



**26<sup>TH</sup> INTERNATIONAL MEETING ON  
FORENSIC MEDICINE  
ALPE – ADRIA – PANNONIA**

**ABSTRACT BOOK**

**Pula, Croatia  
2018**



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Pula, Croatia  
30 May – 2 June 2018

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# SCIENTIFIC SESSION ABSTRACTS

# 1. DAKSA - EXHUMATION AND IDENTIFICATION OF THE WORLD WAR II MASS GRAVE

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The paper presents and describes the organization, field work, forensic anthropological examination and DNA analysis conducted to identify the victims from a World War II mass grave found on the Dalmatian island of Daksa near Dubrovnik (Croatia) in 2009. Excavation of the site was performed according to standard archeological procedures. A basic anthropological examination was made to determine the minimum number of victims, sex, age at death, and height. The bones with pathological and traumatic changes were identified. DNA was extracted from powdered bones and relatives' blood samples. Y-chromosome and autosomal short tandem repeats (STR) were used to establish the relationship of the remains with the putative family members. The remains were found to belong to at least 53 distinctive victims. All were male, mostly with gunshot wounds to the head. DNA analysis and cross-matching of the samples with relatives resulted in 18 positive identifications. Presented is positive identification in a case where great-grandfather's brother was identified by matching with great-grandsons' paternally inherited Y chromosome.

Keywords: Bone samples; DNA analysis; Identification; Mass graves; Skeletal remains



## 2. THE FRAME OF THE FORENSIC APPROCH TO THE ISSUE OF THE MISSING

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Introduction: The issue of the Missing continues to be a regional problem with the forensic challenges. For further progress of this issue it is necessary to intensify and coordinate activities of all competent authorities and institutions on resolving this matter, which would provide systematically, continuous progress and provide answers to the families of the Missing. Data of the International Committee of the Red Cross (ICRC), 10,653 persons in the region are still unaccounted for, out of which number 1,652 of them is on the Kosovo and Metohija. The Commission on Missing Persons of the Government of the Republic of Serbia was formed by the Decision of the Government of the Republic of Serbia on 8th of June 2006, with a mandate to resolve the issue of persons who went missing during the armed conflicts on the territory of SFRY and the Kosovo and Metohija. Approximately 5800 persons went missing during the conflict on the Kosovo and Metohija, after 1998. Faith of about 1652 persons remained unknown to this day.

Materials and Methods: The Commission on Missing Persons implemented a number of measures and activities at different levels in order to expedite solving the cases of missing persons. These activities involved, *inter alia*, field checks, surveys, exhumations, re-exhumations, re-associations, identifications and handover of mortal remains.

The main objectives are: clarifying the fate of the missing persons with the aim of promoting the right to justice, offering certainty to the relatives of the victims, as well as supporting comprehensive facing the past in Serbia and Kosovo: carrying out excavations, exhumations and identifications in order to clarify the fate of the missing persons that might be recovered in Kosovo and Metohija and in Serbia. In view of the gravity of the situation and bearing in mind the scope of the activities to be undertaken in a period of time, in compliance with the democratic principles and fundamental human rights as provided for in particular by the Universal Declaration of Human Rights.

Keywords: missing persons, forensic, approach, human rights.

### 3. SOLVING COLD CASES WITH OLD METHODS: IDENTIFICATION OF THREE GERMAN SOLDIERS KILLED IN 1944

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**Objective:** In these days of DNA technology, it remains possible to obtain results with good old “detective work”. We present the cases of 3 German soldiers who, although they had initially been considered non-identifiable by the Volksbund (German War Graves Commission), ended up being identified after we reviewed their files. 15<sup>th</sup>

**Methods:** While investigating cases of unidentified bodies of German soldiers killed in southern France in 1944, we noted the existence of several cases for which it seemed that a review of their files might enable the discovery of previously overlooked correlations that could lead to their identification. Our methodology consisted in reevaluating exhumation reports prepared by the Volksbund and comparing them to other sources, such as lists of missing compiled by the Red Cross. We also performed field investigations at former exhumation sites.

**Results:** Case 1 consisted of a set of remains discovered in 2006, still wearing an identification (ID) tag. After being examined by authorities in Berlin, it was noted that no missing soldier corresponding to the inscriptions on the tag could be found. The body was therefore reburied as unknown. However, after analyzing the ID tag inscriptions we were able to prove that they had been misread in Berlin, and proposed a different reading that enabled the body to be identified. In case 2 a German soldier had been buried by the US army under the name Enno Strubel, who did not correspond to any known missing man. We noted that an Enno Strobel was reported missing at the same date and location as “Enno Strubel”, which enabled the body to be correctly identified as Enno Strobel. In case 3, we discovered the ID tag of a soldier named Alois Gallus at a site where the Volksbund had exhumed an unknown body in 1958, enabling him to be identified.

**Discussion:** War graves commissions are often understaffed and severely overworked, leading to a certain number of solvable cases being overlooked. Reevaluation of such cases by interested third parties can result in their resolution. In two of the three cases mentioned here, living siblings were located and were very thankful of our work. Strobel's brother visited Strobel's grave in the months following his correct identification, and Gallus' family had an article about their relative published in a local newspaper. As long as close relatives survive, the identification of bodies remains as important 74 year on as it was on day one.

**Keywords:** World War II, identification, German soldier, identification tag, missing in action.

#### 4. GENETIC IDENTIFICATION OF HUMAN REMAINS: A TEN-YEAR EXPERIENCE

**Lara Consoloni<sup>1</sup>, Alessandro Manfredi<sup>1</sup>, Fabio Bassan<sup>1</sup>, Carlo Scorretti<sup>1</sup>, Solange Sorçaburu Ciglieri<sup>1</sup>, Paolo Fattorini<sup>1</sup>**

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DNA technology is an irreplaceable tool for the identification of human remains. In this work, the survey of the Forensic Medicine Institute of Trieste (Italy), in the decade 2007-2017, is presented. Out of the total of n=17 case-works, 14 were performed for personal identification (P.I.) while the remaining three were performed for paternity testing (P.T.). The *post mortem* interval (P.M.I.) ranged from 10 days to 25 years. DNA typing was performed, in each case, by analysing at least two different specimens collected from the same body/skeleton. In the cases performed for P.I., the *ante mortem* reference samples (A.M.R.S.) was represented by first-degree relative DNA profiles (n=12), Interpol DNA profile (n=1) and personal belongings (n=1). The comparison of the genetic profiles allowed to the positive identification (Likelihood Ratio > 10,000) of the human remains in 14/14 cases. Out of the three P.T., one exclusion was found while a probability of paternity > 99.999 was achieved in the remaining two cases.

Although our survey is small, few conclusions can be however made. Firstly, no correlation between the P.M.I. and the quality of the DNA profile was observed. Most importantly, the reliability of the A.M.R.S. was confirmed to play the crucial rule. Two cases of extra-pair paternity, in fact, were found by the way, and only the availability of the appropriate reference sample (e.g., the maternal one) avoided misleading conclusions. Lastly, even the employment of personal belongings (tooth brushing and razors, for example) such as A.M.R.S. can lead to incorrect conclusion. The reasons for this undesirable outcome are discussed.

Keywords: forensic genetics; personal identification; human remains; ante mortem reference samples; DNA profile

## 5. POSSIBILITIES FOR THE USE OF DERMATOGLYPHICS METHOD WITH THE AIM OF DETERMINING THE REGIONAL BELONGING OF UKRAINIANS

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Dermatoglyphics is a section of human morphology that studies the skin relief of palmar and plantar surfaces of a human body formed by papillary lines. In addition to humans, this figure can be detected only by some representatives of hominids (chimpanzees and gorillas). Such a specific skin relief can be considered a kind of genetic "marker", which makes it possible not only to predict to some extent the occurrence of certain diseases, predisposition to them, to a certain kind of sports and work, but is also a "reflection" of centuries-old migration processes. In view of the intensification of armed conflicts in the world, which, in turn, also lead to an increase in the level of migration and aggravation of the crime situation, there is a need to create and implement in practice a simple, cheap and convenient screening method that would allow the determination of ethnic and regional affiliation of person. Such a method could be a fingerprint, an interest in which has grown over the past decades around the world. The issue of studying dermatological features among various ethnic minority groups is relevant worldwide. It should be noted works by D. Awuah, V. Dzogbefia, P. Kumar from Ghana, Dorjee B., T. Nutan from India, and Karmakar B. from Egypt, who explored the peculiarities of the skin relief in representatives of ethnic minorities. As for the definition of the characteristics of dermatological characteristics of Ukrainians, the first works on this topic can be found from the end of the 19th century when the first attempts were made to make a dermatological map of Ukrainians. Further appeared works build on ethnic or historical regions, and there were works aimed at the study of isolated ethnic groups living on the territory of Ukraine. For example, Kozan N.M. studied the features of the dermatoglyphics of Hutsuls, Boykos and Lemkos living in the territory of modern Western Ukraine. However, the work aimed at finding specific markers for the purpose of identifying the regional belonging of persons in the conditions of a modern administrative-territorial division practically does not exist. Conducting a study that could identify the features of dermatological markers of Ukrainians, taking into account the current administrative boundaries of Ukraine, would enable the identification of specific features, characteristic for a particular region, which in the future can be applied in practice to identify unknown individuals, namely, to assume them regional origin.

Keywords: identification of persons; dermatoglyphics; regional affiliation; forensic anthropology.

## 6. KORIĆAN'S CLIFFS: BETWEEN PRIMARY AND SECONDARY MASS GRAVE

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Introduction: Pedestal and Stratigraphic methods are used for excavation of mass graves. In the Pedestal method, the soil around the body mass is removed below the lower boundary of the grave, allowing complete viewing from all angles and access to all bodies along the outer margins and top of the grave. In stratigraphic method, mass grave is treated as a single site: bodies and artifacts are excavated from top to bottom, removing evidence in reverse order to which it was deposited into the grave. Case report: Korićan's cliffs were place of mass murder of more than 200 men during the Bosnian 1992 – 1995 war. In September of 2017 mass grave was found. One that was unique and the bones were utterly mixed up. This mass grave wasn't robed, skeletal remains were close to place where they died but because of the moving of the bodies this could not be considered as a primary mass grave. In addition, this mass grave did not have all the signs of a secondary mass grave. The exhumation team found the first remains about a meter-and-a-half deep under the rocks. Forensic medicine specialists during excavation process could not connect corresponding bones for majority of remains. Team used stratigraphic method with separation in 4 sectors: Bodies and artifacts were excavated from top to bottom. There was always the danger of landslide and falling rocks above the team. The exhumation team put the emphasis on the search for skulls as a way of minimal number of individuals for estimation on the site, and body parts where it could be sure that those bones belong to the same individual. In total 86 complete skulls were found, 137 body parts and a couple of hundreds small bones that could not be appointed. The bones were transported to the Identification Center. Over 1300 samples for DNA analysis were taken and are now awaiting DNA results.

Conclusion: In mass graves with this kind of bone mixing it is hard to choose an adequate method of exhumation. Stratigraphic method with separation in sectors and layers could be a way of collecting remains from mass graves with large scale of bone mixing.

Keywords: Korićan's cliffs, mass grave, stratigraphic method

## 7. HISTOLOGICAL DIAGNOSIS OF BECHTEREW'S DISEASE ON EXHUMATED REMAIN: A CASE REPORT

**Emina Spahić<sup>1</sup>, Nermin Sarajlić<sup>1</sup>, Mirsad Dorić<sup>2</sup>, Adis Salihbegović<sup>1</sup>, Anes Jogunčić<sup>1</sup>**

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Advanced Bechterew's disease (Ankylosing spondylitis) presents with increasing ossification of spinal column, from lower lumbar segments upwards, first causing the impossibility of lumbar spine torsion. The pathological process first causes the inflammation of the ligaments and joints around the spine, then the formation of syndesmophytes, and finally the fusion of vertebral bodies occurs. The disease affects the spine, joints between the ribs and spine, jaw joints, and rarely small joints of the fingers and feet. Through the progression of the disease and the reduction of mobility, a typical spinal change of the vertebral column is produced, which resembles a "bamboo stick". Ankylosing spondylitis is a serious ailment that affects people, with the first appearance of the signs or symptoms usually occurring between the ages of 15 and 45. While the condition is most prevalent in men, women are not immune to the disease.

In April 2018, 25 years after the last war, we exhumated 11 human remains near the city Višegrad. All the remains were completely skeletonised. The vertebra column of a female was specific and shaped like a bamboo branch, with a partial coalescence of vertebral bodies in the lumbar region of the vertebral column and with the total coalescence in the thoracic part. The spinous processes were completely coalesced. Her son had given us the information that she had trouble walking and doing normal activities during her lifetime.

The samples for analysis and pathological diagnostics were used to determine the real bone condition. This case study demonstrates how macroscopic and microscopic analyzes can be useful in the identification from a forensic point of view.

Keywords: Bechterew disease, exhumation, pathology, identification

## 8. PSYCHOACTIVE SUBSTANCES: TRENDS, CHALLENGES AND SUGGESTIONS FOR PREVENTION

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The trends of psychoactive substance use in Vilnius region (Lithuania) were evaluated. During 2013 - 2017, 190 autopsy results were collected, aiming to identify the dominating drugs and other illicit substances, emphasizing on the cause of death. The database of the Republican Center for Addictive Disorders (RCAD) was used in order to evaluate whether the deceased were diagnosed with an addictive disorder and whether they received any treatment. Forensic toxicology results revealed that morphine remained the dominating drug throughout the selected period, with a peak of heroin in 2013. Karfentanil was detected in 2014, with several cases appearing in 2016 and 2017. 6 cases of death due to an unidentified psychoactive substance were detected in 2017. Also, satellite substances were determined alongside opioids and opiates, with diphenhydramine and clonazepam dominating. Out of 190 deceased, men contributed for 83 % (n=157), women made the minority with 17 % (n=33). The mean age of the illicit substances users was  $36.72 \pm 10.8$ . In 53 % of cases, ethanol was present alongside other psychoactive substances. The mean blood ethanol concentration was  $1.65 \pm 0.79$  g/L. The mean urine ethyl alcohol concentration was  $2.17 \pm 1.1$  g/L. Furthermore, the main cause of death was determined as toxic ethyl alcohol and drug effect in 73 cases. The toxic effect of psychoactive substance as a cause of death was identified in 65 cases. 53 % (n=101) of the deceased were present in the database of the Republican Center for Addictive Disorders. Among those, 37 % were diagnosed with F11.2 addictive disorder using The International Statistical Classification of Diseases and Related Health Problems (IDC-10 system), 20 % received the Methadone Maintenance treatment (MMT), and 9 % received Suboxone. Only 2 % received rehabilitation in the RCAD facilities. The collected data is important in order to determine the trends of psychoactive substances use, establishing the dominating causes of death. The collected information is crucial for a progressive prevention program including mandatory rehabilitation, educating drug users with the risks of combining alcohol and drugs. Furthermore, more strict conditions of the Methadone program need to be established in order for a successful addictive disorder treatment.

