

SPECIAL ISSUE  
SELECTED ABSTRACTS OF THE 1<sup>st</sup> INTERNATIONAL  
CAPARICA CONFERENCE ON TRANSLATIONAL FORENSICS  
(FORENSICS 2017)

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# 1st International Caparica Conference on Translational Forensics (FORENSICS 2017)

Caparica – Lisbon, Portugal – 20<sup>th</sup> – 23<sup>rd</sup> November 2017

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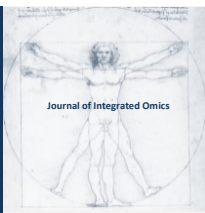
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# Applying Penetration Test to Improve Cybersecurity Forensic Investigation

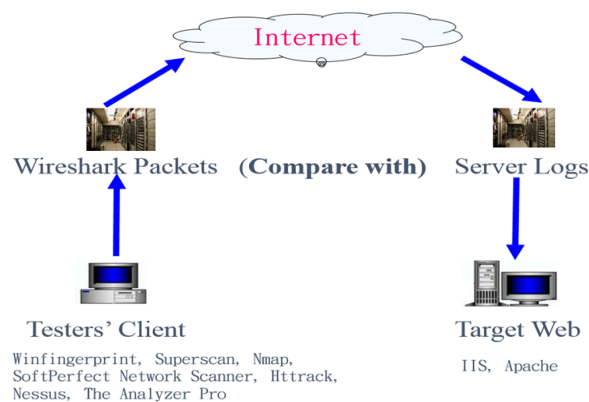
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**Available Online:** 15 December 2017

## ABSTRACT

A data breach occurs when an unauthorized hacker accesses a compromised database or repository over a network connection. Cybersecurity forensic investigation seeks to explain how an Internet data breach occurred and who perpetrated the attack. There is an increasing need to develop techniques that could permit preliminary investigations for first responders at crime scene. This paper uses penetration test to model the investigative process, and engages digital evidence acquired from tester/target computers. All records are stored and collected from the following software [1]: Winfingerprint, Superscan, Nmap, SoftPerfect Network Scanner, Httrack, Nessus, The Analyzer Pro, and Wireshark. In Figure 1, Wireshark packets are filtered and retrieved in SQL database to compare with the auditing records in web servers. Their results are further analyzed to find some attack patterns in these digital records. It discusses how many available attack tools can be used to initiate a cyber intrusion. It also describes a prototype strategy in cybersecurity forensic investigation that is currently under development.



**Figure 1.** The architecture of penetration test platform

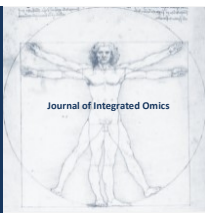
**Keywords:** Cyber Forensics, Digital Evidence, Wireshark Packets, Penetration Test

**Acknowledgments:** This research was partially supported by the Ministry of Science and Technology of the Republic of China under the Grants MOST 106-2221-E-015-002-.

## References:

- [1] Rahalkar, S. A., Certified Ethical Hacker (CEH) Foundation Guide, Apress Media (2016), pp. 97-108.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1ST INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## A Network-Based Sniffer Architecture for Cybercrime Investigation

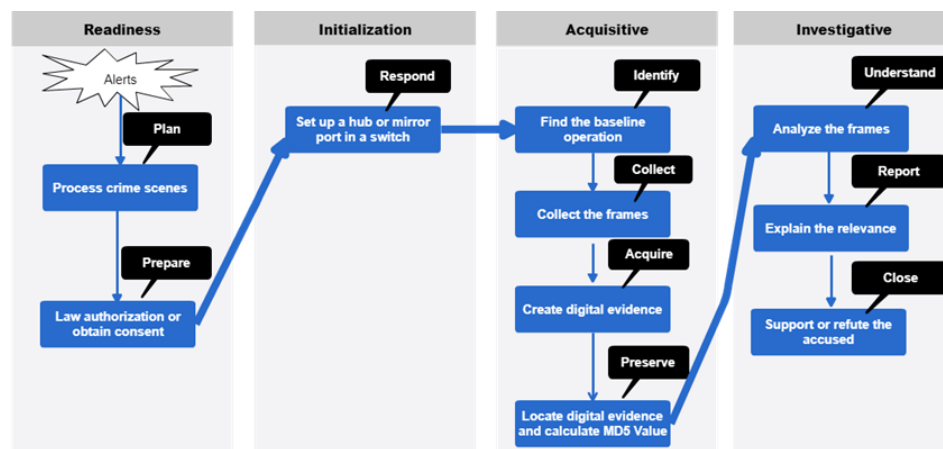
Da-Yu Kao, En-Cih Chang, Fu-Ching Tsai \*

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**Available Online:** 15 December 2017

### ABSTRACT

Using sniffers becomes one of the most common approaches to examine the captured traffic activities when it comes to collecting digital evidence in cybercrime investigation. The storage and handling of sniffer packets are creating significant challenges for law enforcement agencies. These challenges include processing massive amounts of packets, maintaining the integrity of digital evidence, and storing digital evidence during the period of investigation [1]. The ISO/IEC 27043: 2015 international standards provide instructional guidance from the following processes [2]: readiness, initialization, acquisitive, and investigative. In Figure 1, this paper proposes a network-based sniffer architecture that helps address these issues and formalizes what should be logged for an appreciate cybercrime investigation. It also meets the need of ISO/IEC 27043:2015 standards to avoid fear, uncertainty, and doubt. The utility of this methodology is illustrated by applying it to a real-time network forensics and lawful interception system in Taiwan.



**Figure 1.** A network-based sniffer architecture for cybercrime investigation.

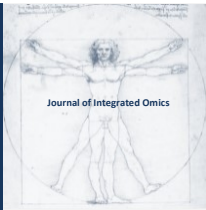
**Keywords:** ISO/IEC 27043: 2015, Cybercrime Investigation, Digital Forensics, Packet Analysis

**Acknowledgments:** This research was partially supported by the Ministry of Science and Technology of the Republic of China under the Grants MOST 106-2221-E-015-002-.

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## **References:**

- 1] Casey, E., Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet (3rd Edition), Elsevier Inc., pp. 722-735, 2011.
- 2] International Organization for Standardization (ISO), "ISO/IEC 27043: 2015 Information Technology – Security Techniques - Incident Investigation Principles and Processes," ISO Office, pp. 5-20, 2015.



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## The Diplomatics and Digital Forensics Science in the digital records: The Pursuit of Authenticity

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**Available Online:** 15 December 2017

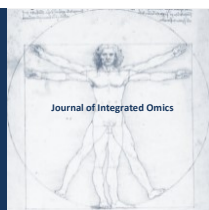
### ABSTRACT

The project aims at the application of Digital Diplomatic Science and Digital Forensics Science in digital born records [1], in order to guarantee its authenticity in institutional routines and processes, but also as a source of proof in possible legal and legal scenarios [2]. In view of the vast and fruitful discussions focused on the complexity of the digital records in Archival Science and Information Science I.C., there is a gap to manage and preserve the digital records, keeping them reliable, accurate and authentic in systems that have the same conditions. This gap makes it impossible to preserve records in the long term due, firstly, to the fragility of the systems where they are stored and, secondly, to the constant risks of obsolescence of hardware and software that occur on a day by day. Digital Diplomatic Science assists this process by determining the form and content of the record to evidence its legal-diplomatic authenticity and establish its historical value [3]. Digital Forensic Science, in turn, provides support for the chain of custody to remain intact, regardless of the medium on which the digital record is fixed. Is questioned: Is it possible to apply the practice of law and the Digital Forensics in the area of the archival science and information science, guaranteeing the authenticity of the born digital record? [4]. In addition, in what way does the junction between Digital Diplomatic Science and Digital Forensic Science guarantee the preservation and preservation of the born digital record? To answer such questions, this research proposes to link five areas of knowledge following the scientific experiences conducted at the University of British Columbia in Canada by the InterPares (International Research on Permanent Authentic Records) group [5]: Digital Forensics, Diplomatics, Archival Science, Information Science and Common Law. Areas of knowledge that are offering interesting results for the preservation not only of the record, but also of the social memory. The research will be carried out in a theoretical and qualitative way, taking into account the literature shared in the site Digital Records Forensics Project[6], coordinated by the author Luciana Duranti of the InterPares group, and the bibliography produced in the country of the areas of knowledge already referenced. The results obtained will contribute to the realization of alternative researches in document conservation within the Archival Science and the Information Science [7].

