortal diagnosis of the cases of a sudden cardiac death, which unfortunately, takes us away from solving this medical problem in terms of institutionalisation of eventual detection of those inclined to sudden cardiac death. Concerning the facts that in our country as well as abroad, very few sudden cardiac deaths go through the autopsy procedure, and concerning the insufficient postmortal diagnosis, the possibilities of forensic medicine and pathology are limited in solving this problem which includes the early detection of those inclined to a sudden cardiac death. This medical problem definitely asks for a more serious multidiscipline approach in its solving, because it fixes a valve on medicine and makes people be more confident in the possibilities of medicine, due to the fact that sudden deaths of healthy people, even sportsmen always discourage the inhabitants and lessen their confidence in the possibilities of modern medicine.

## 3,4 methylendioxyamphetamine, glycemia and glycogen in rat liver

**KEYWORDS:** Ecstasy; Glycogen; Liver

3,4 methylendioxyamphetamine (MDMA, Ecstasy) is apsihostimulative remedy. Having in mind the hepatotoxic and contradictory facts in the literature about the level of glycemia after consuming MDMA, we have decided to analyse glycemia and depot of glycogen in the liver. As experimental animals we selected the rats. Animals received 20mg/kg and 40 mg/kg MDMA. At appropriate environmental temperature of 12°C, 22°C, 32°C animals stayed 8 or 24 hours. Before sacrificing, the blood has been taken from the animals for defining glycemia and after sacrificing the right slice of the liver for pathohistological examination. The clippings of the tissue are colored with PAS method. The results showed that MDMA lead to decreasing of glycemia during eight hours of experiment and increasing of glycemia during 24 hours of experiment. Pathohistological survey shows emptying depot of glycogen in the liver within 24 hours.



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## Histological liver lesions depending on the duration of intravenous heroin intake

## Histopathological myocardial findings in drug abusers

**KEYWORDS:** Heroin; Liver lesions; Morphological changes

**KEYWORDS:** Myocarditis; Drug abusers; Histopathology

Significant morphological changes on the liver tissue very often cause reduced detoxicational function of the liver, which leads to reduced bitransformation of heroin and the growth of increased sensitivity of the brain centers to the influence of this drug and other toxins. Because of that, we have studied liver lesions in intravenous heroin addicts with a sudden death, usually related to overdosing. To facilitate the study, all autopsy cases of intravenous heroin intake were grouped according to the duration of intravenous heroin intake in 4 groups: duration of 2 years, duration between 2 and 5 years, between 5 and 10 years and the duration longer than 10 years. The liver specimens from 40 autopsy heroine abusers were fixed in 10% formaldehyde and routinely processed. Paraffin sections were stained with HE, PAS, Gomori, van Gieson, Congo red and PAP techniques. Panacinus diffusion of vesicular changes is present in 75% of the cases for those who abused heroin for more than 10 years. The frequency of chronic viral, primarily active hepatitis, increases with the duration of the length of time of heroin intake (14.5%, 37%, 77%, 100% for each group respectively). In this study cirrhosis was found in 30% of the analyzed cases and its presence grew with the increase of duration of heroin usage (0%, 6%, 66%, 75%). The liver amyloidosis was found in 22.5% of autopsies and it was always associated with various liver damages. Hepatocytes of 3 cases, in the group with long history of heroin abuse (more than 5 years), exhibited pleomorphism with hyperchromatic large nuclei and with abundant mitotic figures. Intravenous heroin intake leads to significant morphological changes on the liver tissue. The intensity of these changes is higher if the duration of heroin usage is longer.

The aim of this study is to make an analysis of the histological findings in drug abusers and to make a correlation between them and the type of drug. 25 cases, proved as drug abusers with the FPIA method, were autopsied at the Institute of Forensic Medicine and Criminology in Skopje, during the last year. Histological analysis of tissue samples of all organs, especially of the heart was made, using standard histological techniques, with differential staining and imunohistochemistry, if needed. There were 4 females and 21 males, at the mean age of 25 (min 17, max 47) yr. There were 15 abusers of heroin, one abuser of cocaine and 7 abusers of methadone. Although the reason of death was different, microhemorrhage at all serosaes, especially in the epicardium, endocardium and pleura, were found in all cases. There was an unusual case with a thrombus made of cotton fibers in a pancreatic vein. In 5 cases of opiate addicts the histological analysis found out a presence of chronic fibrous myocarditis. There were tick strands of connective tissue between muscle bands, focuses of myocytolysis, various degenerative changes of myocardial fibrils and discrete mononuclear infiltration. According to the literature data, endocarditis and myocardial fibrosis are usual findings in drug abusers, but myocarditis is very uncommon, so we consider our findings important to stress and follow up.