Keywords: Autopsy; Cause of death; Forensic toxicology; Psychoactive substances; Addictive disorders.

## 9. BETA-HYDROXYBUTYRATE ANALYSIS CAN CLARIFY SOME COLD CASES?

**Eduard Kralj<sup>1</sup>, Andrea Grof<sup>1</sup>, Gordana Koželj<sup>1</sup>, Alenka Sešek-Briški<sup>2</sup>, Jože Balažič<sup>1</sup>**

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Introduction: Beta-hydroxybutyrate (BOHB) is the most reliable postmortem indicator of ketoacidosis which can cause death or significantly contribute to death mostly in alcoholics and diabetics and may be found in up to 1 % of medico legal autopsies. Therefore, it is frequently measured at the Institute of Forensic Medicine in Ljubljana, especially in otherwise inexplicable deaths.

Materials & methods: These measurements are performed in the clinical laboratory with Autoanalyser Olympus AU 400 using Rambut detection kit for BOHB, along with measurements of glucose, lactate, urea, K<sup>+</sup>, Na<sup>+</sup> and Cl<sup>-</sup>. To limit the costs, analyses are preferably performed stepwise, starting with vitreous fluid and urine. Results can be obtained during the very autopsy enabling immediate diagnosis of the metabolic cause of death as well as forensic pathologist's decision regarding the necessity of analysis of other bodily fluids. Diagnostic of ketoacidosis is additionally supported by alcohol determination, which also reveals acetone concentration. Another very useful analysis is determination of HbA1c, which helps discriminating whether the underlying cause of ketoacidosis was alcohol abuse or diabetes. Since 2010 such analyses have been performed in 1654 cases. However, in quite a few cases, where postmortem chemistry was not performed, macroscopic, microscopic and toxicological findings failed to reveal the cause of death. Hoping that postmortem chemistry might clarify some of these cases, we have decided to examine the feasibility and reliability of postponed BOHB analysis. For this purpose, we have retested available samples of bodily fluids of 54 deceased, which were already analyzed and subsequently stored refrigerated.

Results: Initial BOHB measurements revealed 52 cases with vitreous BOHB levels >4000  $\mu$ mol/L (considered critical upon Brinkmann's proposal) and additional 4 cases with BOHB levels >4000  $\mu$ mol/L in blood, serum or pericardial fluid. All together BOHB values indicating fatal or potentially fatal ketoacidosis were found at 0.61% of all autopsies, but we believe the real figure is higher. The comparison of initial testing and retesting results revealed a general decrease in BOHB values, on average by 15% in urine and 20% – 30% in other fluids. The samples showing substantial decrease of BOHB were mostly greenish, opaque or fetid, which is easily recognizable.

Conclusion: Deferred postmortem BOHB analysis might clarify some of the cases with unascertained cause of death by revealing initially unrecognized ketoacidosis. Plausible conclusions could be expected if noticeably deteriorated samples are excluded and beside urine at least one body fluid analyzed.

Keywords: Beta-hydroxybutyrate; ketoacidosis; postponed analysis



## 10. Determination of synthetic cannabinoid receptor agonists by SFC-MS/MS

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Synthetic cannabinoid receptor agonists are a class of chemicals that bind to cannabinoid receptors in the body. They are marketed as designer drugs for recreational use. They can cause a number of significant negative side effects including seizures, hallucinations, severe anxiety and paranoia.

Synthetic cannabinoids involve a lot of compounds with very similar structures, the identification of them is very important task in the forensic toxicology. Because of their lipophilicity and without information about their *in vivo* metabolism, analysis of the parent compounds from blood sample would be required. In our toxicology laboratory salting-out assisted liquid-liquid microextraction followed by SFC-MS/MS (supercritical fluid chromatography coupled with triple quadrupole mass spectrometer) technique is used for the analysis of blood and urine samples, which makes possible to determine the mentioned compounds in very small concentration (limit of quantification is 0.02 ng/ml, cut off value is 0.05 ng/ml).

Keywords: synthetic cannabinoids, SFC-MS/MS, blood, urine

## 11. SUDDEN DEATH AFTER DESIGNER DRUG (N-ETHYL-HEXEDRONE) CONSUMPTION

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A 23 years old man ingested and/or sniffed "crystal" and smoked synthetic cannabinoid a few hours before death. The cause of death was thought natural first by the doctor and police officer but after autopsy, toxicological investigation and analysis of history it was classified as unnatural death. In the blood sample taken during the autopsy 285 ng/ml N-ethyl-hexedrone and in low blood concentration ADB-FUBINACA and its metabolite were identified. Two years earlier he was involved in a traffic accident and then pentedrone and alpha-PVP were found in his urine. According to the medical history heart murmur (at the age of 10 years) and grand mal type epilepsy (at the age of 19) were diagnosed. According to the autopsy we found some signs which refers to acute intoxication (oedema in the brain, lung, subpleural diffuse petechial, contraction bands necrosis, acute tubular necrosis), to sniff (hyperaemic nasal mucus) and to chronic abuse (microglial degeneration, dilated cardiomyopathy, lymphocyte interstitial pneumonitis, non-alcoholic steatohepatitis (NASH), nodular neuronal hyperplasia in the nasal cavity, atherosclerosis). This case emphasizes the risk of death associated with regular consumption of stimulant new psychoactive drugs, designer drug and serious health damage among the younger population.

Keywords: synthetic cathinones; N-ethyl-hexedrone; synthetic cannabinoids and metabolite; ADB-FUBINACA; acute and chronic drug abuse

## 12. UNUSUAL CASE OF INTOXICATION WITH MONOSAN

**Marija Bujaroska<sup>1</sup>, Zorica Stojcheska<sup>1</sup>, Natasha Bitoljanu<sup>1</sup>, Goran Pavlovski<sup>1</sup>, Ariton Rakipi<sup>1</sup>, Verica Poposka<sup>1</sup>, Biljana Janeska<sup>1</sup>, Zdravko Chakar<sup>1</sup>**

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Death related with 2, 4-dichlorophenoxyacetic acid (2, 4-D) intoxication are very uncommon. 2, 4-dichlorophenoxyacetic acid is used as agricultural herbicides for the control of broad-leaved weeds. Case report: A 61-year-old male was found with deteriorated consciousness by his neighbor in the backyard. He admitted that he had ingested *Monosan* (2, 4-D). When he was hospitalized he had lost consciousness. Despite a treatment with atropine and adrenaline, the hemodynamic status deteriorated rapidly leading to death a few hours after admission. During the autopsy blood, stomach content and kidney were obtained for toxicological analyzes. Urine is the most common biological sample used for determination of pesticides such as 2, 4-D. For that reason kidney tissue was taken as an alternative sample for urine. Due to the toxin was never identified before in our laboratory, standard GC-MS screening was performed. Sample preparation included ion-exchange solid-phase extraction for blood and liquid-liquid extraction (using ExtrelutNT20 columns) for gastric content and kidney. Extracts were evaporated to dryness, reconstituted in methanol and than analyzed with GC-MS in full scan mode. Identification of substances was performed by library search using PMW Drug and Pesticides Library (PMW\_tox3). *2,4-dichlorophenoxyacetic acid (2, 4-D), 2,4-D methyl ester and it's metabolite 2,4-dichlorophenol were identified in blood and gastric content. In kidney extract were identified only 2,4-D methyl ester and 2,4-dichlorophenol. Despite literature findings that GC-ECD and HPLC methods provide higher sensitivity, and LC-MS-MS is the most suitable technique for this class of herbicides, in this rare case of intoxication with herbicide of chlorophenoxy acids class, toxic agent was determinate without using any derivatizing agent.*

Keywords: 2, 4-dichlorophenoxyacetic acid, GC-MS, intoxication.

### 13. NEW PSICHOACTIVE STIMULANTS IN TOXICOLOGICAL CASES (SOUTH-WEST HUNGARY)

**Ágnes Lakatos<sup>1</sup>, Mátyás Mayer<sup>2</sup>, Mónika Kuzma<sup>2</sup>, Attila Miseta<sup>1</sup>, Anikó Lajtai<sup>1</sup>**

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**Background:** In Hungary as in other European countries, the first representative of the new psychoactive substances (NPS) ("designer drugs") was mephedrone emerged at the beginning of 2010. From this year the market of the recreational drugs and the preferences of drug users has changed radically: New agents are more prevalent than the stimulant-type traditional illegal drugs. This new trend makes excessive challenge to the toxicologists because of the lack of reference materials. Also there is no information about the metabolism of these new compounds. The new psychoactive agents are structurally similar compounds however the number of them increases week by week there are only few scientific publications deal with these substances.

**Materials:** The examined samples originate from those urine and serum samples arrived for toxicological analysis between 2010 and 2017 and found to be positive for recreational drugs with stimulant potency. (n=1556).

**Method:** Shimadzu Prominence TOX.I.S. II. HPLC DAD system was used for the analyses.

**Results:** The most commonly detected stimulant type new psychoactive substances were (in the order of their frequency): pentedrone, mephedrone, alpha-PVP, MDPV, N-ethyl-hexedrone, N-ethyl-pentylone. The most preferred NPS are those one which keep one step ahead the legal regulation.

**Conclusions:** In Hungary the most popular new psychoactive stimulants are the cathinones. The frequency of these materials detected in the biological materials nowadays has decreasing tendency however in our samples the shrinking is markedly less than in the seizure statistics in our country.

**Keywords:** New psychoactive substance (NPS); stimulant drug; HPLC-DAD; mephedrone, N-ethyl-hexedrone

## 14. VITREOUS HUMOR ALCOHOL – OUR EXPERIENCE

**Marina Nestić<sup>1</sup>, Tajana Mraović<sup>1</sup>**

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The analysis of alcohol in the blood and the urine samples of the deceased is a routine procedure for almost every deceased person autopsied at the Department of Forensic Medicine in Zagreb. In the absence of blood, muscle tissue has been collected. Since autumn 2014, a sample of the vitreous humor is also required to collect at autopsy together with already mentioned samples for analysis of alcohol, according to the Ordinance on the taking of blood and urine samples for analysis of alcohol (Official Gazette of the Republic of Croatia, NN 86/14).

We checked the usefulness of the vitreous humor sample in the interpretation of alcohol intoxication by analyzing the alcohol concentrations results in postmortem biological samples collected between 2015 and 2017.

Keywords: vitreous humor; alcohol

## 15. DESIGNER DRUG ASSOCIATED DEATHS IN BARANYA COUNTY, HUNGARY

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The use of designer-drugs became widespread among drug abusers in Hungary since 2010. The obscure effects and toxicity of these drugs presents large problems in forensic evaluation of possible overdose cases. Three cases of fatal overdose with various designer drugs are presented. In two of these cases, subendocardial myocardial infarction developed after the use of different synthetic cannabinoids (ADB-PINACA, EAM-2201, ADB-FUBINACA), and in one case, the death of a young, healthy male occurred after the combined use of N-ethyl-norhexedrone, alprazolam and ethyl-alcohol.

Keywords: forensics, autopsy, overdose, synthetic cannabinoids, cathinones

## 16. CASE REPORT: ACUTE DEATH DUE TO ETHANOL, MEDICATION AND DRUGS INTERACTION

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Disulfiram (DSF) is a type of medication widely prescribed in order to cease alcohol consumption. When used with alcohol, a “disulfiram-alcohol reaction” occurs, causing nausea and vomiting. Disulfiram blocks alcohol dissolving enzymes thus increasing acetaldehyde concentration and inducing the mentioned symptoms. These undesirable symptoms are similar to the side effects that occur to oncological patients after the administration of chemotherapy. When treating oncological diseases, cannabis is legalised in medical practice, as it effectively suppresses undesired symptoms. Case: the body of a 52-year-old man with no external injuries was examined. Autopsy findings: two white, stiff scars were found at the both sides of the lower region of the abdomen. After separating the skin at the scar projection in the fatty tissue, four pills of unidentified substance were found at each side. Toxicology tests revealed a 1.95 ‰ of blood ethyl alcohol and 3.59 ‰ of ethyl alcohol in urine. Furthermore, 2000 ng/ml of citalopram, and 240 ng/ml of tetrahydrocannabinol acid were found in the urine. 0,06 mg/L of disulfiram and traces (81 ng) of citalopram were found in blood. Removed pills were identified as disulfiram.

The primary abstinence at the beginning of treatment by disulfiram, doesn't guarantee that alcohol usage will not appear again at the further stages of treatment. Alcohol addiction forces patients to search for a way to avoid the unwanted reactions. Sometimes, patients tend to be quite ingenious, while trying to suppress the arising side effects. Quite often it involves the usage of additional medication. When alcohol addiction overpowers, the patient tries to reduce the undesirable symptoms and may even die if combines alcohol with disulfiram. A death occurs due to the cardio and neurotoxic effect of acetaldehyde. Before starting treatment with implanted DSF, the doctor must evaluate patient's cardiological condition because of the possible, direct, cardiotoxic effect of acetaldehyde. The patient must receive a complex of consultations including seeing a toxicologist and a psychiatrist. This is necessary to fully understand the possible negative effects of DSF treatment regime violations.

Keywords: forensic science; forensic toxicology; disulfiram; autopsy; drugs.

## 17. LETHAL INTOXICATIONS WITH PRESCRIPTION PSYCHOACTIVE DRUGS

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Introduction: Consumption of prescription psychoactive drugs in Slovak Republic has increased significantly in recent years. Their use / abuse represents a serious health and social problem. Analysis of its fatal consequences is one of the essential indicators of the seriousness of the problem.

Objective: The aim of the work is to present results of retrospective – prospective analysis of cases of direct prescription psychoactive drugs related deaths in the period of years 2001 – 2016 in autopsy material of Bratislava forensic medicine workplaces.