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- 1] Duranti, L. From digital diplomatics to digital records forensics. *Archivaria*, The Journal of the Association of Canadian Archivists. 68 (Fall 2009): 39–66: <http://archivaria.ca/index.php/archivaria/article/view/13229/14548>
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## Forensic DNA analysis of the biological objects sampled from the poaching sites in Belarus

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Available Online: 15 December 2017

### ABSTRACT

**Motivation and Aim:** The illegal removal of animals from the natural environment represents a world problem. Crimes against wildlife objects (in particular illegal hunting) have a high level of latency. DNA analysis of biological traces from the shooting or butchering site, clothes of the poacher, vehicle or meat storage sites may provide evidentiary information.

**Methods and Algorithms:** We performed multiplex PCR of STR loci using fluorescently labeled primers. PCR products were analyzed with capillary electrophoresis using automated sequencers manufactured by Applied Biosystems, PCR-RFLP.

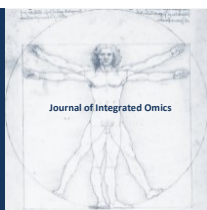
**Results:** DNA analysis of wild animal biological traces is more complex than the DNA analysis of human biological traces because of the phylogenetic relationship of wild species to each other (for example, moos, roe deer, red deer) and kinship with domestic animals (bull, goat, sheep). Thus the obligatory stage of wild animal DNA genotyping is to solve additional classification problems of species affinity and differentiation between the wild or domestic animal. Based on the study of the phenomenon of cross-species amplification we developed a procedure for determining the animal species (moos, roe deer, red deer, deer) by genotyping of biological traces. The panels of loci for DNA identification of individual animal among these species have been chosen. Identification of individual specimen of moos and roe deer whose detailed genome structure is unknown was carried out on the basis of cross-species amplification. Polymorphism of 20 STR-loci and SNP-polymorphism of the melanocortin 1 receptor (MC1R) gene and nuclear receptor subfamily 6, group A, member 1 (NR6A1) gene [1] were studied in wild boar populations (719 samples) and herds of domestic pigs (304 samples, 6 breeds). On the basis of the results obtained a procedure for differentiation of the specimen origin from the wild boar or a domestic pig and procedure for individual identification of the specimen have been developed.

**Conclusion:** The study of genetic features of regional (local) populations of wild animals provides a means of successful identification of the objects from poaching sites. A number of expert examinations were performed with the samples of elk, deer, roe deer, wild boar, bison, bear, beaver, dog, hyena dog, fox, bull, horse, sheep, domestic pig.

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- 1] L. Fontanesi, A. Ribani, E. Scotti, V.J. Utzeri, N. Veličković, S. Dall'Olio, Meat Science 98 (2014) 781-784.

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## Postmortem changes and Interpretation of Amphetamine type stimulants

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Available Online: 15 December 2017

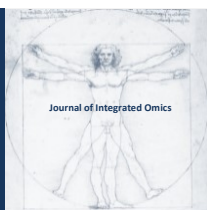
### ABSTRACT

Amphetamine type stimulants (ATS) refer to a group of drugs that have a common phenethylamine structural backbone and include drugs such as amphetamine, methamphetamine, 3,4-methylenedioxymphetamine (MDA) and 3,4-Methylenedioxymethamphetamine (MDMA). The abuse of Amphetamine type stimulants (ATS) has emerged as a global problem. The abuse of these potent stimulants began to appear in a few countries of North America, Europe and the Far East, gradually spreading to neighboring countries in the respective regions as well as to other regions. By the mid-1990s, abuse of ATS has become a global phenomenon. Global demand for amphetamines, which increased strongly in most part of the world in the 1990's, is now showing signs of an overall stabilization, however its abuse is still prevalent all over the world while ecstasy use has been declining globally. There are distinct regional abuse patterns in ATS abuse. Methamphetamine is abused in north America and Asia, while amphetamine and Ecstasy in Europe and Australia. In Korea, methamphetamine is the most abused drug. Recently, along with the advances in organic chemistry that greatly enhance the capability of chemical synthesis, many synthetic drugs with psychoactive properties (New Psychoactive Substances, NPS) have emerged on the illicit market. In this talk, firstly the abuse trends of ATS and NPS with phenethylamine structural backbone will be discussed based on the report of UNODC. Secondly, the analysis of ATS and synthetic amphetamines in urine and hair will be focused because it has been a great challenge for forensic toxicologists due to insufficient chromatographic separation of their isomers and metabolites. Amphetamine and methamphetamine are chiral molecules and D-enantiomer has greater biological activity than the L-enantiomer. Lastly, postmortem changes and interpretation of ATS in drug testing will be discussed with real cases. There are various factors to have an impact on the concentration of ATS in postmortem specimens such as postmortem redistribution. The concentration of methamphetamine detected in cardiac blood was about 2 times higher than that detected in peripheral blood. Considering all these factors, the interpretation of toxicological results should be coupled with autopsy findings, crime scene information, related medical history and toxicokinetics.

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- 1] World drug report 2017, UNODC, <http://www.unodc.org/wdr2017/?lf=1&lng=en>
- 2] Olaf Drummer, Forensic Science International (2004), 142 101-113
- 3] Graham Jones, Interpretation of postmortem drug level, chapter 6, Postmortem Toxicology of abused drug, Steven Karch CRC Press, 2017

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## The determination of cholinesterase activity using photography

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**Available Online:** 15 December 2017

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### ABSTRACT

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Smartphones are popular devices frequently equipped with a sensitive sensor like camera and immense computational ability [1,2]. Surprisingly, no serious application based on a smartphone in analytical chemistry is available except of remote control of another device. In this work, smartphone is performed as a tool for the determination of cholinesterasemia i.e. the determination of a biochemical marker butyrylcholinesterase (BChE). Paper strips soaked with indoxylacetate were used for the determination of BChE activity. Standard spectrophotometric test was used as a reference measurement. In the smartphone based assay, BChE converted indoxylacetate to indigo blue and coloration was photographed using integrated camera. RGB color model was analyzed and color values for the individual color channels were determined. The assay was verified using plasma samples and samples containing pure BChE, and it was validated to standard spectrophotometry. The smartphone assay was proved to be reliable and applicable for routine diagnoses where BChE serves as a marker. Liver function test and diagnosis of poisoning by some neurotoxic compounds can be exemplified. It can be concluded that practical applicability of the assay is expected because of the results relevance.

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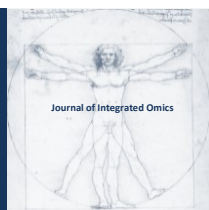
**Acknowledgments:** This work was supported by the Ministry of Defence of the Czech Republic - long-term organization development plan Medical Aspects of Weapons of Mass Destruction of the Faculty of Military Health Sciences, University of Defence.

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- 1] P. Martinkova, M. Pohanka, Chemical Papers, Journal of Applied Biomedicine, 14 (2016) 315–319.
- 2] M. Pohanka, Chemical Papers, doi:10.1007/s11696-017-0166-z

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## Investigation of suicide risk factors in Yerevan, Armenia

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Available Online: 15 December 2017

### ABSTRACT

**Background:** According to the WHO almost one million people commit suicide around the world every year. Suicide remains a significant social, public health problem [1] and the number of suicides is increasing each year. The crucial role in suicide prevention is to understand the causes of suicide and draw attention to the risk factors. The purpose of the study was to investigate forensic medical and socio-medical aspects and methods of suicides, to specify potential risk factors, to develop and implement appropriate suicide prevention strategies by means of decreasing risk factors and increasing protective measures.

**Materials and Methods:** Data for this study were obtained from internal database of the Scientific Practical Center of Forensic Medicine, SNPO, Department of Forensic Medicine, City of Yerevan, for the period from 2003 to 2012. The study included 729 cases of suicide and was based on 10- year collected data screening. The relevant conclusions were made and suicidal risk factors were identified. Suicides have been investigated according to the following criteria: sex, age group, month, year, season and meteorological factors, place where the suicide was committed, alcohol or drug abuse, method of committed suicide, citizenship and nationality of suicide committed person, social status and social factors, mental disorders and somatic diseases.

**Results:** 1) Suicide is generally most common among those over the age of 70 (19%); however, those aged between 18 and 29 are at highest risk (18%); 2) The risk of suicide is higher in spring (about 29.7% of all investigated cases), predominantly in May (about 10.8% of all investigated cases); 3) The risk of suicide is higher in people with alcohol abuse (about 20.6% of all investigated cases); 4) The risk of suicide is higher in people with mental disorders and somatic diseases (about 22% of all investigated cases); 5) The risk of suicide is higher in people with many complex socio-cultural factors (about 19% of all investigated cases); 6) The risk of suicide is higher among the unemployed (about 46% of all investigated cases).