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## Post-mortal temperature of the body and time of death

**KEYWORDS:** Time of death; Body temperature

The time of death is of great interest in the forensic medicine expertise, especially in the case of a forced death with an unknown executor. In the early post mortal period, cooling of the body represents one of the important parameters for determining the time of death. The aim of this work is to make an analysis of the received results of the possible time of death by using Henssge's nomogram in order to determine the possibility of using this nomogram in our conditions and routine work. Measuring of the rectal temperature of the body is made with digital thermometer in 50 cases autopsied at our Institute, with a known time of death. At the same time the temperature of the environment is measured, the body weight and it is registered whether the body is dressed or naked. A discrepancy of several hours occurs when comparing the known time of death with the time of death determined by the Henssge's nomogram.

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## Application of the SEM/EDX method in the forensic medical practice

**KEYWORDS:** SEM/EDX method; Forensic medical practice; Application

A scanning electric microscopy with an energetic disperse attachment including X-ray (SEM/EDX) has been used in the criminological technical practice in cases of clearing up the crimes committed with firearms since the beginning of the nineties of the twentieth century. This primarily relates to the identification of persons suspected to have used firearms while committing a crime. However, the SEM/EDX method can very effectively be applied in determination of the distance of shooting. Giving an expert opinion on the distance of firing means determining the distance between the mouth of the firearm barrel and the damage made on the clothes (body) of the person who was injured with that weapon. Determination of the shooting distance is an essential, quite often, crucial fact for the classification of the crime committed with a firearm. Whether it concerns a justifiable self-defense, exceeding of a justifiable self-defense or something else, will depend on how long the distance was between the accused and the damaged. In cases when the projectile first hit the garment which the person who was injured by the firearm, was wearing, then the expert opinion on the shooting distance is in the domain of the expert in the criminological chemistry. In cases when the projectile fired from the weapon directly hit the human body, the expert opinion on the shooting distance is then asked from the expert in the forensic medicine. It frequently happens, and the author supports it himself, that these expert opinions are given as a team work, i.e. by the commission members. This team consisting of experts in the criminological chemistry and experts in the forensic medicine should also include an expert in the criminological ballistics. The SEM/EDX method detects the GSR particles (gunshot residues). The GSR particles appear during shooting a bullet from the firearm and they originate from the elements of the initial powder charge of the cartridge (mostly antimony, lead and barium). When firing a bullet from the firearm, the GSR particles spread (deposit) over: I) hands of the person who fires, II) the mouth of the projectile firearm barrel. By means of I) depositing we carry out identification of the person who fired from the projectile firearm and by means of II) we define the shooting distance. Therefore, the application of the SEM/EDX in giving an expert opinion on the shooting distance on the human body will comprise the following: separation of the GSR particles by a convenient device nearby the injury in the human body. This may be done by means of an aluminum metal carrier with a sticky foil; detection of the GSR particles and counting of them in the specified sq. area unit; comparison of the GSR per area unit of the subject (disputable) sample with the number of the GSR particles in the same area unit achieved in the laboratory conditions during test (indisputable) firing from various distance but using the same type of the firearm and the same ammunition. An expert opinion on the shooting distance to the human body (and generally) is very reliable when the SEM/EDX method is used because the GSR particles arise only during firing a bullet from the firearm and in no other way. Moreover, the SEM/EDX method may identify the projectile which has caused a criminal act, for example, whether it concerns a projectile with a lead lining or some other sort of perpetrator of the crime caused by a firearm. At the end of this abstract, I would like to mention that this method may face some little problems when applied in cases when the surroundings of the injury caused by the firearm deeply soaked in blood. With this connection, it is necessary to improve this method in the direction of more effective sampling of the GSR particles from the surroundings of the injury soaked in blood.