Methods: The study included all those deceased who died in relation to prescription psychoactive drug use / abuse in the territory of the Bratislava and Trnava regions (Slovakia) and were submitted to medico-legal autopsy and toxicological investigation at the Institute of Forensic Medicine of the Faculty of Medicine of Comenius University and the Institute of Forensic Medicine of Health Care Surveillance Authority in Bratislava within sixteen-year period of the years 2001 - 2016. Cases were evaluated according to occurrence of cases in particular years, sex, age, drugs detected, cause of death, external cause of death etc. Statistical analyses were made by means of SPSS software.

Results: During the monitored period, 14 977 autopsies were carried out in the mentioned workplaces. The criteria matched 112 cases – 0.7 % of all performed autopsies. Males comprised 60 % of all cases and females 40 %. The age category up to 34 years represented 80 % of cases. Benzodiazepines were the most frequently detected as a main substance in 45 % of cases, totally, in combination with other substances in 57 % of cases. Combination with ethanol was found in 39 % of cases, of which in 70 % it was combined also with benzodiazepines. In Bratislava region, 73% of the deaths were found. External cause of death was suicide – in 67 % of the cases, 54 % of the deaths occurred in the domestic environment.

Conclusion: The results of the analysis point to a high risk of benzodiazepine use / misuse, possibly combined with ethanol. The results of our study showed relatively high participation rate of prescription drugs on fatal cases related to drug abuse. This fact highlights the need to pay more attention to the indication of the treatment and to control of prescription in treated psychiatric patients, especially those at risk of suicide.

Keywords: lethal intoxication; drug related deaths; prescription psychoactive drugs; autopsy; toxicological analysis



## 18. DETECTIONS AND METABOLISM OF THREE SYNTHETIC CANNABINOIDS

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The synthetic cannabinoids appeared in Hungary in 2010. At present, in our laboratory, we focus on the detection of parent compounds through routine analysis of biological samples. Their concentration in urine is often below 1 ng/ml, so we tend to develop the sensitivity. It seems to be an indisputable fact that they can be detected by identification of their metabolites. We have studied the metabolism of three synthetic cannabinoids (MDMB-CHMICA, ADB-FUBINACA, CUMYL-PEGACLONE) by in vitro human liver microsomal experimentations. After the identification of metabolites, their presence could be detected also in parent compound positive urines. In a death case, the consumption of ADB-FUBINACA could be proven only by the identification of metabolites. Today, we examine the metabolism of CUMYL-PEGACLONE, that has shown up last year, through human liver microsomal incubation and through hepatocytes experimentations. We also examine the liver- and neuronal toxicity of the compound. Our goal is to screen the metabolites of synthetic cannabinoids as a routine in the future.

Keywords: synthetic cannabinoids; detection; metabolism; human liver microsomes; ADB-FUBINACA; CUMYL-PEGACLONE

## 19. INERT GASES SUICIDE: THE UNCATCHABLES?!

**Petar Škavić<sup>1</sup>, Anita Galić-Mihić<sup>1</sup>, Marina Nestić<sup>1</sup>, Tajana Mraović<sup>1</sup>**

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Since the publication of various right to die literature in the early 1990s such as *Final Exit: The Practicalities of Self-Deliverance and Assisted Suicide for the Dying*, there has been a promotion of various suicide methods of which some are completely new. The aforementioned book introduced the EXIT bag as a method of suicide and caused immediate increase of such suicides. In the early 2000s the adaptation of the EXIT bag using simultaneous inert gases inhalation caused a wave of such suicides firstly in North America and Australia and then around the World. The explosive increase in the number of such suicides happened because it was advertised as (virtually) undetectable and provided a pain-free method of ending one's life. The proof there is/was a massive hysteria and a great number of helium-asphyxia suicides is a move by Balloon Time, one of, if not the, world's largest manufacturer for party balloons and equipment to start mixing a minimum of 20% of oxygen in their helium tanks to make them inappropriate for such uses. The forensic importance and size of the inert gases suicide wave is evident from the numerous case report series from around the world presenting first cases of inert gases asphyxia suicides in particular countries. They firstly concentrated on the circumstances of death and autopsy findings as a novelty, but as soon as they attempted to detect the presence of helium or other inert gases in specimens taken from the deceased different problems arose. Helium for instance is the carrier gas in most GC-MS machines so it is present in all analyses as a confounder. Therefore, some Institutes have started switched helium to nitrogen as a carrier gas in their GC – MS machines in order to detect helium in the deceased, but there are still major problems of proving the presence of helium and other inert gases in the deceased due to the rapid loss of analyte and the need for fast and secure sampling. We have had three cases of inert gases suicides (helium) in history that we will present. Regretfully, we have not been able to detect helium in the deceased due to technical reasons (helium is the carrier gas in our GC – MS machine, and it is not possible to exchange it with some other gas as carrier) so all of our causes of death are set based on nonspecific autopsy findings and circumstances of death.

Keywords: suicide; asphyxia; inert gases; helium

## 20. VIOLENT DEATHS IN CHILDHOOD IN ZAGREB, CROATIA – POINT OF PREVENTION

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In the anticipation of the new *World report on child injury prevention* due for publication in 2018 by the World Health Organization (WHO), we looked through some of statistical data related to childhood fatal injuries from our Institute for period from 2000 to 2016. According to the WHO report from 2008, injuries and violence kill around 950 000 children and young people under the age of 18 years each year, which makes a major public health issue and is a call for quality preventive measures.

The focus of this research were unintentional injuries and major mechanisms of child fatalities in this category. In the 16-year-period that was examined there were 245 cases of unintentional fatal injuries in the children aged 0 to 18 years. Out of these, 116 (47%) were in the age group from 15 to 18 years old, 44 (18%) in the age group from 6 to 10 years old, 40 (16%) were between 1-5 years old, 30 (12%) were 11-14-year-olds and the last group encompassed children under the age of 1 year which held the least amount of cases – 15 (6%). If we look at the causes of death than the majority of those children died in traffic accidents – the astonishing number of 164 (67%), and that number includes both drivers and passengers in vehicles, pedestrians and cyclists. Following traffic accidents in frequency are drownings, with a few more cases than poisonings which are third on the list. Other recorded mechanisms, with significantly less cases, were falls with 13 (5%) cases, burns with 10 (4%), electrocution with 8 (3%) and foreign body aspiration was seen in 3 cases (1%). In 10 other cases (4%), mechanisms were different from the above mentioned so all of them were classified as Other. What was also seen is that fatal unintentional injuries were far more likely to happen to male children (71%) than female (29%), with the sudden steep rise of child fatalities recorded in the age group from 15 to 18 years.

It is evident that traffic accidents play a major role in child fatalities and are an obvious place to start when trying to reduce violent death among children. Thankfully the problem was recognized by Croatian authorities and in the past decade increased effort was put into achieving European goals for child and traffic safety. By organizing public campaigns focused on driving safely, not drinking and driving, educational programmes for children about safety on the road, as well as harmonising regulations and standards with EU Road Safety Action Programme, Croatian National Road Safety Programme was put into action. Combining that with other public campaigns related to addictions and other safety measures, apparent results were seen in decrease of child deaths from unintentional injuries in recent years. Although the results show positive feedback, when compared to European data it seems that we are still not doing enough to keep the children safe, and that there is still room for improvement, so in coming years new energy has to be directed towards finding loose spots in current measures as well as using statistical data to find new points of prevention.

Keywords: children, fatal injuries, prevention, Zagreb, forensic medicine

## 21. CURRENT STATE OF CLINICAL FORENSIC MEDICINE IN CROATIA

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Forensic medicine is commonly used to describe all aspects of forensic work. In broad terms, a forensic pathologist generally deal with the deceased, and a point of interest of forensic physicians are living individuals. There are many areas where both, clinical and pathological, aspects of forensic medicine overlap, and this is reflected in the history and development of the specialty as a whole and its current practice.

Clinical forensic medicine refers to that branch of medicine that involves an interaction among law, judiciary and police officials, generally involving living persons. The practitioners of clinical forensic medicine have been given many different names throughout the years, but the term forensic physician has become more widely accepted. The use of general practitioners (primary care physicians) with a special interest in clinical forensic medicine is common in some countries (UK, Australia, Netherlands...) and in some countries physicians and residents, principally from the specialities of emergency medicine, pediatrics, surgery and gynecology, are performing clinical forensic examinations. These physicians generally have little or no forensic training and yet may be expected to render "expert forensic opinions". They are well trained to provide competent medical treatment but may be unable to provide the patient with an equally competent forensic evaluation.

Currently, there are great differences in approach and examination of victims of physical and sexualized violence, as well in their rights, in the different states of European Union (EU).

Therefore, supporting the victims of crime, European Parliament and the Council adopted Directive 2012/29/EU establishing minimum standards on the rights. The purpose of this Directive is to ensure that victims of crime receive appropriate information, support and protection and are able to participate in criminal proceedings.

In this lecture, we will present the current position of clinical forensic medicine in Croatia; our difficulties, plans and aims for the future.

Keywords: clinical forensic medicine, forensic physician, forensic examination

## **22. FORENSIC INVESTIGATION AND ASSESSMENT OF ALLEGED TORTURE - A CHALLENGE IN CLINICAL FORENSIC MEDICINE**

**Isabella Klasinc<sup>1</sup>, Kathrin Ogris<sup>1</sup>, Peter Grabuschnigg<sup>1</sup>**

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As a result of the global migration movement, the number of asylum seekers in Europe and in connection with this development also in Austria has increased in recent years. The experience of the last three years shows that the migration movement has a direct influence on clinical forensic routine work. We have to deal not only with a clear accumulation of sharp violence, bite and thermal injuries compared to victims without a migration background, but also with a strong increase in forensic age estimation diagnosis compared to previous years. Cases of forensic age assessment are often associated with the allegation of torture. As a consequence forensic medicine will have to deal more often with the recognition of the consequences of torture and possible differential diagnoses. Although acute lesions may be characteristic of the alleged injuries, most lesions heal leaving non - specific scars or heal even without scars. Further the differentiation of self - inflicted or ritual - inflicted injuries and those caused by torture can be challenging for the investigating physician. For the future, it is desirable to offer more possibilities of special trainings on the physical examination methods of victims of torture as well as in the interpretation of findings. Furthermore a special intercultural competence of the investigating physicians will be necessary. In the oral communication of this abstract, some cases of alleged torture from our clinical forensic routine activity will be discussed.

Keywords: clinical forensic medicine, torture, migration

## 23. ACUPUNCTURE INDUCED HAEMATOPNEUMOTHORAX-CASE REPORT

**Aleksandar Stankov<sup>1</sup>, Biljana Janeska<sup>1</sup>, Verica Poposka<sup>1</sup>, Renata Jankova-Ajanovska<sup>1</sup>, Zlatko Jakjovski<sup>1</sup>, Natasha Bitoljanu<sup>1</sup>, Ana Ivceva<sup>1</sup>, Zdravko Cakar<sup>1</sup>**

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Acupuncture is one of the most popular alternative therapies in the world. Certain complications may occur when performing acupuncture. Although a rare but quite serious complication is the penetration of air into the chest cavity, due to lung injury with the needles that are used. Based on post mortem experience, it has been proven that the lungs are only 20 mm below the skin in the region of the clavicle bone, region beside sternal bone and in the region of the back along the spine, between the scapular bones, the distance between the skin and lung surface is 15 to 20 mm. A 26-year-old female was treated with acupuncture therapy for mild scoliosis and sinusitis. The patient was treated on three occasions by insertion of needles in various acupuncture points in the area of the face, neck, chest, abdomen, legs, back (along the spinal column) and the cross. During the third treatment after the completion of the therapy on the back she felt a severe pain localized in the left side of the thorax accompanied by difficulty breathing that became worse as time passed. With severe pain, breathing difficulties and vomiting she was received at the Emergency Center in the City General Hospital "8th September" where a one-sided hematomothorax was found, which was treated with evacuation of the blood and air from the left chest cavity. Medical expertise for establishing connection between hematomothorax and acupuncture therapy was carried out from our Institute. The expertise found that the air and blood in the left chest cavity originated from a lesion on the left lung, caused by the needles that were used for acupuncture. That they do not originate from previous diseases, indicate the RTG recordings where no disease has been detected, nor the presence of bullae, which are the most common cause of the so-called spontaneous pneumothorax. Findings of the connective tissues between left lung and thoracic cavity were observed during later X-ray observations which prove that there was lung injury before. Pneumothorax associated with acupuncture is a rare but very serious complication. Techniques should always be used to prevent the needle entering the chest cavity. Acupuncture should be performed by well-educated physiotherapists, especially when performed in zones dangerous for occurrence of such injuries such as the chest region.

Keywords: acupuncture, haematopneumothorax, medico-legal expertise

## **24. FORENSIC MEDICINE IN CRIMES AGAINST THE PHYSICAL AND SEXUAL INTEGRITY OF PEOPLE**

**Ljupcho Chakar<sup>1</sup>, Verica Poposka<sup>1</sup>, Natasha Davcheva<sup>1</sup>, Zlatko Jakjovski<sup>1</sup>, Goran Pavlovski<sup>1</sup>, Viktorija Srpanova Belakaposka<sup>1</sup>, Ana Ivcheva<sup>1</sup>, Biljana Janeska<sup>1</sup>**

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The physical and sexual integrity of the human being covers acts that are unlawfully made to young children of both sexes as well as to male and female adults. Their expanse cannot be denied, even though in many cases are concealed with social, religious, custom reasons, etc. Those acts are classified as crimes in every society and are being penalized in accordance with the legislation in different environments. When those acts already constitute criminal offenses, as well as for other crimes, material evidence must be provided for proving the crime. The approach in proving this type of criminal offence covers not only the parts of the body which are the primary provocation or alleged provocation for committing the crime, but also the rest of the body parts because the human organism is viewed as a whole. The principles of access to registration and collection of evidence for the resolution of these types of crimes will be exposed in the presentation. They might be seen as “easy to prove” if the verbal statement is dominantly considered, but it cannot give a solution until the material evidence is provided – which will be subject of discussion in the presentation. A ten-year period is being processed (2008-2017) by the Institute for forensic medicine, criminalistics and medical deontology and the forensic procedure for providing material proof, we suggest use of the specific judicial-medical knowledge in the cases of violence that not always end up with sexual acts.