The study showed that other factors affecting the risk of suicides, such as place of suicide, citizenship and nationality, drug abuse, were not significant and thus were not considered as suicidal risk factors.

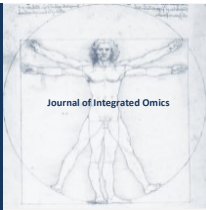
**Conclusions:** The analyses of data collected for the period from 2003 to 2010 revealed the following major suicide risk factors—1) The highest suicide rates are reported for males at the age 70 and older, the persons between age 18 and 29 are at highest risk; 2) Alcohol abuse; 3) Spring months, especially May; 4) Mental disorders and somatic diseases; 5) Social factors and unemployment.

### References:

- 1] PUBLIC HEALTH ACTION FOR THE PREVENTION OF SUICIDE © World Health Organization 2012 [http://apps.who.int/iris/bitstream/10665/75166/1/9789241503570\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/75166/1/9789241503570_eng.pdf)

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## Use of Optical Coherence Tomography (OCT) on detection of postmortem Ocular findings: pilot data from two cases

Matteo Nioi <sup>1\*</sup>, Pietro Emanuele Napoli <sup>2\*</sup>, Francesco Paribello <sup>1</sup>, Roberto Demontis <sup>1</sup>, Fabio De-Giorgio <sup>3</sup>, Elia Porru <sup>1</sup>, Maurizio Fossarello <sup>2</sup>, Ernesto d'Aloja <sup>1</sup>

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**Available Online:** 15 December 2017

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### ABSTRACT

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**Purpose.** The aim of this study was to describe by means of a portable Optical Coherence Tomography (OCT) the postmortem ocular findings in two cases of forensic interest.

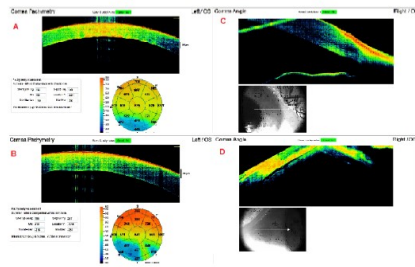
**Case 1.** A 41-year-old Caucasian man, dead from a gunshot in the head, was found inside his car. Time of death was precisely assessed from the testimony of eye witnesses. The body was transported at the Morgue of Medico-Legal Institute at the University of Cagliari for autopsy. OCT scans of cornea, anterior chamber and retina were performed at the 6<sup>th</sup>, 12<sup>th</sup> and 24<sup>th</sup> hour postmortem without change eyelid opening status. Corneal examination showed a progressive tendency of tissue to thickening. From a morphological point of view, we also observed a progressive formation of waves in the posterior stroma and in the endothelium. An ongoing modification in reflectivity between anterior (hyper-reflective) and posterior (hypo-reflective) segment of the corneal stroma was detected and a progressive decrease in amplitude of anterior chamber, mainly related to changes in tissue curvature. The retinal tissue showed since the first scan an increasing trend of retinal oedema together with a diffuse vascular depletion. It was also detectable the formation of a scleral *tache noir*.

**Case 2.** A 42-year-old woman, dead from myocardial infarction, underwent an autopsy at the Medico-Legal Institute at University of Cagliari (as suspected case of medical malpractice). Exact time of death was deduced by certificate of death drawn up by the emergency medical team. Scans of cornea, retina and anterior chamber were executed at the 24<sup>th</sup>, 36<sup>th</sup> and 48<sup>th</sup> hour postmortem. From the first scan an enhancement of corneal thickness, if compared to the physiological *in vivo* ranges, was detected; a change in corneal curvature was observed while no images from the retinal tissue were achieved. Late scans evidenced a progressive corneal endothelial exfoliation, and an enhancement of posterior stroma waving.

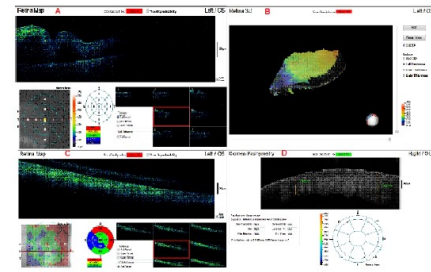
**Conclusion.** Portable OCT may be a useful device to observe and to record postmortem ocular changes. Its use could represent an important tool to study the early and the late modification of ocular tissues, with a special interest in the forensic scenario (PMI estimation) and in ophthalmology (viability of cornea for transplantation purposes).

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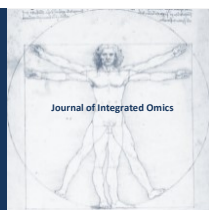
**Figure 1.** Pachymetric corneal changes over the time (A,B). Corneal angle (C) and OCT image of scleral *tache noir* (D).



**Figure 2.** OCT image of the fovea (A). 3-D retinal reconstruction (B). Retinal map (C). Corneal tardive scan [>48h] (D).

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1ST INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## A rapid multi-target screening in urine for emergency toxicology by GC-MS and LC-MS/MS

Heesun Chung <sup>1\*</sup>, Junhui Lee <sup>1</sup>, Heesung Moon <sup>1</sup> and Wonjoon Jeong <sup>2</sup>

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**Available Online:** 15 December 2017

### ABSTRACT

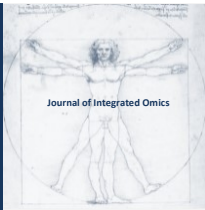
In order to establish the rapid method for screening of multiple toxicants in Emergency toxicology, GC-MS and LC-MS/MS were used to determine targeted and unknown toxicants in urine collected from intoxicated patients in emergency room. Totally 265 urine samples from February 2015 to March 2017 were submitted from Chungnam University Hospital emergency room. Urine samples were cleaned up by using Waters Ostro (pass-through type) and analyzed by Agilent GC-MS and LC-MS/MS. The library search for unknowns was conducted by in-house Mass spectral databases with the Automated Mass spectral Deconvolution and Identification System (AMDIS) as well as Chemstation software. For the specimen by LC-MS/MS, the 3200 Qtrap LC-MS/MS and Cliquant software (AB scx) was used for a simultaneous multi-targeted screening. As a result, a rapid multi-target method by GC-MS and LC-MS/MS was developed to determine the toxic substances in urine. By using Ostro extraction and in-house data base, it was possible to screen urines for toxic substances within three hours. Among 265 urine samples were examined, Zolpidem, acetaminophen and escitalopram were detected in 49, 29 and 16 cases respectively. Zolpidem was the most frequently encountered drugs in emergency room patients. By AMDIS & Chemstation with GC/MS and Cliquant 2.0 software with LC-MS/MS, unknown toxicants were well searched and identified. The comparison of urine analysis and the family report revealed that it is necessary to examine the specimen for the reliability of information. The rapid multi-target screening methods by GC-MS and LC-MS/MS proved to be well applicable to the hospital poisoning samples. This method will efficiently use to detect toxic substances in urine within 3 hour in emergency cases.

**Acknowledgments:** This work was supported by a grant (MFDS 2016-22204) from Ministry of Food and Drug Safety in 2017.

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## A molecular population genetics approach for the identification and forensic assignment of viral transmission groups

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**Available Online:** 15 December 2017

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### ABSTRACT

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Most cases of virus transmission that get to court imply pairs of putative donor-recipient. They usually involve fast evolving viruses, such as Human Immunodeficiency Virus (HIV) or Hepatitis C Virus (HCV), capable of accumulating enough variation within an infected individual to generate a heterogeneous swarm of virus variants usually known as “viral quasispecies”. The viral population in the recipient is usually a subsample of that in the donor individual and, if the time elapsed between the infection event and the sampling for analysis is not long, they can be easily identified as such. However, there can be a long delay in the diagnostic of infection for both viruses, which allows for intrapatient evolution and divergence of the two populations. With longer times between infection and sampling, the donor’s and the recipient’s viral populations may reach complete differentiation and their relatedness can be inferred only through phylogenetic analysis including some unrelated, control samples. A high bootstrap support is usually accepted as a reliable indicator of a close link, resulting from a transmission event. However, this depends on the availability of appropriate controls and the situation can worsen when the transmission under investigation is not between a pair of individuals but results from many such events. We analyzed one such case [1] which involved the infection of almost 300 persons from a common source, a practicing anesthesiologist. There, we included the analysis of within patient variability to better determine the estimated time of infection as well as to provide individualized estimates of the probability of each person having been infected by the source. This analysis included local controls (n=42) and putative outbreak victims (n=47) which were effectively excluded from the outbreak. The increased availability of next generation sequencing allows a more efficient and affordable estimation of within patient variability which we have recently used to establish which persons infected by HCV were likely members of transmission clusters despite the initial results with the analysis of a portion of the NS5B gene with a local population controls [2]. We present a population genetic parameter that can be estimated from intrapatient data (obtained by sequencing of clones or PCR products or by NGS) and used to discriminate between epidemiologically relevant clusters of transmission at different times in the past, through comparison with data from unrelated controls. This parameter is very flexible and, in the absence of additional epidemiological information and with additional phylogenetic analyses, can be used as a first guide for establishing hypotheses of which patients can be included in a transmission cluster.