Keywords: stuprum, conversation, forensic-medicine examination, principles, stuprum-violence

## **25. Forensic examinations at the Clinical Forensic Care Unit of the Medical University of Graz - an overview**

**Isabella Klasinc<sup>1</sup>, Kathrin Ogris<sup>1</sup>, Peter Grabuschnigg<sup>1</sup>**

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The Clinical Forensic Care Unit of the Medical University of Graz allows victims of physical and / or sexual violence a low - threshold access to a clinical forensic examination. Results of the investigations can be used for evidential purposes in court. So far such a low - threshold approach for victims of every age is unique in Austria. In this work the development of the outpatient center over a period of nearly ten years will be presented and discussed.

Since the beginning of the Clinical Forensic Care Unit in 2008, 1275 clinical forensic examinations in cases of physical and / or sexual violence and 2648 forensic age estimations of asylum seekers were performed by forensic pathologists. A statistical analysis of the cases showed that concerning the nature of the violence, suspected child maltreatment was the most common reason to take a clinical forensic examination into account. With regards to the allocations to the Clinical Forensic Care Unit, it could be shown that most of them have been carried out by hospitals or physicians in private practice. Furthermore, the statistic pointed out that the police, the court and the public prosecutor's office also often made use of the Clinical Forensic Care Unit.

Among others one reason for the disproportional high allocations by hospitals or private physicians is certainly the medical duty of disclosure in Austria. Additionally, the evaluation of findings in cases of violence for physicians not specialized in forensic pathology is challenging. Therefore, the ability to refer patients into the Clinical Forensic Care Unit is often used. The acceptance among the law enforcement agencies is mainly founded by the availability to receive promptly secured evidence and court - proof documentation. As physical and sexual violence affect all levels of society, regardless of age and gender, the possibility of a forensic examination timely after the incident, including qualified securing of evidence, should be indispensable for every modern constitutional state.

Keywords: Clinical Forensic Care Unit, low - threshold examination, clinical forensic medicine, physical abuse, sexual abuse



## **26. A CASE REPORT OF NOSOCOMIAL MYIASIS IN ELDERLY WOMAN WITH MALIGNANT FACIAL OPEN WOUND: MALPRACTICE OR ELDER ABUSE?**

**Leonardo Ciccone<sup>1</sup>, Lorenzo Desinan<sup>1</sup>**

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Myiasis (myia is Greek for fly) is an infestation of live vertebrates (humans and animals) by developing dipterous larvae (maggots) of a variety of fly species. The larvae can feed on the host's living dead tissue or liquid body substance. The pathophysiology of the human infestation differs depending on the type of fly and its mode of infestation. Wound myiasis is characterized by several larvae in places where there is loss of integrity of the skin. Poor hygiene, low socioeconomic status and the presence of an open wound, are the most important predisposing factors for human wound myiasis. A lack of adequate medical and nurse care of the elderly, psychiatric patients and those with the inability to discourage flies from depositing eggs or larvae, also makes human prone to wound infestation. Myiasis is a self-limited infestation with minimal morbidity in the majority of cases. Complications include, local destruction and invasion into deep tissues, local pain and secondary infections. Wound myiasis is diagnosed by a clinical inspection of the wound, but the exact type of maggot species can be difficult to determine from examination. When myiasis occurs in a patient after hospitalization the disease is termed nosocomial myiasis, a rare medical phenomenon.

Case Report: a 98-year-old cachectic female with facial locally advanced basal-cell epithelioma was placed in senior care center for long time. Italian Senior care center is a nursing home for hold people with nursing care and minimally assisted medical care. When the doctor noticed the sizable open wound of epithelioma was infested from maggots, the elderly woman was transferred to local hospital. After hospital admission, the treatment of wound myiasis required mechanical removal of maggots (about 100) under morphine narcosis. The hospital doctor sued the fact to the judicial authorities. The old woman died three days later hospital admission. Medico-legal autopsy showed locally advanced neoplasia without metastasis, multi-organ underweight in cachexia. Blood-tox report shows no lethal levels of morphine. The autopsy excluded both myiasis as cause of death and the liability of doctor who removed the maggots under morphine narcosis; the senior care center healthcare malpractice was censored.

Critical aspects related to the treatment of wound myiasis and toxic role of morphine are revised. The role of lack of adequate healthcare and nutrition in the senior care center, is discussed.

Conclusion: nosocomial wound myiasis can represent an elder abuse and neglect.

Keywords: nosocomial myiasis; morphine; elder abuse; malpractice

## **27. A FATAL CASE OF FAT AND BONE MARROW EMBOLISM IN A YOUNG MAN WITH FRACTURES OF LONG BONES AFTER A TRAFFIC ACCIDENT**

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Fat embolism syndrome is a diagnostic challenge for clinicians. Fat embolism often is asymptomatic; it refers to the presence of fat globules in the lung parenchyma and in peripheral circulation following long bone fractures or other major trauma. Fat embolism syndrome is a serious consequence of fat emboli dissemination that gives rise to a distinct clinical pattern characterized by the classic triad of respiratory impairment, neurological abnormalities, and petechial rash. Treatment is only supportive. Most affected patients undergo full recover, while mortality involves only a minority of cases. We report a fatal case of a 17-year-old male admitted to hospital with left femur and tibial fractures after a traffic accident. At time of admission (22.52 PM) the patient was fully oriented, and conversant. Under general anesthesia, external reduction of inferior left limb was performed and the patient woke up successfully at the end of the procedure, at 23.50 PM. After completion of diagnostic investigations, the patient was sent to the operating room for external fixation of femoral and tibial fractures. Just before anesthesia induction, 2.5 hours after trauma, the neurological status appeared to be altered with a Glasgow Coma Scale of 7, oxygenation was impaired with a sPO<sub>2</sub> of 80%, and the heart rate was of 150 beats/min. Pulmonary inhalation was excluded, as well as a late effect of sedation following the previous anesthesia. The post hoc hypothesis was consistent with an impairment of cerebral function caused by massive cerebral embolism. Nevertheless, cardiovascular and respiratory parameters remained stable along surgical intervention. At 6 AM an ultrasound examination of the lungs, was positive for alveolo-interstitial impairment, and after the attempt to wake up the patient, bilateral mydriasis appeared. Cerebral death followed on 3th day after admission. A medico-legal autopsy was performed. At external examination subconjunctival petechiae were present. Petechiae were also present in brain, lungs and pericardium. Internal organs showed massive oedema and necrosis of the brain, and pulmonary congestion, in spite of the absence of any communication between right and left heart chambers. Histology revealed fat globules in lungs, kidneys, and brain. In addition in brain sections, images of bone marrow embolism were seen.

Keywords: fractures of long bones, fat embolism, bone marrow embolism, fatal case

## 28. PREVENTION OF MOTORCYCLE FATALITIES – BACK TO BASICS

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The aim of this study was to analyze characteristics of the fatally injured motorcycle drivers and circumstances of the respective motorcycle traffic accidents. We conducted a single center observational retrospective study over a 10 year period (2007 – 2016). Autopsy was performed on the drivers as well as the pillion riders. Autopsy was done on total of 163 people. Depending on their culpability, subjects were divided into two groups. First group consisted of drivers who were culpable of causing the traffic accident, while the second group consisted of drivers and pillions riders who were not culpable of causing the traffic accident or their culpability could not be determined. A total of 83 (51%) motorcycle drivers were culpable of causing the traffic accident. Parameters that were measured were sex, age, blood alcohol content at the time of death, cause of death, time of death in dependence with the time of the accident and the circumstances of the accident (time of day, day of the week, season). Most of the subjects in the study died within 24 hours of the accident (132, 81%), and the main cause of death in most of these cases (91, 56%) was "multiple injuries", which simultaneously contribute to a death outcome. Out of 132 subjects that had their blood alcohol content measured (BAC), a total of 71 (54%) had a BAC above the legal limit for motorcycle drivers (BAC above 0.5 g / kg). The mean BAC in subjects who had blood alcohol contents above the legal limit for motorcycle drivers was as high as 1.91 g / kg. From the results of this study it can be concluded that strict prevention of driving under the influence of alcohol could be first and very effective measure in decreasing motorcycle fatalities.

Keywords: traffic, accidents, motorcycle, alcohol

## 29. CASE REPORT: MEDICAL MALPRACTICE?, POISONING?, THYROID DISEASE?

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A 15 year-old young lady was found dead at home. There were no indications of any intervention or the application of force. On the previous days she was admitted to the hospital because of palpitation, fatigue, headache and swollen neck. During physical examination swollen thyroid gland and tachycardia were found. In family history the mother had thyroid disease. According to the laboratory values she had elevated thyroid hormone levels, but the results arrived only after the death of the patient. B-blockers were administered to control the tachycardia. After one day hospitalization, the patient was discharged. The parents denounced the endocrinologist doctor for medical malpractice. The police ordered autopsy. Of course the question was the cause of death: medical malpractice?, B-blocker poisoning?, thyroid disease?. Histological examination and laboratory values were the clues to find the reason of the death of the young lady.

Keywords: thyroid storm; thyroid gland histology; elevated thyroid hormone; hyperthyreoidism.

### **30. ABDOMINAL SELF-STABBING AND PLASTIC BAG SUFFOCATION: A PARTICULAR CASE OF COMPLEX SUICIDE**

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The term "complex suicide" was used for the first time by Marcinkowski et al. in 1974 and it defines rare forms of suicide in which more than one method is used to induce death, unlikely from "simple suicides" where only one technique is involved. According to the different combinations reported in literature, complex suicides have been classified into "typical" (where two common suicide-methods are associated) and "atypical" (where more than two methods, or infrequent combinations of two suicide methods are involved).

In the following case an elderly man suffering of depression was found in the shack of his house with a knife embedded in abdomen and two plastic bags fastened around his neck with a twine. Three other superficial stab wounds were clustered in the upper-left abdomen, close to the penetrating lesion. Internal examination revealed haemorrhagic infiltration at the omentum and haemoperitoneum, whereas no evident signs of asphyxia were highlighted. The cause of death was ascribed to haemorrhagic shock. Features of the crime scene and of the tools used to commit to suicide have been studied. External and internal lesions have been also examined according to the current literature. The outcome of the analysis revealed that this association of suicide methods is unusual, confirming that complex suicides represent a challenging investigation for the forensic pathologist.

Keywords: complex suicide; stab wounds; plastic bag suffocation

### **31. COINCIDENCE OF RARE CAUSES OF DEATH: COMMOTIO CORDIS OR POSTTRAUMATIC APNEA IN ACUTE ALCOHOLISM?**

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Cases of inconclusive autopsy findings often require a detailed description of the circumstances of the injurious event in order to reach a forensic conclusion. Also, a specific forensic dilemma arises in cases with two possible causes of death, both of which are rare. The case described herein presented with an unclear cause and mechanism of death of a 33-year-old alcoholic male, who died after a physical altercation with his brother and an unsuccessful attempt of cardiopulmonary cerebral resuscitation by the emergency medical team. At the time of autopsy, specific circumstances about the altercation were unknown. External examination of the corpse showed signs of congestion, three haematomas on the scalp, a haematoma in the left pectoral region, as well as cerebral and pulmonary edema. Blood alcohol concentration at the time of death was 263 mg/dL. Two possible causes of death were investigated: commotio cordis or posttraumatic apnea in acute alcoholism. The complete presentation of the paper will provide the results of the interrogation of the suspect (the victim's brother) and the witnesses, revealing the circumstances of the lethal event as the keystone in determining the cause of death.

**Keywords:** commotio cordis, concussion, posttraumatic apnea, acute alcoholism, rare causes of death

## 32. DEATH RELATED INJURIES FROM LARGE DOMESTIC ANIMALS

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In our country, cases in which the cause of death is related to injuries sustained from domestic animals, are very rare. In the past five years, from all autopsies performed in the Institute of Forensic Medicine-Skopje, only two cases were related to large domestic animal attack. Death caused by large domestic animals attack has not been well described in the literature. On behalf of the rarity of these cases, we decided to present them as case reports. Case report I: A 61 –year- old man, had been attacked by an ox, during its moving out from the enclosure. During the autopsy, injuries were noted from blunt force and sharp force trauma. On the thorax, a puncture wound was determined which entered the chest cavity. In the abdominal region, only parallel lacerations of the skin and abdominal muscles were concluded. In the depths of lacerations intestine were noticed. This injuries were most fit with stabbing from one of the oxes horns. The rest of the body had many blunt force injuries like abrasions and bruises. During the internal examination, we concluded rib fractures and bruising of the lungs. Case report II: A 53- year -old man, was found dead after one day from the time he had taken out the cows to the meadow. During the autopsy, in the back of the torso and the upper parts of the legs, signs of blunt force trauma was noted, which had similar oval characteristics. After thorough analysis of the injuries and comparison to the hooves of the cow, we determined similarities in shape and size. Also, at the time of autopsy there were marks of thoracic compression with bilateral conjunctival hemorrhages and congestive syndrome, as a result of stomping. Internal examination showed multiple rib fractures with dislocation and consequently haematopneumothorax. Injuries from large domestic animals are often made by the sharp horns most likely localized in the thoraco-abdominal region or blunt force injuries sustained from stomping over. Methodical examination of specific injuries at autopsy may explain the mechanism of death due large domestic animal attack.

Keywords: large domestic animals, injury, forensic medicine

### 33. LETHAL BLEEDING IN PREGANANCY

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Disseminated intravascular coagulation, (DIC) occurs as complication in variety of diseases. It is characterised by activation of the coagulation sequence, leading to formation of thrombi throughout the microcirculation. As a consequence of the widespread thrombosis, there is consumption of platelets and coagulation factors and, secondary activation of fibrinolysis. Thus, DIC may give rise either to tissue hypoxia and microinfarcts by myriad microthrombi or to a bleeding disorder related to pathologic activation of fibrinolysis and/or depletion of the elements required for hemostasis. Two major mechanisms may trigger DIC: release of tissue factor or thromboplastic substances into the circulation and widespread injury to endothelial cells. In general acute DIC, that associated with obstetric complications: abruptio placentae, retained dead fetus, septic abortion, amniotic fluid embolism, toxemia, preeclampsia is dominated by a bleeding diathesis. The child bearing women in the seventh month of pregnancy suddenly began to feel dyspnea, weakness, became unresponsive and unconscious (GCS 3). She was cyanotic with widespread petechiae and ecchymoses over the skin. There were also manifestations of hemorrhage into the gastrointestinal and urinary tract. Obstetricians urgently decided to perform Caesarean section (CS) to save the baby. Unfortunately, baby ( male, 49 cm, 3040 g) was born dead at 11:42, July the fifth 2016. Mother was continually treated for the severe hemorrhage with blood preparations and vasoactive support. Mother's condition became progressively worse until death at 18:55 on the same day. Clinical laboratory report confirmed severe anemia (Hc 1.34 x 10<sup>12</sup>/L), very low hematocrit (0.131), thrombocytopenia (Trc 89 x 10<sup>9</sup>/L) what was related with bleeding diathesis. Autopsy was revealed widespread bleeding into the serous linings of the pleural and peritoneal cavities. There were fluid blood in both side of the thoracic ( left 350 ml, right 500ml) and into the peritoneal ( 300ml) cavities. Five small subserous ( average 3 cm) and one large submucosal (10 cm) leiomyoma were found embedded in the myometrium. Finally we could only theorize that interplay between several factors like: multiple leiomyoma, separation of the placenta, preeclampsia triggered releasing thromboplastic substance into the circulation. The common approach of obstetricians and pathologist in that case was prerequisite for a correct diagnosis and cause of death.

Keywords: obstetrics, clinical pathology, bleeding diathesis



### **34. POST-MORTEM INTERVAL ESTIMATION BY CHANGES IN THE OPTICAL DENSITY OF THE CEREBROSPINAL FLUID WITH THE TIME AFTER DEATH INCREASING**

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The ability to accurately determine when death has occurred allows more accurate and with high quality provide the investigation of crimes, so the definition of a post-mortem interval (PMI) covers both medical and legal aspects.

Purpose: to estimate the interval and accuracy of the PMI establishment by generalizing the time dependence of changes in the optical density of the cerebrospinal fluid with the time after death increasing.

Materials and methods: The subject of the study were native centrifuged specimens of the cerebrospinal fluid. The cerebrospinal fluid was taken from 30 corpses of both sexes (the main study group) aged 53 to 78 years PMI from 1 to 6 hours and 20 healthy volunteers (control group).

It is known that the spectral optical density due to absorption of proteins is primarily determined by the spectral dependences of the absorption of optical radiation by amino acids in the structure of proteins. The optical density of tyrosine, tryptophan and phenylalanine is at a maximum in the spectral region from 260 to 290 nm. So the spectral dependence of the post-mortem temporal changes in the optical density of samples of cerebrospinal fluid in the ultraviolet spectrum of electromagnetic radiation in the range of wavelengths from 260 to 380 nm was studied. The choice of spectral range of wavelengths from 260 nm to 380 nm provides a separate possibility to study changes in the concentration of protein compounds under the influence of biochemical changes in the cerebrospinal fluid of the deceased during various intervals after death.

Results: Whith increasing the wavelength there is an optical density drop. Starting from wavelengths larger than 300 nm, proteins and amino acids do not absorb. So, it was found that the change in the optical density of the protein fraction of the cerebrospinal fluid in the range of wavelengths from 280 to 310 nm is interrelated with the PMI.

Conclusion: The spectrophotometric method is suitable for post-mortem interval diagnosing with an accuracy of  $\pm 1$  hours at wavelength 280 nm, with an accuracy of  $\pm 1$  hours 45 min at wavelength 300 nm, with an accuracy of  $\pm 2$  hours at wavelength 310 nm.

Keywords: post-mortem interval, spectrophotometry, cerebrospinal fluid

### **35. AIRBAG AND SEATBELT EFFECTIVENESS ON FACIAL INJURIES IN FRONTAL COLLISIONS, AND RELATED PHYSICS**

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A common dilemma arising in court is related to whether the traffic-related injury or death could have been prevented if the velocity of the vehicle was smaller. The purpose of this paper was to determine the effectiveness of airbags and seatbelts in facial injury prevention related to the velocity in frontal collisions. A retrospective study determined three groups: vehicle occupants who suffered Le Fort fractures, vehicle occupants who suffered slight facial injuries without bone fractures, and uninjured vehicle occupants. The homogeneity of groups arising by frontal collisions in every case, airbag activation, and seatbelt use. The ROC curve was used to determine the cut-off value related to the amount of total kinetic energy elicited by both vehicles in frontal collisions associated with Le Fort fractures or slight facial trauma. A cut-off value of 121 KJ with an AUC of 0,752 is likely to produce a slight facial injury (equals to an average-weighted vehicle hitting a static obstacle at 46,8 km/h; ranging from 35 to 62 km/h depending on the weight of the vehicle), with a sensitivity of 57% and a specificity of 88%. A cut-off value of 152 KJ with an AUC of 0,871 is likely to produce a Le Fort fracture (equals to an average-weighted vehicle hitting a static obstacle at 53 km/h, ranging from 40 to 70 km/h depending on the weight of the vehicle), with a sensitivity of 83% and a specificity of 84%. Therefore, airbags and seatbelts are effective in velocities under 46,8 km/h; however, they do not provide adequate protection from facial fractures in velocities greater than 53 km/h.

Keywords: traffic accidents, vehicle velocity, frontal collisions, Le Fort fractures, effectiveness of airbags and seatbelts

### **36. DEVELOPMENT OF A MATHEMATICAL-STATISTICAL METHOD TO DISCRIMINATE BETWEEN SUICIDAL, ACCIDENTAL OR HOMICIDAL FATAL FALLS FROM A HEIGHT: COMPARISON OF REAL CASES WITH MULTIBODY NUMERICAL SIMULATIONS**

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According to the data from the Italian National Institute of Statistics (ISTAT), in Italy in 2015 the death rate for suicide was 6.5 cases per 100,000 inhabitants, with higher values in the North-East Regions (8.3 suicides each 100,000 inhabitants). Falls and jumps from heights are in second place among the chosen self-injurious manners (19.2%), immediately after asphyxias (48.9%).

The idea of this study arises from the observation of a particular case of fatal fall from a height occurred in January 2018 in Trieste, in which a man committed suicide by falling from a window on the third floor of a building and reaching a considerable distance of 4.10 meters from the perpendicular line passing through the point of falling, without bumping any object during the fall. This suggested the need to solve the complex question about the manner of the event, if self-injurious, accidental or homicidal.

The role of the active forward thrust of the subject in determining the trajectory of fall has been assessed and the cases of known falls from a height occurred in Trieste from 2015 to 2017 have been statistically evaluated. For each case, the height from which the body was fallen, the distance reached by the body from the perpendicular line passing through the launch point, the body weight and the physical characteristics of the victim have been considered. Simulations with multibody solver have been performed, imposing dynamic actions to simulate the input of another subject in the fall, like in case of homicide.

The aim of the present study is to develop a diagram to determinate, starting from the rest position and the launch point, if a fall from a height is self-injured or accidental, or if there could be the suspicion of the input of another subject.

Keywords: fall from a height; manner of death; forensic pathology

### **37. IS HISTOLOGICAL EXAMINATION ALWAYS NECESSARY? ANALYSIS OF 870 MEDICO-LEGAL AUTOPSIES**

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Forensic histopathology has been underevaluated in the world for many years. In European forensic medicine histological investigation is carried out in only 50 % of all autopsies, enzyme and immunohistochemical methods are used even less frequently [Ferrara, 2010]. When searching the literature for the role of forensic histopathology in routine medico-legal practice, the resulting few articles demonstrate different opinions. The study of Molina et al (189 cases) concluded that microscopic examination is not necessary as a matter of routine practice. Chatelain et al drewed the similar conclusion (400 cases), according to which histological examination should be limited to cases with no anatomic cause of death. On the other hand, de la Grandmaison (428 cases) and Langlois (638 cases) proposed that systematic standard histology for the main organs should be used in routine forensic autopsies. In Hungary, Governmental Decree No. 351/2013 declared that in the case of medico-legal autopsy histological sampling of the main organs, injuries and other morphological changes leading to death or considered to be the direct cause of death is obligatory. In our study, we analysed medico-legal autopsy cases between 01.01.2014 and 31.12.2017. Skeleton cases, SIDS and cases with no anatomical cause of death were excluded. Systematic histological examination was performed according to our protocol. All histological examination was performed by the author and reviewed by a pathologist. For each case, histological information regarding the cause and manner of death, prior medical conditions and their contributory effects were analysed. The aim of this study was to analyse the usefulness of systematic forensic histopathology in our material and to compare our results with the aforementioned studies.

Keywords:

### **38. USING OF METHOD OF MULTIPARAMETRIC SPECTRAL-SELECTIVE LASER POLARIZATION AUTOFLUORESCENCE OF BIOLOGICAL LAYERS FOR POST-MORTEM DIAGNOSTICS OF ACUTE ISCHEMIA OF MYOCARDIUM**

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Significant prevalence of acute coronary insufficiency (ACI) and its suddenness in the forensic practice gives rise to suspicion of police about violent nature of death. That is why objective precise methods for diagnosis of acute ischemia (AI) of the myocardium requires. However, ACI is difficult to diagnose because of the non-specificity of macroscopic signs and the need for specific coloring methods and the role of the "human factor".

The aim of the study: To develop method of multiparametric polarization and laser autofluorescence microscopy of biological layers by improving methods of traditional polarization and mueller-matrix mapping of optically anisotropic nets for post-mortem diagnostics of foci of AI of myocardium.

Materials and methods: Investigations of 65 samples of the myocardium in case of ACI, 65 with chronic ischemic heart disease (CIHD) and 20 specimens of the control group were carried out. Experimental measurement was carried out in standard disposition of stocks-polarimetry, modified for autofluorescence investigations. The mueller-matrix mapping of the laser autofluorescence of the samples of the myocardium of the studied groups was carried out and the statistical moments of the 1st - 4th order ( $M_1$ - $M_4$ ) of the distributions of the Mueller-matrix invariants were calculated.

Results: According to authors, fluorescence is always partially polarized. Anisotropic light excitation allows to separate from a chaotic accumulation of atoms and molecules a certain group. For myocardial tissue with ACI, the concentration of porphyrin is higher than in chronic ischemic heart disease. This fact can be explained by lower degenerative-dystrophic changes. That is why the intensity of the corresponding autofluorescence image is higher. Quantitatively, this manifests itself in the shift of the excess in the direction of greater values.

Sensitive to the presence of ACI were the statistical moments of higher orders - asymmetry and excess (the magnitude of the asymmetry  $M_3$  increases in 1,5 times, and the magnitude of the excess  $M_4$  of Mueller-matrix invariant distribution is reduced by 1.6 times).

Conclusion: Diagnostic efficiency of statistical analysis of coordinate distributions of mueller-matrix invariants of spectral-selective laser polarization autofluorescence on the wavelength 450 for posthumous diagnosis of myocardial infarction with excellent balanced accuracy in 95% is demonstrated. Results obtained during the research allow obtaining modern, substantiated, accurate and objective data on the posthumous structure of the myocardium of the deceased due to ACI.

Keywords:

### 39. MOLECULAR AUTOPSY IN SCD: OPTION OR NECESSITY?

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Sudden cardiac death (SCD) is the most frequent cause of death among sudden natural causes of death. SCD is defined as »a natural, unexpected fatal event occurring within one hour from the onset of symptoms in previously asymptomatic, apparently healthy person«. This definition is useful for witnessed death, but in forensic practice, number of deaths are not witnessed, so we assume that death was sudden if the deceased was known to be in good health 24 hours before death occurred. The incidence of SCD increases with age. The approximate yearly incidence in adolescents and young adults (<35 years) is 0.01/1000. In the subjects 35–40 years the yearly incidence of SCD increases to approximately 1/1000, then by 60 years 2/1000, and 200/1000 in the elderly. Sudden death is a traumatic event in family and community, especially for young population, and the autopsy is usually the only opportunity to diagnose the SCD. Therefore, clinical and forensic pathologists are responsible for establishing the precise diagnosis of sudden death. Forensic autopsy procedure should be performed as structured examination that follows the Recommendations on the Harmonisation of Medico-Legal Autopsy Rules. In the case of SCD we should follow the Guidelines for autopsy investigation of sudden cardiac death: 2017 update from the Association for European Cardiovascular Pathology, which include the protocol and recommendations for the morphological examination of the heart, and collecting of material for toxicological, microbiological, biochemical, and molecular analysis. The last analysis is very important as many cardiovascular diseases causing SCD have a genetic background. SCD mostly results from arrhythmias which are usually triggered by coronary artery disease in patients aged over 40 years, but in younger patients major causes are cardiomyopathies, myocarditis, premature coronary artery disease, congenital coronary artery anomalies, and channelopathies. Cardiomyopathies like hypertrophic, dilated or arrhythmogenic right ventricular cardiomyopathy show structural abnormalities, however in some cases the heart may be macroscopically and microscopically normal, and the disorder is primary electrical disease, like long and short QT syndrome, Brugada syndrome, or catecholaminergic polymorphic ventricular tachycardia. If the last group of disorders were not diagnosed in life it is impossible to determine them at autopsy without postmortem genetic testing (»molecular autopsy«). Technology like next generation sequencing could help us to identify pathogenic gene mutations that may either cause or be associated with SCD; therefore it is necessary to include it in our postmortem analysis, but with reservations.

Keywords: sudden cardiac death; autopsy; protocol and guidelines; molecular autopsy; next generation sequencing

## 40. TRENDS IN CHILD DEATH CAUSES IN LITHUANIA: FORENSIC AUTOPSY DATA

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Background: children mortality rate is generally regarded as a fundamental indicator of population health and is often used to validate public health. According to the World Health Organization report, more than half of all children deaths are preventable. This study is aimed to identify the causes of death in children under the age of two.

Materials & Methods: retrospective autopsy report analysis for 195 cases of children deaths in Vilnius State Forensic Medicine Service between 1995 and 2015. The eligible population included children, who died under the age of two. Data was collected regarding age, sex, place of death and cause of death. Data was analyzed using R studio software.

Results: 52,8 % of dead children were males and 47,2 % were females. The age median of the cases was 4 months. There was no statistically significant age difference between male and female groups ( $p = 0.55$ ). Non-violent death causes was 55.4 % of the sample, a violent - 33.3 %. The main cause of non-violent deaths was pneumonia (34,9 %). Congenital anomalies was the second most frequent cause of non-violent death. Injuries (9.7 %) and asphyxia (7,2 %) were the main causes of violent deaths. There was no statistically significant medical diagnosis difference between male and female groups ( $p = 0.47$ ). 75,4 % of dead children were found at home, 16,4 % died in hospital. There was no statistically significant difference between places of death in male and female groups ( $p = 0.09$ ).