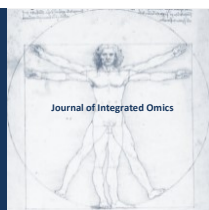
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**Acknowledgments:** Supported by projects BFU2014-58565R (MINECO, Spanish Government) and PROMETEO/2016/122 (Generalitat Valenciana, Spain).

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1ST INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## DSC as a new diagnostic method in forensic medicine

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<sup>1</sup> Clinics of Radiology Clinical Center, University Pécs, Pécs, Hungary; <sup>2</sup> Institute of Forensic Medicine School of Medicine, University Pécs, Hungary; <sup>3</sup> Institute of Biophysics School of Medicine, University Pécs, Pécs, Hungary.

**Available Online:** 15 December 2017

### ABSTRACT

Differential scanning calorimetry (DSC) is an often used method in thermal analysis. Recently, growing clinical use for it. By this method we can measure the effects of drugs/medicines and we can characterize changes in body. We have examined the effects of cyclophosphamide on different samples of guinea pigs to give a judicial expertise in a disability pension lawsuit. Besides of its beneficial effects cyclophosphamide may have got severe life-threatening side effects and complications because of the actual plasma level and high cumulative dosage. In the first step of our experiment we examined the effects of cyclophosphamide on guinea pigs' nerve-muscle complex with oncological indication by using a dosage protocol based on body mass [1]. According to our results we could show a significant, dose dependent difference between thermal parameters of untreated and treated samples which proved that cyclophosphamide has got a nerve and muscle damage effect. As a second step with the same method and drug dosage we examined its effect on the heart muscle [2]. The third step was in the further clinical application experiment with unchanged parameters on blood plasma as well as blood cells too, exhibiting dosage dependent changes on plasma and blood cells [3]. Evaluating the per-formed studies a correlation with the dosage can be observed on different experimental materials. We found detectable alterations with DSC on blood plasma components too, so it can be used in clinical routine. In long term treatments incidental severe results and side effects caused by cumulative dose may become predictive with this method. If we can manage to predict the harmful effects for patients which are arising from different factors, we could prevent them with this method by decreasing the dose or changing to other drug. All these show a new promising area in DSC usage which passed out of mind in the last 10 years.

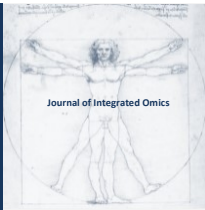
**Keywords:** cyclophosphamide, nerve, muscle, blood plasma and cell, DSC

**Acknowledgments:** This presentation is dedicated to the 650<sup>th</sup> anniversary of the foundation of the University of Pécs, Hungary.

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## Forensic EcoGenomics – The successful application of microbial ecology techniques for enhanced forensic analysis

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**Available Online:** 15 December 2017

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### ABSTRACT

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Developed in 2014, the term ‘Forensic EcoGenomics’ was defined in literature as “*the application of molecular microbial ecology techniques at the interface of (environmental) forensics, microbiology and archaeology*” [1]. It is inherently trans-disciplinary by definition and application, and is one of several emergent forensic sub-disciplines that aim to advance forensic science and enhance the modern crime scene toolkit. Therefore, forensic ecogenomics encapsulates culture-based and molecular techniques that analyse the dynamics of microbial and macrobial communities in different forensic contexts. Although we have proposed that forensic ecogenomics has a significant role in ante- and postmortem investigations, this paper will focus on our subsurface decomposition-based research [e.g. 2]. Since most studies have to date focused on aboveground scenarios, this discourse will explore shifts in the soil necrobiome particularly belowground due to the decomposition of *Sus scrofa domesticus* – a widely accepted surrogate for human cadaver. Further to this will be comparisons of soil bacterial and fungal community structure and composition during the decomposition of different types of plant litter. The aims of the overarching research programme have been to apply denaturing gradient gel electrophoresis and next generation sequencing to: (i) measure shifts in soil necrobiome community composition and structure in the presence of a mammalian analogue; (ii) compare these to plant litter decomposition; and (iii) assess the potential applicability of forensic ecogenomics-based analyses in pilot studies and, ultimately, real crime scenes

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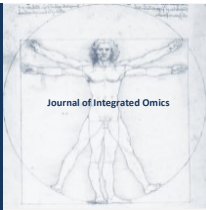
**Acknowledgments:** The Teesside University Research Fund is acknowledged for funding Project 10/06/07. Professor Tim Thompson, Dr Helen Carney, Dr Gillian Taylor and Dr Caroline Orr are acknowledged gratefully for their co-supervision of Messieurs Olakanye and Bisker.

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## Deadly head injuries by military weapon: a special attention

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**Available Online:** 15 December 2017

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### ABSTRACT

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Gunshot wounds have a very special appearance because of their penetrating nature. They have a great diversity of lesion depending on the weapon, the ammunition, the distance and the angle of the shot, as well as the living target.

On the human head, these injuries are characteristic of specific lesions related to the structure of the cranial case, it's require special attention during the external examination and autopsy to help determine the medico-legal form of the wound.

We Report in this work, our experience in head injuries by assault rifle, since 2011 at the autopsy laboratory of the Military Hospital of Tunis, Tunisia, and the difficulties encountered in examining these wounds.

All the head injuries observed are caused by the Steyr Aug assault rifle, the main weapon used by the armed forces in Tunisia, and by the AK47 the weapon used during the terrorist attacks. Accidents and homicides are the majority forms. A suicidal case was reported but quickly converted into homicide after the autopsy data and the deep investigation.

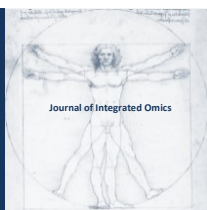
The aim of our study is to emphasis the fact that autopsy remains an essential tool to reduce misdiagnoses in addition to assessing the gunshot characteristics.

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## A Study on Physical Features and Potential Wounding Effects of Fireworks Which Is One Of The Samples of Pyrotechnics

Nergis Canturk <sup>1\*</sup>, Murat Durdu <sup>1</sup>, Filiz Eren <sup>2</sup>, Bulent Eren <sup>2</sup>

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### ABSTRACT

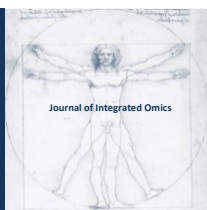
Aerial shells which is one of the pyrotechnic products are widely used in some religious and national days all around the world. Depending on the common use there are some scientific research and case presentations about wounding and deaths caused by aerial shells and other fireworks in literature. Use of aerial shells in Türkiye is less than other countries but becoming very common in recent years in public. In some public incidents and protests, it has been observed that aerial shells are used like a firearm against law enforcement. In this perspective, potential risks of aerial shells are researched this study. Commercially available aerial shells were physically examined for their construction and functioning mechanism, their extradiation from the barrels was recorded and speed calculated by fastcam, detonation of shells were recorded with fastcam and detonation pressure was measured, finally shells were detonated 19 cm in front of sheep eyes mounted on ballistic simulants and physical effects were inspected on simulants and pathological researchs were held on the sheep eyes. In 25 (%55,5) sheep eyes of 45 eyes used in experiments; foreign material, focal bleeding, extraocular muscle bleeding, bleeding, focal detachment, decolman and congestion are observed in pathological analyse of the sheep eyes. Measured detontion pressure value of shells 89,64 kPa (SD: 19,241) and the fragmentataion effect whic is observed in fastcam records were found relative to traumatical observations on sheep eyes.

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## Recognition of the 'high quality forgeries' among the medicines: application of NIR spectroscopy and chemometrics

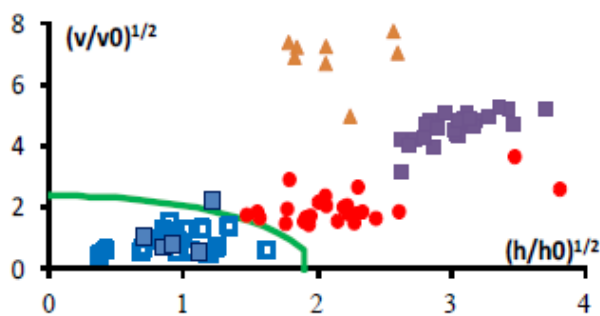
O.Ye. Rodionova<sup>1,4\*</sup>, K.S. Balyklova<sup>2,4</sup>, A.V. Titova<sup>3,4</sup>, A.L. Pomerantsev<sup>1,5</sup>

<sup>1</sup> N.N.Semenov Institute of Chemical Physics, Moscow, Russia; <sup>2</sup> I.M. Sechenov First Moscow State Medical University, Moscow, Russia; <sup>3</sup> Pirogov Russian National Research Medical University, Moscow, Russia; <sup>4</sup> Information and Methodological Center for Expertise, Stocktaking and Analysis of Circulation of Medical Products, Moscow, Russia; <sup>5</sup> Branch of Institute of Natural and Technical Systems RAS, Sochi, Russia

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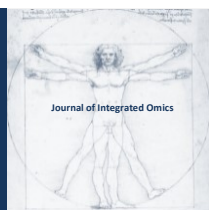
### ABSTRACT

Counterfeiting causes a huge economic and reputational damage to pharmaceutical companies, as well as poses a significant danger to public health. Fake medicines could be of different type: placebo, the medicines with lower concentration of active substances, the drugs that do not contain the proper concentrations or contain a wrong type of excipients, etc. From the recognition point of view there are also various types of fakes. They are (1) pills/tablets that can be recognized without any instruments, simply by glance, or, at least, by experienced glance; (2) medications with special drug packages, holograms, unique printing on tablet surface, special shapes of pills and capsules; (3) fakes that only can be detected using chemical/physical testing of drugs themselves. The most difficult for revealing are 'the high quality fakes', which have a proper composition but produced by the underground manufactures with violation of technological regulations. For rapid testing we propose application of Near Infrared (NIR) measurements accompanied with chemometric data processing. NIR spectra carry information regarding not only chemical but also physical phenomena. A general approach is to consider a remedy as a whole object, taking into account a complex composition of active ingredients, excipients, as well as manufacturing conditions, such as degree of drying, etc. A newly developed classification method, DD-SIMCA, shows satisfactory results both in revealing counterfeits and in separation of various manufacturers of similar drugs. A real world example presents an analysis of the widely used medication for treating allergies, produced by five various manufacturers, and comparison the results with counterfeited samples (Figure 1). The case study demonstrates that theoretically predicted classifier characteristics, such as the Type I error,  $\alpha$ , and the Type II error,  $\beta$ , are confirmed by the real-life calculations. The values of  $\alpha$  and  $\beta$  errors provide a quantitative assessment of the risk of wrong decisions and can be employed for the science-based risk assessment.



**Figure 1.** The DD-SIMCA plot. The green curve delineates the acceptance area. Outside objects are aliens.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1ST INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Quality Improvement for Criminal Investigations Lessons from Science?

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### ABSTRACT

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Criminal investigations generally aim at discovering previously unknown facts. The same is true for scientific (or academic) research. Both follow a rather tight framework of rules – most importantly, the principles of objectivity, reliability and validity. However, some of the intentions differ. Science generally attempts to discover and/or explain new principles, while criminal inquiries are instead usually bound to past, often singular, events. For example, the methods used in forensic investigations are required to be well established, standardised and undisputed inasmuch as possible. In contrast, the exploration of new methods is an important feature of the advancement of science. Consequently, both tendencies – similarities and opposites – can be discerned when comparing criminal and academic examinations.

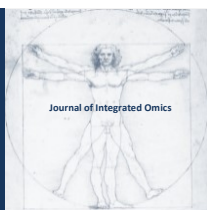
The ‘Pareto principle’ indicates that the vast majority of all criminal investigations runs rather un-problematically. Nevertheless, the highest quality criteria must be guaranteed for these and the remaining, more challenging cases as well – based on the ‘fair trial’ principle. Acknowledging that mistakes are inevitable (Murphy’s law), methodical approaches for error identification, handling, management and reduction are essential.

Error correction mechanisms that are typical for forensic statements normally include a second source of expertise and/or an appeals procedure. In academic science, however, the peer review system has long been established as the most important quality control and error correction system. In addition, possible mistakes can usually be corrected in later, more detailed studies. However, the central position of forensic experts and criminal investigators in a legal procedure and the severe personal consequences of incorrect statements emphasize the high importance of continuous improvement of both the qualifications of the investigators and the quality of their methods.

Nevertheless, error reduction provisions should not be restricted to technical measures like quality management and accreditations. Additionally, a systemic/organisational approach towards error management seems promising. This involves, among other measures, a systematic examination of mistakes and the recognition of the human factors that underlie them. Nevertheless, an indispensable component for quality enhancement is intense cooperation from both sides – the criminalistic and forensic practice as well as scientific (basic) research.

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## Rectus abdominis rupture - a case of occupational injury

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**Available Online:** 15 December 2017

### ABSTRACT

Because of its anatomical location and its verticality, the rectus abdominis is subjected to dynamic stretching and shortening movements. As such, it is the most prone abdominal muscle to injury. Despite this, lesions on the abdominal wall are relatively rare, being more frequent in sportsmen [1]. These lesions are vastly underdiagnosed and untreated because of the very scarce and insidious symptoms and the low functional limitation that they generate, leading to chronicity [2].

Small lesions are most frequently located in the bottom half of the rectus abdominis. The risk associated with these lesions is greater in low muscle mass and absent of pre-competition heating. The main injury mechanism are sudden or repeated trunk flexion, extension and rotation or direct abdominal injury. Repeated Valsalva maneuver (intense cough, sneeze, vomit, effort to defecate) can also cause this injury [3].

The authors present a case of a 37-year-old man, bricklayer, who suffered a work accident when lifting a concrete beam experiencing severe pain in the lower abdomen. Two days later he went to a local hospital where initially he was thought to have a urinary tract infection. That diagnosis was ruled out by a urinary test, receiving discharge with probable rectus abdominis rupture. He started follow up in the clinical services of insurance company where an ultrasound confirmed a rectus abdominis rupture. Conservative treatment with rest was chosen.

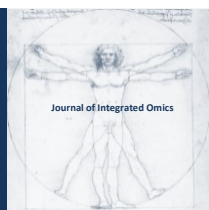
Physical examination revealed a small deformity in the left inferior quadrant of abdomen, slightly painful to deep palpation, without herniation with Valsalva maneuver. Regarding the bodily harm parameters, a temporary total disability of 46 days was proposed. Taking into account the physical effort necessary for his normal work activity and the deformity observed upon physical examination a partial disability of 2% was assigned.

Despite the lack of reference to sequelae of rectus abdominis rupture treated conservatively in the *Tabela Nacional de Incapacidades para Acidentes de Trabalho e Doenças Profissionais* (national disability table), a percentage of disability was yet proposed, given that, it is the responsibility of the medical experts to depart from the regulation table whenever it seems appropriate, as long as duly justified, as was the case.

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# JOURNAL OF INTEGRATED OMICS

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE I INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Acid attack in domestic violence – a case of serious physical harm

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**Available Online:** 15 December 2017

### ABSTRACT

Domestic violence against women is a global issue that transcends national, cultural, racial and class boundaries [1]. Many authors consider the research made on cases of abused children in the 60s the stepping stone regarding a model of domestic violence which included the child, but also the woman and later the elderly [2]. Incidents of domestic violence include battery, beatings, acid baths, rape, and even death through honor killings [3]. Acid thrown on the victim's face is a common form of assault in many countries. The purpose of these kind of assaults is not to bring death but to cause severe facial disfigurement or blindness. Moreover acid is often readily available and at an inexpensive cost. Regardless of gender or motive, the attacks fulfill their intended consequences, and the resulting scarring and deformities lead to disability, destitution, and social isolation [4].

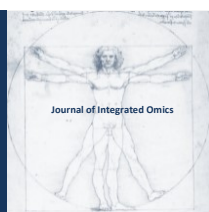
The authors present a case of a 57-year-old woman, house cleaner, divorced after years of domestic violence inflicted by her ex-husband. She was attacked with acid. Of the assault resulted burning of the face, neck, shoulders and thorax. Primary care was undertaken by paramedics who washed the wounds and transferred the victim to a central hospital with a specialized burn treatment center (Coimbra). During hospitalization, the victim required band aid treatment every other day, sedation for balneotherapy and surgery (skin autograft from the anterior thigh to the neck and anterior thorax). The victim had a previous history of domestic violence with physical assault and threats with a firearm and acid, feeling terrified of her ex-husband. Physical examination revealed three scars on the face, a large area of scarring tissue involving the neck (retractile, limiting mobility) extending to the abdomen and a grafting harvest zone on the anterior thigh. According to Portuguese Penal Law this episode represents a serious physical harm as the lesions cause serious and permanent disfiguration, affect the ability to use one's body, namely cervical mobility, and cause a particularly painful disease. Medical-psychiatric follow-up and the adoption of psychosocial measures were recommended to ensure the victims treatment and protection.