Conclusion: according to the present study, pneumonia and congenital anomalies are major causes of death in children up to the age of 2 years old. The majority of children deaths were unintentional, but preventable. Unfortunately, most of the children who died of leading cause of death – pneumonia, died at home without receiving any hospital treatment.

Keywords: forensic pathology; child death; autopsy; cause of death.

## 41. CYANOBACTERIAL DNA-BASED IDENTIFICATION OF DROWNING

**Bernadett Csányi<sup>1</sup>, Gabrijela Dulka<sup>1</sup>, Tomas Zakar<sup>2</sup>, Mihály Kis<sup>2</sup>, Éva Kereszty<sup>1</sup>**

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The diagnosis of drowning is one of the most difficult tasks in the case study of forensic medicine. For proving the diagnosis we used polymerase chain reaction amplification to demonstrate the presence of cyanobacterial DNA. A 310 base pairs long 16S ribosomal DNA fragment was identified from cyanobacterial culture, postmortem human liver and from Tisza River.

We found that inhibitors in the Tisza can block the polymerase enzyme and can cause a false negative conclusion. With an increased amount of the enzyme positive result was obtained.

Keywords: Drowning, Cyanobacteria, Polymerase chain reaction, Inhibitor, DNA



## 42. THE "BRAVE NEW WORLD" OF FORENSIC MEDICAL EXPERTS IN HUNGARY

**Zsolt Kozma**<sup>1</sup>

<sup>1</sup>Department of Forensic Medicine, University of Pécs, Medical School, Hungary

Since 2012, a number of important legal changes has taken place in Hungary, which essentially affected the work of forensic experts, including forensic medical experts. New Criminal Code, Civil Code, Civil Procedural Law and new Criminal Procedural Act came into effect this year. Our administrative law and system of judicial bodies have been changed to a certain extent, too.

A completely new law for forensic experts and the new system and structure of the Chamber of Forensic Experts both have also revolutionized the position of legal experts.

The formerly separated network of forensic experts of the Ministry of Justice and the Ministry of Interior has been concentrated in a new public organization, under the umbrella of the Ministry of Interior since 1st January 2017 and in parallel, new directions entered into force in the process of giving mandate to "independent" forensic experts. All of these have created an extremely sensitive situation to people and organizations currently working in this field. In my lecture I would like to review the present situation of medico-legal experts in Hungary.

Keywords: Medico-legal experts; Civil Code; Criminal Code; Procedural Act

# **ODONTOLOGY SCIENTIFIC SESSION ABSTRACTS**

## **D1. FORENSIC ODONTOLOGY IN BRAZIL: GENERAL OVERVIEW**

**Ricardo Henrique Alves da Silva<sup>1</sup>**

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Background: in Brazil, Forensic Odontology is a recognized dental speciality and the Forensic Odontologist is the professional with a mandatory degree in Dentistry and the expertise field is regulated by Brazilian Federal Law 5081/1966 and Brazilian Federal Council of Dentistry, guaranteeing the right to work in the criminal, civil, labour and administrative/ethics areas, including human identification, DVI, bitemarks, dental damage evaluation, age estimation, ethics in Dentistry, expert witness in dental malpractice litigation and labour exams, crime scene investigation and others activities related to Forensic Sciences.

Objective: present the wide range of activities to the Forensic Odontology specialist in Brazil.

Results: The official number of professional of Forensic Odontologists in Brazil, according to the Brazilian Federal Council of Dentistry is 719 (CFO, 2018) and the cases presented were selected from the exams performed in the Forensic Odontology Expert Witness Service (USP, Faculty of Dentistry, Ribeirão Preto, Brazil) to show the different fields and opportunities in Forensic Odontology.

Conclusion: It can be concluded that in Brazil, Forensic Odontology is a well know field in Dentistry and presents many positions for a professional career related to this field of knowledge.

Keywords:

## **D2. THE ROLE OF CLINICAL DOCUMENTATION IN FORENSIC AND CRIMINAL LEGAL ASSESSMENT OF TOOTH LOSS AND OTHER DENTAL INJURIES**

**Peter Gergely<sup>1</sup>, Philipp Schneider<sup>2</sup>, Agnes Ban<sup>3</sup>, Katalin Fogarasi<sup>4</sup>, Robert Boda<sup>5</sup>, Zoltan Patonai<sup>6</sup>**

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As the forensic assessment of dental injuries often requires special dental medical and oral surgical expertise, their precise primary clinical documentation is of particular importance. It is especially tooth loss whose criminal legal assessment might be impaired by insufficient descriptions and/or ambiguous terminology recorded during primary care. The present study aims to compare the criminal legal approaches to tooth loss in the Hungarian, German and Austrian Criminal Code in order to discuss differences of forensic importance.

In Hungary, medical documentation is commonly issued by healthcare providers especially for forensic purposes on the request of the investigating authority, court or the injured person (this specific documentation is called 'constat'). Data from a previous empirical study on 147 Hungarian dental constats are analysed in view of the current Hungarian Administrative Regulation concerning tooth loss. The results of the study reveal numerous insufficiencies in medical reports in terms of inaccuracies and self-contradictions both in terminology and the professional medical practice. The low number of attributes per injury (0.64 on average) also indicates insufficient documentation. Based on the results yielded by the empirical study, the authors make suggestions for effective and forensically usable documentation of different types of tooth injuries as well as tooth loss.

Keywords: dental injury; tooth loss; terminology; criminal law; Hungary; Germany; Austria

### **D3. DENTAL EXAMINATION OF A POSSIBLE TORTURE VICTIM**

**Alan Richards**<sup>1</sup>

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A 28 year-old male asylum seeker reported that he had been tortured during two incarceration periods, and that he had escaped from prison one year ago. The subject also stated that he had received dental treatment in between the two periods of imprisonment and that treatment was not completed before he was imprisoned for the second time. He alleged that he had experienced several blows to the front and to both sides of his face. He explained that this trauma had resulted in fractures and loosening of his front teeth, a “small cheek tooth” on the right side of the upper jaw was “knocked out”, the position of some teeth had changed and he had an altered occlusion. Clinical examination, together with intra-oral radiographs revealed sound teeth without caries. The central incisors which had been partially root treated and restored with composite plastic fillings covering the incisal half of the crowns, the upper right first premolar was missing and only the roots of the upper left first molar were present. In addition, it was observed that the lower left first premolar was lingually displaced and there was an abscess related to the upper right central incisor, which was painful. Islands of hypercalcification were observed in the jawbone in relation to the root apex of the lingually situated lower left first premolar. Although only the roots of the upper first molar were present, the tissue of the roots was hard and not affected by caries. It was concluded that all of the findings from the dental examination could be a result of the trauma described by the patient. No finding were in contradiction to the explanations given by the patient. It is not possible from the dental findings to establish whether the probable trauma was due to torture.

Keywords:

#### **D4. COMPARING PULP/TOOTH RATIO METHOD WITH STANDARD ANTHROPOLOGICAL METHOD FOR AGE ESTIMATION IN ADULTS**

**Danijela Djonic<sup>1</sup>, Ksenija Zelic Mihajlovic<sup>1, 2</sup>, Jovana Mijucic<sup>1</sup>, Strahinja Pavlovic<sup>1</sup>, Milutin Micic<sup>1</sup>, Marija Djuric<sup>1</sup>**

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The estimation of an individual's age at the time of death is a very important parameter in forensic anthropology. It is used in the identification of victims and also applied in the demographical analysis of ancient populations. Standard skeletal method for age estimation in adults have serious disadvantages as they cannot be applied on living individuals, they have large error range and they show very low accuracy in individuals older than 60 years.

The aim of this research was to test the reliability of Cameriere's pulp/tooth ratio method based on canines. The reliability was obtained by comparing results with the results gained by standard anthropological method for age estimation (Suchey-Brooks method).

Skeletal material taken from medieval archeological necropolis Stara Torina was used. The research was done on 22 adult individuals (10 were female and 12 were male) with preserved pubic symphysis in which 33 canines were found. Periapical radiographs were used in order to measure both - tooth and pulp areas using the ImageJ program. According to appropriate formulas based on pulp/tooth ratio, the age of each individual was calculated.

Descriptive analysis of morphological changes of the pubic symphysis was applied in order to categorize adults in different age groups.

Finally, we conducted a comparison between these two methods.

The results showed that age estimation of 86% and 68% of lower and upper canines respectively fell in range of age category obtained by Suchey-Brooks method.

Our study showed that the estimated age of adults obtained by the Cameriere's method is mostly compatible with the method routinely used in practice.

Keywords: Age estimation; Pubic symphysis, Pulp/tooth ratio,

## **D5. COMPARISON OF ACCURACY AND RELIABILITY OF TWO DENTAL AGE ESTIMATION METHODS BETWEEN TRAINED AND UNTRAINED EXAMINERS**

Nemanja Marinković<sup>1</sup>, Miša Spirković<sup>1</sup>, Aleksandra Radmanović<sup>1</sup>, Petar Milovanović<sup>2</sup>, Marija Đurić<sup>2</sup>, Nenad Nedeljković<sup>1</sup>, Ksenija Zelić<sup>2</sup>

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**Aim:**The aim of the study was to compare the accuracy and reliability of Willem's method and Cameriere's European formula between trained and untrained examiners in order to assess the applicability of those methods.

**Material and methods:**50 panoramic radiographs of Serbian non-adults were selected. First, the untrained examiners received detailed instructions for both Willem's and Cameriere's (European formula) methods and the use of computer aided drafting program (Image J®). Then, together with 2 trained examiners they analyzed 10 panoramic radiographs in order to verify their capability for further individual work. After that, three examiners analyzed independently 50 panoramic radiographs. The results of the first examiner, as well as the real age of the individuals, were unknown to the other, in order to reduce bias. Estimated age was compared to real age of individuals. Mean errors between trained and untrained examiners were also compared. After one month, the measurements were repeated.

**Results:** Intra-class correlation (ICC) test showed very good accuracy for both trained and untrained examiners and for both methods. For European formula, ICC was over 0,800 estimated by trained examiners and over 0,820 estimated by untrained examiners. ICC was over 0,810 for Willem's method, estimated by trained and untrained examiners. Comparison of mean error between trained and untrained examiners was not significant for any method and in both sexes. Repeated measurements after one month showed same accuracy and reproducibility for both methods as first measurements.

**Conclusion:** This research shows that both methods are highly reproducible and accurate. But also, it was shown there is no need for a lot of practice in order to accurately apply Willems' or Cameriere's method.

**Keywords:** Willem's method, European formula, Serbs, Untrained examiner

## **D6. FORENSIC DENTISTRY EDUCATION IN CROATIA**

### **Hrvoje Brkić<sup>1</sup>**

<sup>1</sup>Chair for Forensic Dentistry, School of Dental Medicine, University of Zagreb, Zagreb, Croatia

Chair for Forensic Dentistry at the School of Dental Medicine University of Zagreb was founded in 1997 as a part of Department of Dental Anthropology. According to the current trends in the forensic sciences, the dental school curriculum was changed in a way that the subject "Forensic dental medicine" was included. The subject has 30 hours of teaching, and was based on the guidelines of Scandinavian and American schools with local (Croatian) experience. Today, the Chair and its teachers take part in three study programs: integrated undergraduate and graduate program Dental medicine, postgraduate specialist program and postgraduate doctoral program. Courses and trainings in forensic dental medicine is a part of a lifelong learning of doctors of dental medicine. Scientific and publishing activities of the Chair are based on scientific projects and include identification techniques, dental profiling and expertise in dentistry. Founding of the Croatian Association of Forensic Dentists 21 years ago and the activities of the staff had contributed to the international recognition inside the International Organization of Forensic OdontoStomatology.

Keywords:



## **POSTER SESSION ABSTRACTS**

## **P1. A CASE OF HIGH VOLTAGE ELECTROCUTION INCREASING AWARENESS OF HARMFUL SELFIE-TAKING BEHAVIOURS**

Ivan Šoša<sup>1</sup>, Valter Stemberga<sup>1</sup>, Antun Ferenčić<sup>1</sup>, Dražen Cuculić<sup>1</sup>

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Objective: Newer technologies have become very popular, but the selfie-mania has reached a stage where people are so engrossed in selfie-taking that they endanger themselves risking electrocution by live wires contacts on the top of railway wagons. We present one such case, dealing with issues related to selfie deaths.

Case report: After witnessing the accident on the rooftop of a parked railway wagon, police found an electrocuted 20 years-old male. Our victim's arms were semi-flexed in elbows and slightly spaced apart, while his legs were semi-extended with the knees raised somewhat off the rooftop. Above the body and the rooftop of the wagon extends the driving guide for the railway wagon's electricity supply made of fuller copper; above this guide, there is another made of stranded copper. The electrocuted body was completely burned and yellowish-brown in colour, in places, fragments of the clothes could be identified; his waist belt, white training shoes, and socks were all charred. Some of his belongings, including a smartphone, were scattered nearby. As well, throughout the scene, pieces of slightly burned clothes could be found. On the live wires contacts on the top of the railway, there could be identified two traces of welding on that first wire. Similar traces of welding can be seen from the rooftop of a railway wagon.

Discussion: Mostly, deaths caused by electrocution are accidental in manner. Suicides by electrocution are rare; homicides are even more unusual. These accidental cases can be blamed on defective tools or electrical appliances. When caused by high-voltage wires, as in our case, they occur secondary to inadvertent contact with a high-voltage line. Inadvertence is likely to be due to the socially apprehended relationship between personality and selfie-posting behaviours. Namely, selfies or self-portrait photographs are typically shared on social networking services.

Conclusion: We aimed to draw attention and increase awareness of the potentially harmful consequences of selfie-taking behaviours. In order to avoid such events provoked by technology-addicted trends, several actions should be undertaken. Increasing safety in public, in particular, workplace routines for many professionals should be a priority to reduce the number of unsafe events. Firming up the education and promoting risks of such behaviour should be a manner for public health organisations to diminish this hazard.

Keywords: electrocution; railway; selfie-taking

## **P2. SUDDEN INFANT DEATH SYNDROME IN CROATIA IN THE PERIOD 2011-2015**

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The primary aim of this study was to determine the share of sudden infant death syndrome (SIDS) within all the causes of death in Croatian infants, excluding newborns, in the period from 2011 to 2015. The secondary aim was to establish the sex distribution of infants who died of SIDS and to compare the results with the equivalent data for the infants in the entire European Union (EU), of which Croatia is a member. The data were collected from Eurostat database. Newborns were excluded from the study, along with their specific childbirth-related causes of death, thus removing their influence on the results. Since SIDS only occurs in children aged less than one year, the age category from 28 to 364 days was selected for the study. The data were available only for 2011-2015, therefore the evaluation was limited to the said period. The total number of deaths within the selected population in the observed period was 226 and 36 (15,93%) of them were caused by SIDS, which is more than in the EU, where only 11,17% infant deaths had the same cause. Among the SIDS-caused deaths in Croatia, there was a noted decrease from 71,43% in 2011 to 50,00% in 2015, but it was not continuous and the trends could not be properly evaluated due to a relatively small number of subjects. 58,33% of deaths caused by SIDS in Croatia occurred in male infants, which is almost the same as in the EU, where 59,69% of affected children were male. In conclusion, SIDS was a significant cause of death in infants aged 28-364 days in Croatia in the period 2011-2015 and, when taken into account that there is no steady decline in it's share, it probably still is. The reason for the difference in SIDS-related death proportions between Croatia and the EU could lie in the variability in cause-of-death determination, with Croatian doctors being more inclined to declaring unexplained infant deaths as SIDS, but further studies are needed to explore such hypothesis. There are slightly more male than female infants who died of SIDS in Croatia, which is consistent with the findings in other published studies.

Keywords: sudden infant death syndrome; SIDS; Croatia

### **P3. HOMICIDE OR COMPLICATED SUICIDE?**

**Janos Bokor<sup>1</sup>, Zsafia Almadi<sup>1</sup>, Eva Keller<sup>1</sup>, Krisztina Danics<sup>1</sup>**

<sup>1</sup>Department of Forensic and Insurance Medicine, Semmelweis University, Budapest

61-year-old male with a history of multiple suicidal remarks, and chronic alcoholism was found beheaded in his home, with an extensive pool of blood surrounding the corpse. A plastic-based rope, also stained with blood was hanging from the second floor rail. The general practitioner called to the scene knew the deceased. He didn't enter the house during the scene inspection, didn't conduct a physical examination on the corpse, however excluded homicide based only on the fact that no footprints were seen in the pool of blood surrounding the body. He concluded that the beheading was the outcome of hanging. The police arriving to the scene also didn't suspect that a third party would have been involved. The forensic experts faced the challenge to answer the question: is it possible to suffer beheading as a consequence of hanging, or is it highly likely that they were looking into a homicide case. The complex forensic medicine report clarified the circumstances of the death.

Keywords: suicide, homicide, hanging, beheading

#### **P4. CASE WITH ONE MISSING PIECE OF PUZZLE**

**Dražen Cuculić<sup>1</sup>, Valter Stemberga<sup>1</sup>, Silvia Arbanas<sup>1</sup>, Antun Ferenčić<sup>1</sup>, Ivan Šoša<sup>1</sup>**

<sup>1</sup>Department of Forensic Medicine and Criminalistics, Faculty of Medicine, University of Rijeka

Objective: To illustrate the identification first by dactyloscopy and then by molecular DNA analysis, since the former was insufficient and failed to yield adequate results to solve the case.

Case report: After they found a human finger in the city centre of Rijeka, concerned citizens alerted the police. After inspecting the scene, the finger was transported to the Department of Forensic Medicine where it was rehydrated (by injecting diluted glycerol). After that, the dactyloscopy was possible, and the fingerprint was photographed. However, the automated fingerprint identification system (AFIS) was unable to recognize this particular fingerprint in comparison to any other from the system database. Therefore, it was concluded that the finger belonged to a person who was not suspected of committing a criminal offense, or has not been a part of a ten-finger dactyloscopic collection, so the identification process remained unsuccessful. The medical examiner recognized it was the fourth finger of the left hand of a male that was chopped off by some sharp object. At the same time, into the neighbour county of Karlovac, the dead body of a young man of known identity was found in the car. By criminalistic insight into the events, police investigators from the police department of the county of Primorsko-Goranska županija (PU PG) assumed that the finger found in Rijeka was associated with the male body found in the car near Karlovac. By taking the required samples from the corpse and sending the finger to the Forensic Science Centre "Ivan Vučetić" in Zagreb, it was possible to conduct a molecular DNA analysis that confirmed the match between the finger and the deceased.

Discussion: Dactyloscopy is an accepted scientific method for physical and legal identification of a person based on papillary lines (primarily on fingers, palms, and thighs). It helps with the identification expertise by rapidly identifying deceased persons when recognition can not yield satisfactory results. The case outlines the need for proper co-operation between police officers and medicolegal experts, emphasizing the role of the forensic laboratories.

Conclusion: Dactyloscopy as an undisputedly cost-effective and reliable classical identification method can provide quick information on the identity of a person in some instances. Sometimes, however DNA analysis is mandatory for definite identification.

Keywords: dactyloscopy; forensic medicine; identification

## **P5. MYSTERIOUS CASE OF MUMMY THE MUMMY**

**Dražen Cuculić<sup>1</sup>, Valter Stemberga<sup>1</sup>, Silvia Arbanas<sup>1</sup>, Antun Ferencić<sup>1</sup>, Ivan Šoša<sup>1</sup>**

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**Objective:** Criminalistics investigations, particularly those considering a dead body found with certain delay, present challenges such as naming the deceased, ascertain the cause and the time of death. Rarely, these questions can be answered with certainty especially in case of assessing a purposely hidden body.

**Case report:** After the fire destroyed an apartment, the firefighters found a mummy in the living room. The body, wrapped in blankets and prone on a sofa where it was concealed beneath the dump of rubbish, belonged to an unknown women. It turned out that she owned the apartment where her son lived but was missing after the fire. He was unemployed; of problematic, addictive behavior and has been collecting trash and storing it in the apartment. Police concluded that he set the arson to disguise his mother's mummy. She has not been seen alive by any of the neighbors for years and the last time she was seen by her general practitioner was seven years ago. She was the beneficiary of a German retirement pension and had it paid out by the mail. The fire burst out soon after the mail carrier refused to deliver payment to the son. Since the decisive identification was not possible without molecular DNA analysis, preserved teeth were collected. The DNA profile of teeth collected at the autopsy corresponded to that of the blood sample of the living mother of the mummified woman.

**Discussion:** The autopsy of a mummified corpse is a significant challenge. Certain determination of the identity is undoubtedly the most pivotal challenge in these cases. In that vein, it is essential to conduct a DNA analysis of the remains. Another problem lies in deciding on the immediate cause of death, due to the lack of vital organs. On a mummy, it is almost impossible to spot any visible traces of injuries. Additionally, there is an incapacity to estimate the approximate time of death, what is best subtracted in Knight's quote: "The opinion of any doctor who offers a single time of death, instead of a range, must be viewed with suspicion."

**Conclusion:** Whenever the dead body is found with a delay and when late postmortem changes have already set on, many of our conclusions on the post-mortal period are relative. In the case of mummified bodies, the preserved basic appearance of the corpse does not warrant accurate identification, and the DNA analysis is mandatory.

**Keywords:** DNA expertise, identification, mummification, time of death

## **P6. WHEN BLOOD LOSS IS NOT ENOUGH: PULMONARY FAT EMBOLISM FOLLOWING BLUNT TRAUMA**

**Danica Cvetković<sup>1</sup>, Vladimir Živković<sup>1</sup>, Slobodan Nikolić<sup>1</sup>**

<sup>1</sup>Institute of Forensic Medicine, School of Medicine, University of Belgrade

In forensic practice, violent (posttraumatic, exogenous) fat embolism is the result of an injury and is related to trauma. Most often, this phenomenon follows fractures of the long bones, extensive bruising of subcutaneous fat tissue, isolated rupture of fatty liver, surgical operations on fatty tissues (especially mastectomy), septicaemia, etc. Herein, we present the case of a 24-year-old male who was beaten with a metal rod by several persons. After the event, he was transported to the hospital. On admission, he was conscious, confused, somnolent, but did not show any other pathological neurological signs. After complete diagnostic procedures, neither injuries of internal organs nor blood effusions were found. Still, laboratory findings and vital signs were indicative of a haemorrhagic shock and gradual respiratory failure. Patient's consciousness deteriorated gradually. He died nine hours after admission. The autopsy showed multiple injuries: multiple lacerations of the head, forearms and lower legs; numerous bruises, mostly on the limbs, some of them with a "tramline" shape; multiple stripe-like excoriations and skin contusions; fractures of one rib, ulna bones, right fibula and one metatarsal bone. The subcutaneous tissue of the limbs and back (about 35% of the body surface) was bruised, especially on the arms where thickness of bruising was up to 2 cm. Additionally, traumatic avulsion of the skin and subcutaneous fat tissue was present on the left leg. Autopsy examination showed absence of other injuries (including injuries of internal organs), with autopsy findings suggestive of a significant blood loss. The clinical course and autopsy findings suggested the possibility of a pulmonary fat embolism. In order to evaluate the presence and the degree of fat embolism, frozen samples from the lungs were stained with Sudan III staining for fat. Microscopic examination of these samples showed a massive fat embolism (grade III according to Sevitt). The cause of death was attributed to the pulmonary fat embolism combined with the severe blood loss, following extensive and severe bruising of the subcutaneous tissues and fractures of the long bones. Some authors state that exsanguination into the contusions of the subcutaneous fat tissue could be the cause of death if more than 50% of body surface is injured (using "the rule of nine" by Wallace). The presented case shows that fat embolism should be regarded as the possible cause of death, either main or additional, even if lesser body surface is engaged, especially with other autopsy findings being unremarkable.

Keywords: fat embolism; subcutaneous fat tissue contusions; blunt trauma

## **P7. ASPHYXIA IN THE PAPER FACTORY**

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Occupational accidents with fatal outcome are part of medicolegal casework with special regard to case reconstruction, liabilities and insurance law-related issues. We present a case of a 49-year-old mechanic who worked in a paper and cardboard factory. According to the police report, while repairing one of the machines, he fell into the funnel through which moist cellulose pulp is put into the cardboard production process. His disappearance was noticed when the production process stopped. Other workers checked the machine and found his body stuck in the funnel, with his legs, arms and head in the upright position. The autopsy was performed the following day. The man was of average physique (175 cm tall, weighted 80 kg). Postmortem hypostasis was well-expressed, with pinpoint skin haemorrhages (vibices) on the front side of the neck and thorax. Bilateral conjunctival haemorrhages were also present. There were multiple fresh bruises and excoriations on the arms and legs, which probably originated from the tumbling in the funnel. Soggy, greyish material (cellulose pulp) was found in his mouth, nose, oesophagus and stomach. The same material filled and completely obstructed the larynx, trachea, both principal bronchi and lobar bronchial branches, and it could even be seen on the lung sections, causing asphyxia. Other signs of asphyxia on internal organs were also present: subserosal petechiae (on the pleura and diaphragms), discrete haemorrhages in the psoas muscle, streaky haemorrhages on the anterior aspects of the intervertebral disks ("Simon's sign") and congestion of all organs. Except for the moderate cardiovascular atherosclerosis, the rest of the autopsy findings were unremarkable. In the microscopic examination, cellulose fibres were evident in terminal bronchioles. Toxicological analysis was negative for alcohol and drugs. The cause of death was asphyxia due to choking on the cellulose pulp which completely blocked entire internal airways. The reason why the victim fell in the funnel remained unclear.

Keywords: occupational accident; asphyxia; choking; cellulose pulp



## **P8. CLINICAL-PATHOLOGICAL NETWORK IN DETECTION OF NPS IN CROATIA**

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As reported by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), over the past 5 years there has been an unprecedented increase in the number, type and availability of New Psychoactive Substances (NPS) in Europe, including in Republic of Croatia. A rapid expansion of the online market for NPS has been observed over the last decade, with these substances sold as both 'research chemicals' and 'legal highs' in online shops, available to everyone surfing the net, especially to young people very comfortable with new IT technologies, and more and more frequently responsible of NPS related intoxications. Strong national and regional Early Warning Systems has to continue to play a central role in the early detection of harms and help to ensure timely public health responses. In addition, in Split, Croatia, in the frame of I-SEE project, a monitoring system of NPS related intoxications was launched as a preparation for Ultra Europe Music Festival, Split, 2015-2017. Operational guidelines and communication protocols about NPS related intoxications management had been draft and shared among people working in emergency services to better and faster tackle NPS poisonings. To this regard, an Official Standardized Worksheet for monitoring patients with suspected NPS intoxications had been developed for the Croatian EWS clinical network. That allowed health professionals to collect clinical information about patients with suspected NPS intoxication with main purpose to help the analysis of their biological fluids at the Clinical Hospital Center Split, Toxicological Laboratory, Department of Forensic Medicine of the University of Split. Here we present some results of the mentioned project.

Keywords: New Psychoactive Substances, Early Warning System, information exchange

## **P9. AN UNUSUAL SUICIDE WITH A SAFETY RAZOR BLADE—A CASE REPORT**

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A 69-year-old woman was found dead in the sofa in a sitting position surrounded with a pool of blood. The individual is alleged to have committed suicide by cutting her lower legs with a safety razor blade, which was found at the scene by the investigating police authority. The deceased, as per her relatives, was suffering from depression and diabetes mellitus for the last few years. Scene circumstances and autopsy findings, together with hesitation marks located in the immediate proximity pointed toward a suicidal etiology. Autopsy revealed a large number of superficial cuts of sizes ranging from 3 to 6 cm over the both lower legs. These cuts were almost parallel to each other, wavy in nature, had a transverse orientation, indicating tentative or hesitation. Below these, on both lower legs, there were a cut wounds horizontally placed over the whole circumference of the lower legs, 24 cm above heel level, cutting external veins on both sides, underneath lower legs muscles and reaching up to the both lower legs bones with associated haematoma. Deep lower-legs arteries on both sides were intact. Death was attributed to haemorrhagic shock following injuries of the external blood vessels and muscles of both lower legs. Circumstantial evidence statements by the relatives and neighbors, the absence of any defense wounds on the body, the presence of hesitant wounds on the lower legs along with old scars on the forearms indicating earlier suicide attempts were indicative of the fact that the deceased had allegedly committed suicide. The authors suggest that a complete forensic approach by means of scene investigation, autopsy as well as toxicological analysis is fundamental in unusual suicide cases like this.