In conclusion, it is important for the forensic doctor be prepared to analyze the problematic issue of domestic violence from a medical but also legal scope, making sure never to forget their social role to signal and facilitate the handling of cases as complex as domestic violence.

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## An Automated Magnetic Dispersive Solid-phase Extraction Method for Detection of Cocaine in Human Urine

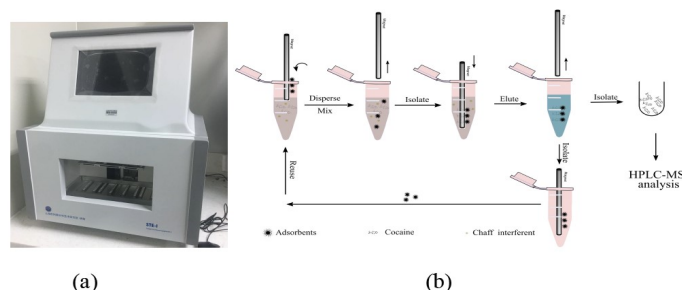
Feiyu Yang\*, Chunfang Ni, Rong Wang, Yun Zou, Xiaoliang Yuan, Wenbin Liu

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Available Online: 15 December 2017

### ABSTRACT

Growing consumption trend of abused cocaine and drug crimes are a great concern, therefore urine sample testing has become an important noninvasive sampling whereas cocaine and its metabolites (COCs) are usually present in high concentrations and relatively long detection windows. However, direct analysis of urine samples is not feasible and the extraction step is time-consuming. So developing a sensitive, rapid and high-throughput method for detection of COCs in human body is indispensable for law enforcement officers, treatment specialists and health officials. In this work, a new automated magnetic dispersive solid-phase extraction (MDSPE) sampling method followed by high performance liquid chromatography-mass spectrometry (HPLCMS) was developed for quantitative enrichment of COCs from human urine, using modified magnetic nanoparticles as adsorbents. The proposed device significantly improved the sampling preparation efficiency with 32 samples in one batch within 40mins. Optimization of the preparation procedure for the magnetic nanoparticles was explored and the performances of magnetic nanoparticles were characterized by scanning electron microscopy, vibrating sample magnetometer and infrared spectra measurements. Several analytical experimental parameters were studied, including amount of particles, adsorption time, elution solvent, extraction and desorption kinetics, and the verification of the proposed method was accomplished. The limits of detection for the cocaine and cocaine metabolites were 0.09-1.1 ng/mL-1 with recoveries ranging from 75.1 to 104.1%. Compared to traditional sampling method, this method is time-saving and environmentally friendly. It was confirmed that the proposed automated method was a kind of highly effective way for the trace cocaine and cocaine metabolites analyses in human urine.



**Figure 1.** Automated sampling equipment (a) and process of magnetic dispersive solid-phase extraction (b).

**Table 1.** Linear ranges, correlation coefficients <sup>a</sup>, LOD), LOQ, intra-days/inter-days variation, recovery and RSD for COCs studied.

Analytes <sup>a</sup>	Linear range <sup>a</sup> (ng/mL) <sup>a</sup>	r <sup>a</sup>	LOD <sup>a</sup> (ng/mL) <sup>a</sup>	LOQ <sup>a</sup> (ng/mL) <sup>a</sup>	Intra-day/ Inter-day variation (%) <sup>a</sup>	Recovery (%) 20 ng/mL <sup>a</sup>	Recovery (%) 100 ng/mL <sup>b</sup>
BE <sup>a</sup>	5-200 <sup>a</sup>	0.9973 <sup>a</sup>	0.09 <sup>a</sup>	0.31 <sup>a</sup>	3.5/2.2 <sup>a</sup>	78.3 <sup>a</sup>	83.6 <sup>a</sup>
NC <sup>a</sup>	5-200 <sup>a</sup>	0.9982 <sup>a</sup>	0.20 <sup>a</sup>	0.63 <sup>a</sup>	2.1/3.4 <sup>a</sup>	82.4 <sup>a</sup>	79.6 <sup>a</sup>
ECG <sup>a</sup>	5-200 <sup>a</sup>	0.9987 <sup>a</sup>	1.1 <sup>a</sup>	3.2 <sup>a</sup>	4.5/5.5 <sup>a</sup>	104.1 <sup>a</sup>	96.3 <sup>a</sup>
m-HOBE <sup>a</sup>	5-200 <sup>a</sup>	0.9998 <sup>a</sup>	0.13 <sup>a</sup>	0.42 <sup>a</sup>	2.6/3.4 <sup>a</sup>	85.2 <sup>a</sup>	82.3 <sup>a</sup>
BN <sup>a</sup>	5-200 <sup>a</sup>	0.9972 <sup>a</sup>	0.26 <sup>a</sup>	0.81 <sup>a</sup>	3.5/2.4 <sup>a</sup>	88.1 <sup>a</sup>	77.3 <sup>a</sup>
CE <sup>a</sup>	5-200 <sup>a</sup>	0.9984 <sup>a</sup>	0.36 <sup>a</sup>	1.15 <sup>a</sup>	2.7/3.2 <sup>a</sup>	82.3 <sup>a</sup>	85.3 <sup>a</sup>
NCE <sup>a</sup>	5-200 <sup>a</sup>	0.9982 <sup>a</sup>	0.21 <sup>a</sup>	0.65 <sup>a</sup>	1.9/1.2 <sup>a</sup>	98.3 <sup>a</sup>	75.1 <sup>a</sup>
COC <sup>a</sup>	5-200 <sup>a</sup>	0.9979 <sup>a</sup>	0.29 <sup>a</sup>	0.92 <sup>a</sup>	2.8/5.3 <sup>a</sup>	84.5 <sup>a</sup>	82.3 <sup>a</sup>

<sup>a</sup>: spiked at 20 ng/mL<sup>a</sup>

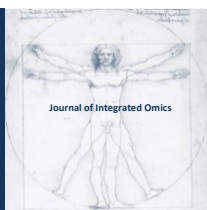
<sup>b</sup>: spiked at 100 ng/mL<sup>a</sup>

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## International cooperation to counter cybercrime

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Università degli Studi della Campania Luigi Vanvitelli

**Available Online:** 15 December 2017

### ABSTRACT

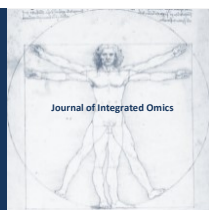
The topic of Cybercrime in international law branches out in “cybercrime against individuals” and “cybercrime against states”. The latter have not yet been disciplined by international law even if the number of cyberattacks against critical infrastructure is rapidly increasing, so nowadays targeted states are still forced into the so called “response crisis” - which often develops in a real state paralysis - arising from the doubt that in case of a cyber threat or a cyber attack any operative choice may lead to a violation of international law and, above all, of the absolute prohibition of resorting to the use of armed force [1].

On the contrary some international legal instruments exist in the field of cyber crimes which are aimed at contrasting and persecuting private cyber offences: almost 125 countries have already signed and/or ratified a legal instrument on cybercrime (i.e. *Council of Europe Convention on Cybercrime* (2001); *Shanghai Convention on Combatting Terrorism, Separatism and Extremism* (2001); *League of Arab States Convention on Combatting Information Technology Offences* (2010); *African Union Convention on Cybersecurity and Personal Data Protection* (2014)) [2]. This outcome is not positive mainly because there are too many instruments giving a partial regulation on the issue of cybercrime and, inter alia, with a scarce number of ratifications with the result that the international legal framework appears fragmented. Certainly the Council of Europe Convention on Cybercrime (“CEC”) adopted in 2001 is the milestone on the field: it is a law-enforcement treaty concluded with the purpose of harmonizing the domestic legislations of the contracting parties in the field of cybercrime and to establish effective transnational cooperation in contrasting, preventing and sanctioning said phenomenon. The CEC was considered as a supplemental instrument to the 1957 *European Convention of Extradition* and the 1950 *European Convention of Mutual Assistance in Criminal Matters* and the related *Additional Protocol* finalized to promote and simplify extradition procedures and to overcome many of the impediments of an internal nature (for example, the need for double incrimination as a *conditio sine qua non* for the purpose of extradition requests) which, as past experience has demonstrated, have allowed numerous criminals to escape justice (between 1982 and 2003, the much debated “*Mitterrand doctrine*” prevented the extradition from France to Italy of Italian criminals convicted of terrorism as the French President was against the anti-terrorist laws passed in Italy during the 1970s and 1980s). Nonetheless, considering that nowadays only 56 States ratified the Convention, despite the fact that the initial aim was that of creating a universal instrument, this treaty is deemed as a big failure, especially because international cooperation in fighting cybercrime has developed - and still develops - outside of the Convention. The reduced number of Signatories can be primarily attributed to the limit that concern every universal treaty, that is the difficulty involved in identifying contents to be agreed upon by all the States in the International Community [3]. Secondly the fact that a similar convention was introduced by the Council of Europe and not by the United Nations seems to constitute one of the main causes for reticence to accession, despite the fact that, formally, the Treaty is open to ratification by any States wishing to do so. [4]. This is the reason why “national governments often cooperate with each other informally by exchanging information, investigating attacks or crimes, preventing or stopping harmful conducts, providing evidence and even arranging for the rendition of the requesting state” [5].