Keywords: multiple cutting wounds; depression; suicide; safety razor blade

## **P10. STUDY ON THE RELATIONSHIP BETWEEN THE CONCENTRATION OF ETHANOL IN THE BLOOD AND THE VITREOUS HUMOUR**

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**Introduction:** Ethanol (ethylic alcohol) is widely available, being the most commonly used drug worldwide and often involved in forensic cases. It therefore becomes essential to analyze and correctly interpret the blood alcohol concentration (BAC) in samples collected during autopsy.

**Aim:** The purpose of our study was to establish a relationship between the concentration of ethanol in vitreous humor and blood, and to determine potential factors that could have influence on its values, which should lead to a more accurate assessment of the BAC, in cases where direct measurement is difficult because of putrefaction, severe trauma, embalming etc.

**Material and Methods:** The study was conducted at the Institute of Forensic Medicine, School of Medicine, University of Belgrade, between January 2016 and January 2017 on a total of 125 forensic cases in which samples of blood and vitreous humor were collected for toxicological examination. The association between alcohol concentrations was tested by correlation analysis, while contributing independent predictors to BAC were determined using multiple linear regression analysis.

**Results:** We found a strong correlation between the concentration of ethanol in blood and vitreous humor ( $r=0.97$ ;  $p < 0.001$ ). Postmortem interval duration (PMI) significantly affected the strength of correlation between samples ( $p < 0.001$ ). For PMI shorter than 24h, BAC/VAC correlation was stronger ( $r=0.98$ ;  $p < 0.001$ ) than compared to PMI > 24h ( $r=0.97$ ;  $p < 0.001$ ). Also, the age of the deceased significantly affected the correlation between BAC/VAC ( $r=0.97$  in younger than 35 yrs vs.  $r=0.95$  in older than 65 yrs;  $p < 0.001$ ). We also identified a method for calculation of blood alcohol concentration at the time of death from blood alcohol concentration at the time of autopsy, depending on the postmortem interval duration.

**Keywords:** ethanol concentration; blood; vitreous humor; autopsy

## **P11. FATAL FALLS FROM HEIGHTS**

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Introduction: Falls from heights places are very common in urban settings. When body is brought for the autopsy it is sometimes unclear whether the mode of death is accident, suicide or homicide.

The aim of this study was to assess the pattern and extent of the injuries sustained by victims of fall from height depending on the high of fall.

Material and methods: The study included 60 bodies of victims of fatal falls from different heights who were subjected to medical legal autopsy at the Institute of Forensic Medicine and Criminalistic in Skopje, between 2014 and 2017. For each selected data were collected including gender, age, injury types, body height and presence of alcohol and intoxicants in blood. The analysis comprised injury to the brain, thoracic and abdominal organs, fractures of the skull, fracture of the extremities, ribs and spines, and fractures of the scapula, clavicle and sternum (considered together). The study was focused on determination the frequency of occurrence of different injuries in relation to one another and depending on the height of fall.

Results: Sixty deaths due to falls from height occurred in ten year period. There were 53 male, and 7 females. The average age of the victims was 49,7 years (range from 20 to 80 ). The number and extent of injuries was found to increase along with the height of fall. The study also revealed number of correlations between the frequencies occurrence of different injuries.

Conclusion: Our data showed that evaluation of pathological features alone is not sufficient to assess the model of death in fatal falls from height. Each case should be considered individually, within the framework of the victim`s history in conjunctions with findings at the death scene and toxicology results.

Keywords: fall from height, forensic pathology, injuries

## **P12. BRAIN-HEART CROSSTALK**

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Neurogenic stress cardiomyopathy (NSC) is a syndrome that can occur after severe acute neurologic injury. It is clinically characterized by electrocardiographic signs, arrhythmias, left ventricular wall motion abnormalities and myocardial necrosis enzyme release. The highest incidence of NSC was observed in subarachnoid haemorrhage (SAH). Despite the reported relatively high incidence of NSC there are just very few clinically recognised cases in our autopsy material.

In our study we attempted to confirm or exclude the diagnosis of NSC retrospectively of ten selected cases where severe head trauma caused SAH and lead to death after various length of post-trauma.

The method included the re-evaluation of the already available myocardial histopathology and the expansion of it by immunohistochemistry (fibronectin, myoglobin, desmin). The specific tissue lesions we looked for were the contraction band necrosis, myocardial disarray, mild interstitial mononuclear infiltration and fibrotic changes

As a preliminary result, we find it difficult to differentiate NSC from other cardiac diseases such as ischaemic heart disease and drug induced changes. Furthermore some of the missing clinical results and investigations hinder our goal.

Keywords: neurogenic stress cardiomyopathy; subarachnoid haemorrhage; immunohistochemistry

### **P13. A CASE OF PEDESTRIAN DOUBLE HIT. RECONSTRUCTION OF THE INJURIES-RELATED DEATH.**

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This case discusses about a pedestrian double hit by two separate vehicles. The pedestrian, an 82-years old woman, suffered serious injuries that caused her immediate decease.

Since two vehicles were involved and the dynamic was not clear, forensics were carried out on the vehicles in order to identify possible contact points with the pedestrian. Moreover, a consultant was appointed to reconstruct the accident.

To determine the most accurate sequence of events and how the collision occurred, physical evidences like damages to vehicles, debris patterns, and vehicle rest positions were carefully considered.

At the autopsy, the body presented different injuries, including thoracic crushing and pelvic, femur and right leg bones fractures. There were also head injuries that, however, were not fatal.

At the vehicle analysis, the first car was damaged to the right front bumper, the right-wing mirror and the right part of the frame; the second one, instead, to the right front foglamp, the radiator and the underbody that was spattered with biological material. The events were fully recreated thanks to injuries found at autopsy, accident investigation, computer simulation and accident reconstruction: the first car hit the pedestrian with the right part of the frame causing his fall (fender vault collision) and, subsequently, the non-fatal head injuries. The second vehicle ran over the body causing thorax injuries and determining the death of the woman.

Keywords: pedestrian; computer simulation; accident reconstruction

## **P14. DEATH CAUSED BY APPARENTLY ASYMPTOMATIC PERITONITIS DUE TO an IMPACTED DENTURE**

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A case of a 60-year-old woman from a nursery home who was admitted to hospital unconscious. The native X-ray of the abdomen was apparently unremarkable. She died shortly after admission, following cardiopulmonary resuscitation, without a known cause of death. The autopsy showed a purulent peritonitis, with layers of fibrin over the bowels, and thick adhesions in the area of caecum and adjacent small and large intestines. In that region a small perforation with thickened, ulcerated edges was noticed (3 mm in diameter). The dissection of bowels in the described area showed a partial lower denture that had a small metal hook at its very end. The mucosa had several small ulcerations in the region where the denture was discovered. The postmortem examination also discovered that the woman had a hysterectomy earlier in life, which might have been the reason for the adhesions in the lower part of the abdominal cavity, which, possibly, eventually caused the denture to get stuck in the convolutions of the intestines. Even though severe abdominal pain would have been an expected symptom of peritonitis, and that it must have been present for at least several days, necessary for the denture to get to the caecum region and produce the ulcerations and the perforation, the patient never complained. The reason must have been that she wasn't able to speak because of an old cerebrovascular insult (8x3x6 cm) that was located in Broca's area of the left hemisphere and the adjacent parts of temporal and parietal lobes, destroying her basal ganglia, which was also discovered at the autopsy. The medical history and heteroanamnestic data that were later acquired showed that she also had right hemiplegia and swallowing difficulties. The significance of this report is even greater considering the fact that occult gastrointestinal disease remains a cause of unexpected death in the disabled that may only be revealed at autopsy. The recommendation could be the removal of the dentures in patients with swallowing difficulties to prevent serious complications caused by swallowing or inhaling them.

Keywords: autopsy; intestine foreign body; perforation; peritonitis; cerebrovascular insult

## **P15. INFLUENCE OF CLIMATIC FACTORS ON SUICIDE RATE IN SPLIT IN 2011-2015**

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**Objective:** To investigate the relationship between climatic factors and daily numbers of completed suicide in the area of Split-Dalmatia County in the years 2011 to 2015.

**Subject and method:** Retrospective analysis of all suicides between 1<sup>st</sup> of January 2011 and 31<sup>st</sup> of December 2015. Weather variables of interest were sunshine duration, atmospheric pressure, temperature, relative humidity, wind direction (Bura/Jugo) and wind speed. Data was collected on the weather station Split Marjan and compared on a day-to-day basis with daily number of suicides. Timelines for each variable were created and Pearson correlation coefficients were calculated to demonstrate possible associations. Calculations were repeated distinguishing between male and female suicides. To reduce seasonality, data on weather and suicides were differenced.

**Results:** Positive correlation was found between sunshine duration and number of daily suicides ( $r=0,057$ ;  $p=0,015$ ) and conversely negative correlation between cloud coverage and number of daily suicides ( $r=-0,052$ ;  $p=0,057$ ). These associations were found in the whole sample as well as only in men. In female suicides these results were not reproducible.

**Conclusion:** This study confirms the hypothesis that sunshine may facilitate suicide and conversely cloud coverage can be seen as protective factor. Associations with other climatic factors may be present but due to the complexity of the interaction between weather and human behaviour and health difficult to demonstrate.

**Keywords:** suicide, weather, climate



## **P16. RECONSTRUCTING THE CRIME SCENE VIA RECONSTRUCTING THE SKULL**

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The posters present 3+1 homicide cases with extremely fragmented skulls. The multiple fractures were caused by hammer and axe, respectively. The comprehensive examination of the distinct fractures allow us to determine the shape and size of the weapon, the number, sequence and direction of the blows and the changing position of the victim and the perpetrator. The authors highlight the importance of the maceration and careful cleaning of the bones in cases of multiple cranial fractures.

Keywords: skull fracture; homicide; crime scene reconstruction

## P17. CHALLENGES IN DETECTION OF THE RECENTLY EMERGED SYNTHETIC CANNABINOIDS IN HUMAN URINE SAMPLES

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Analytical strategies for detecting designer drugs in human urine are challenges, because in most cases the parent compounds are detectable in narrow time window due to their fast metabolism prior to renal excretion. The aims of this study were the *in vitro* identification of metabolites of CUMYL-PEGACLONE (2-cumyl-5-pentyl-gamma-carbolin-1-one) and 5F-MDMB-PICA (methyl N-[[1-(5-fluoropentyl)-1H-indol-3-yl]carbonyl]-3-methylvalinate) as one of the newest synthetic cannabinoids (SCs) using human liver microsome (HLM) and to confirm the results in authentic human urine specimens. Currently, there is limited information available about the effect of SC on cells nerve cells and hepatocytes. Therefore, another goal of this study was the investigation of effect of CUMYL-PEGACLONE on SH-SY5Y and HepG2 cells.

New sample preparation and LC-MS/MS method was developed for identification and analysis of metabolites of CUMYL-PEGACLONE and 5F-MDMB-PICA in HLM and urine specimen. The SCs were incubated at 37°C with HML and hepatocyte for 30 min and 24 hours in order, while the human urine samples were analyzed after  $\beta$ -glucuronidase hydrolysis. The analysis was performed on Waters Acquity I-Class UPLC system coupled to Thermo Scientific Q Exact Plus hybrid quadrupole-Orbitrap mass spectrometer. The separation of metabolites was achieved by using C18 core-shell column. The molecular characterization of metabolites was based on the MS/MS fragmentation patterns of molecules that are detected as ions in positive mode.

The developed analytical LC-MS/MS method provided the separation and characterization of numerous CUMYL-PEGACLONE and 5F-MDMB-PICA *phase I* metabolites, such as mono- and di-hydroxylated, dealkylated, dehydrogenated, carbonyl formation and their isomers in HLM and urine samples. Finally, the effect of CUMYL-PEGACLONE was determined on the viability of SY5Y and HepG2 cells.

Keywords: synthetic cannabinoids; metabolism; LC-MS/MS; urine sample

## **P18. LEADING EXTERNAL CAUSES OF DEATH IN PERSONS AGED 20-24 YEARS IN THE PERIOD 2011-2015 IN CROATIA**

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The aim of this study was to determine the leading external causes of death in persons of student age in the period 2011-2015 in Croatia, as an indirect indicator of external death causes in the student population of Croatia. The hypothesis was that accidents are the most prevalent external cause of death in the observed population. The data were collected from Eurostat database. Since there are strictly determined age categories in the said database, the category of people aged 20-24 years was selected for the study as the most appropriate for the purpose of extrapolating the results to the student population. The total number of deaths within the selected population in the observed period was 630. Among those deaths, 447 (70,95%) were caused by external factors. The leading external cause of death were accidents (64,88%), 79.66% of which were transport accidents - the only parameter with a significant tendency of decrease (from 46,85% in 2011 to 31,93% in 2015 in relation to total number of deaths) - and 7,93% of which were accidental drownings and submersion, a cause specifically observed due to Croatia's long coastline. Prevalence of other external causes of death was as follows: suicide 31,54% and assault 3,35%. In conclusion, accidents are the leading external cause of death in persons aged 20-24 years in Croatia, which confirms our hypothesis. It is yet to be examined whether the reason for that is, as one might assume, a high prevalence of alcohol use in people of said age. Further studies should also be made to determine if the extrapolation of results to the student population is valid. All in all, the distribution of external death causes of young people in Croatia is not much different than the one in other developing countries of Europe.

Keywords: student; Croatia; external causes of death; accidents

## **P19. BLUE CRYSTAL OF „TOMAŠICA“ BODIES**

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The Tomašica grave-site near Prijedor, in the north of Bosnia and Herzegovina, is reported to be one of the largest primary mass grave discovered thus far relating to the 1992 – 95 war. Tomašica grave-site was part of iron ore mine complex. A total of 275 complete bodies and 125 body parts were exhumed from it in 2013. Striking feature was the degree of preservation of many of the bodies, even 21 years on, with skin, soft tissues and internal organs still present in abundance and gross structures clearly identifiable. Such soft tissue preservation here was attributed to the formation of adipocere. Additionally on many of the bodies, the skin was heavily impregnated by blue crystals which were determined to be Vivianite. Vivianite is an iron phosphate mineral which is normally found in organic archaeological context hundreds of years old. Thus in context of mass graves it's rarely seen.

Keywords: Tomašica mass grave, Vivianite, Exhumation, Blue crystal