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## The Forensic application of proteomics for the study of the time of death: An operative experimental model for post mortem interval estimation

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### ABSTRACT

'Proteomics is a branch of molecular biology that allows the systematic identification of the proteome from a quantitative and qualitative point of view. Below, we propose the operating model of an experimental study currently underway at the Department of Legal Medicine of the University of Catanzaro. The model is based on taking of peripheral blood samples on patients who died at the Intensive Care Unit, following an operative protocol. The study was approved by the Ethics Committee of University. The informed consent was signed by the family members before the death of the patients. Samples were taken according to predefined time intervals, starting from the exact time of death ("time zero") and up to two hours after the death. Samples were immediately centrifuged in order to extract plasma, stored at -80 ° C and they are currently subjected to proteomic analysis by Western Blot and Mass Spectrometry at Proteomic Laboratories of the University of Catanzaro. Although the experimental study is still ongoing, we expect to find consistent results both with the time interval examined and the data already known in the literature. In fact, a review of literature on this topic has already shown that several proteins can undergo quantitative changes in terms of increase or reduction directly proportional to the postmortem interval investigated, but also qualitative ones. According to the scientific evidence already available in the literature, the expected results of the study are related to the search for quantitative and/or qualitative alterations from the exact moment of death of some markers, already showing time dependent variations such as:

1. ubiquitous cellular proteins, like HMGB1 (High Mobility Group Box 1): this protein has already proved to progressively increase with respect to time [1];
2. specific organ proteins:
  - muscle proteins due to progressive degradation, such as cTn I and cTnT [2] [3];
  - proteins related to the brain damage, such as GFAP (Glial fibrillary acidic protein) or talin, respectively with an increase and a reduction.

Finally, this operating model is intended to:

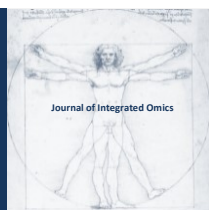
- Identify the possible role in the estimation of PMIs of new potential protein biomarkers expressed in peripheral blood from the exact moment of death;
- Verify and evaluate in detail the variation of the proteomic profile of markers already known in the literature;
- Focus on the analysis of the so-called "early post-mortem interval" for forensic purposes

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## Recognition of patterns in pattern recognition

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### ABSTRACT

Classification, aka 'pattern recognition', takes an essential part in scientific research, including, a fortiori, the forensic applications. Classification method should be selected with respect to the underlying features of the solved problem. In practice, each sample that has to be attributed to a predefined class, or classes, or left unclassified. In case the sample is unlabeled, this is either identification, or discrimination problem. Otherwise, this is an authentication task. Another characteristic refers to the classes, which list can be exhaustive (complete), or open (incomplete). Our message is that a risk-based decision should only be made out after a thoughtful examination and recognition of the classification pattern (prototype: identification, discrimination, or authentication), which goes better with the research objectives. This time we focus on the assessment of the authentication (labeled, incomplete) versus the discrimination (unlabeled, complete) classification problems [1].

Authentication is the process of determining whether an object is, in fact, what it is declared to be. Discrimination is the process of allocation of an object to one of the predefined classes. In practice, authentication is often solved using discrimination. We explain that such techniques do a poor authentication job. The main drawback of these methods is inability of proper classification of new samples, which do not belong to any of the predefined classes. We illustrate this by real-world examples and a comparison of the two methods: Partial Least Squares- Discriminant Analysis, PLS-DA, and Data Driven Soft Independent Modeling of Class Analogy, DD-SIMCA [2, 3].

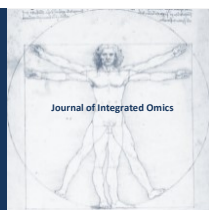
Pattern recognition encloses a big variety of different methods and techniques. Each type of problem requires an application of relevant methods. A well constructed discrimination method will perfectly classify a new sample only if this sample is a member of one of the predefined classes. However, in case the new sample does not belong to any of such classes, the discriminant analysis is unable to properly define the membership of the sample. Thus, discrimination methods are inappropriate for solving authentication problems. Class-modeling methods [4] develop the acceptance area around the target class, and, thus, delimit the target objects from any other objects and classes. This is the reason why only one-class classifiers should be used for authentication.

**Acknowledgements:** We acknowledge partly funding from the IAEA in the frame of projects D5240 and G42007.

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## Recent advances in the analytical chemistry of cadaveric decomposition

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### ABSTRACT

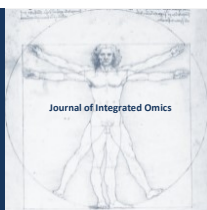
The chemical processes of human cadaver decomposition are complex and not well understood. The study of decomposition chemistry aims to elucidate the postmortem processes, particularly relating to the production of volatile organic compounds (VOCs) throughout the various decomposition stages [1]. The study of human remains (HR) decomposition chemistry is further motivated by the need for developing specific tools to locate dead or injured bodies during mass disaster victim recovery cases, for forensic investigations, and the search for clandestine graves. Over the last few years, the use of thermal desorption coupled with comprehensive two-dimensional gas chromatography time-of-flight mass spectrometry (TD-GC×GC-TOFMS) has allowed partial elucidation of cadaveric VOC profiles [2]. GC×GC-TOFMS is a powerful Separation Science tool that combines advantages from the added peak capacity and zone compression of GC×GC and from the deconvolution of mass spectral signals of high resolution TOFMS offering accurate mass measurements for proper analyte identity assignments. The collection of exhaustive data sets including first and second retention time values (<sup>1</sup>t<sub>R</sub> and <sup>2</sup>t<sub>R</sub>), intensities, mass spectra, accurate mass values, however, results in the production of large files that require specific treatment before they can be exploited [3]. On the top of basic spectral alignment and normalization, supervised and non-supervised statistics have to be used to extract the relevant information from the multidimensional perspective [4].

This lecture will illustrate how such data can be produced and used in specific forensic chemistry situations such as training of HR detection (HRD) canines [5], search for dead bodies [6], cadaveric internal gas reservoir analyses for postmortem interval (PMI) determination [7].

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## Forensic engineering of advanced polymeric materials

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### ABSTRACT

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Classical forensic polymer engineering concerns a study of failure in polymer product. This area of science comprises fracture of plastic products, or any other reason why such a product fails in service or fails to meet its specification. Our novel approach i.e.: forensic engineering of advanced polymeric materials (FEAPM) deals with the evaluation and understanding of the relationships between their structure, properties and behavior before, during and after practical applications. FEAPM provides a central driving force for the otherwise disconnected works and should help to design novel polymeric materials and to avoid potential failures of the commercial products manufactured from them [1-4].

The selected prediction and case studies related with design of novel polymeric materials for diverse applications in medicine, cosmetic industry and agrichemistry will be presented. The molecular level characterization of polymers, including natural polyhydroxyalkanoates (PHA) and their synthetic analogues, will be discussed [5]. It will be demonstrated, that both the ex-ante investigations as well as the ex-post studies are needed in the area of FEAPM in order to increase efficiency and to define and minimize the potential failure of novel polymer products before and after specific applications.

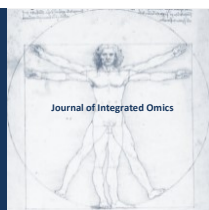
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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Molecular biology aspects of hypothermia

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**Available Online:** 15 December 2017

### ABSTRACT

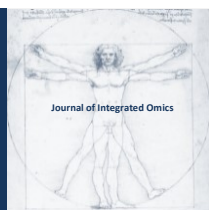
Cold exposure causes a multitude of molecular responses in cells, tissues and systemic level. Some of the stress reactions connected to hypothermia are beneficial, protecting tissues against cold-induced acute ischemia. Cardiac cell survival has been extensively studied in animal models and cell culture, but limited information is available from hypothermic humans. We have recently successfully identified molecular events connected to hypothermia, cardiovascular diseases and other deaths by investigating human postmortem tissue samples, especially the heart with various methods. We have also carried out precise cold exposures of rats to analyze effects on target genes during different levels of hypothermia. Protein as well as RNA level studies have been carried out using quantitative PCR, immunohistochemistry and ELISA-assays, for example. Activation of sympathoadrenal axis is characteristic to hypothermia and leads to high levels of adrenalin and noradrenalin in the circulation. These catecholamines modify e.g. endothelial function with gene expression changes dependent on the severity of cold exposure [1]. Typically, gene expression profiles vary in tissue-specific manner during hypothermia [2]. We have also identified stress-specific cardiac expression pattern of certain transcript variants in hypothermia, chronic hypoxia and acute ischemia [3]. Cell-cycle regulator p21 cyclin-dependent kinase inhibitor, endothelial thrombomodulin and growth factor amphiregulin are examples of target genes and proteins in our studies. We have investigated the values of adrenaline to noradrenaline ratio [4] and thrombomodulin [5] as markers of antemortem hypothermia. Tissue samples from medico-legal autopsies and animal experiments together with cell culture studies help us understand the molecular basis of hypothermia further, aiming to improve postmortem diagnostics.

**Acknowledgments:** The authors are grateful to the forensic pathologists, autopsy assistants and laboratory technicians for collaboration.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Non-Destructive Identification of Defaced Serial Numbers on Metal Surfaces

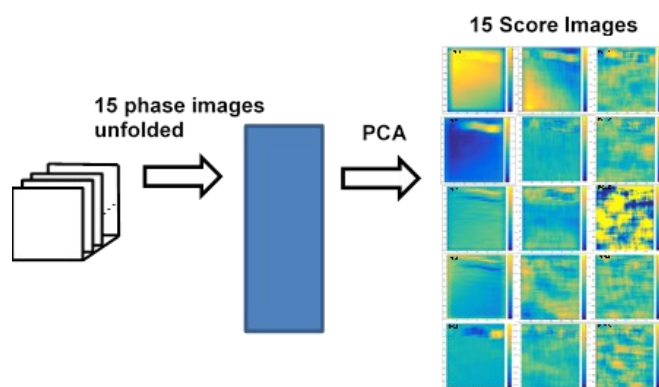
John Kalivas\*, Ikwulono Unobe, Lisa Lau, Andrew Sorensen, Rene Rodriguez

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**Available Online:** 15 December 2017

### ABSTRACT

Infrared thermography is useful for nondestructive evaluation of structural integrity. Subsurface defects produce non-uniform heat dissipation and this phenomenon is captured by an infrared camera. Pulsed thermography has emerged as the most widely used technique where the specimen surface is heated with a brief pulse of heat and surface temperatures are monitored with an IR camera. In this study, lock-in thermography (LIT) is used to recover defaced serial numbers based on the underlying deformation from the stamping or laser etching process. For example, the collection of LIT phase images in Figure 1 are unfolded and decomposed by principal component analysis (PCA) to form a sequence of principal component score images shown in Figure 1 for a defaced number 6. In order to avoid selection of specific score images for further examination, all images are used in a data fusion approach for a consensus analysis. In order to identify a defaced number, multiple numerical library images are matched to each score image by a collection of similarity measures. Prior to computing similarity measures between a library number image and a defaced score image, all images are decomposed to Zernike moments by respective Zernike polynomials. Zernike polynomials form an orthogonal basis set allowing extraction of image features describing shape characteristics of an imaged object. Fusion is again the main tool for analysis of the multiple libraries and similarity measures providing consensus identification of a defaced number. Results are presented for a series of known defaced numbers on stainless steel as well as recovery of the VIN defaced on a stolen motorcycle.

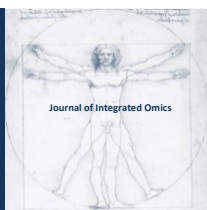


**Figure 1.** Phase images unfolded for PCA to form 15 score images.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Tissue glycogen and beta-hydroxybutyric acid in lethal hypothermia

Danchanka Alena

State Forensic Examination Committee of the Republic of Belarus

**Available Online:** 15 December 2017

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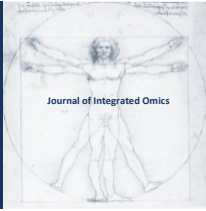
### ABSTRACT

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Biochemical studies in hypothermia are widely used in forensic medicine. In our country glycogen content in the skeletal muscle, liver and heart muscle of all suspected hypothermia cases is determined by spectrophotometric method. But it is known that the cases of death from hypothermia are usually accompanied by increasing of beta-hydroxybutyric acid concentration. The purpose of our study was to compare the significance of the determination of glycogen content and beta-hydroxybutyrate in lethal hypothermia. The sample of blood and the fragments of liver, skeletal muscle and heart muscle were collected during autopsies from 13 men and 5 women aged 21-81 who died in the circumstances suggesting overcooling. In 11 cases (alcohol content in the blood was 1,1-2,4‰) the glycogen level in the liver, skeletal muscle and heart muscle was reduced, the beta-hydroxybutyrate concentration was increased and there were microscopic signs of hypothermia. In 1 case (alcohol content in the blood was 2,4‰) the level of glycogen in tissues, beta-hydroxybutyrate in blood serum did not change and this could be associated with an acute death before energy reserves are utilized. In 2 cases (alcohol was absent) the level of glycogen in the tissues was normal, there were no histological signs of hypothermia and the concentration of beta-hydroxybutyrate in one case did not differ from the normal level and in the other case it was increased. In 4 cases (alcohol was absent in two cases and its concentration was 2,3‰ and 2,4‰ in two other cases) the glycogen level was low, the concentration of beta-hydroxybutyrate was above normal and there were no histological signs of hypothermia. Thus, abnormalities of the tissue glycogen content and beta-hydroxybutyric acid concentration must be interpreted carefully, as they do not allow the diagnosis to be categorically excluded or confirmed. Preexisting metabolic dysfunctions, blood ethanol levels, duration of death may contribute to the increasing and decreasing of glycogen content and beta-hydroxybutyric acid concentration.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Suicide Ideation and Hopelessness Among Substance Users in Probation System

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**Available Online:** 15 December 2017

### ABSTRACT

As in the whole world, substance use behavior is also increasing in Turkey [1, 2]. This situation also causes some psychosocial problems. One of these problems is suicidal ideation and hopelessness are high in substance abusers [3, 4]. It is known that there is a reciprocal relationship between substance use behavior and suicide [5]. This situation is an important obstacle to the prevention and intervention of substance abuse. At this point it is important to determine the risk factors that cause hopelessness and suicide ideation. Therefore, the aim of this study is to determine the relationship between various psychosocial characteristics and suicidal ideation and hopelessness of substance users. For this purpose, it is conducted with 256 male substance users by purposive sampling method in Ankara Probation Service. The variables were gathered from Personal Data Form, Hopelessness Scale and Suicide Ideation Scale. The difference between psychosocial variables and hopelessness and suicidal ideation was analyzed by independent-sample t test and Anova. According to the results, it was found that economic insufficiency, psychiatric diagnosis, substance use in the early ages, substance use in the family and social environment, exposure to violence in childhood or adolescence cause to increase hopelessness and suicidal ideation (Table 1). In the light of the results, risk factors should be analyzed in substance users who have hopeless feelings and suicidal ideations, and multifactorial based psychosocial studies should be done.

**Key words:** Substance use, suicide ideation, hopelessness.

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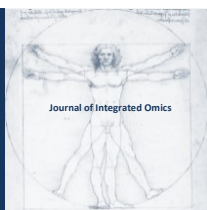
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**Table 1.** Independent-sample t test and Anova results for group differences.

Variables		Hopelessness Scale				Suicide Ideation Scale		
		N	M/Sd	t/f	Post	M/Sd	t/f	Post hoc
Regular work	Yes	168	19.52/5.62	-4.34**		12.59/5.62	-3.23***	
	No	88	22.81/6.08			14.95/6.06		
Income	Non-income <sup>a</sup>	47	22.60/6.09			15.36/5.62		
	100-1000 TL (24-230€) <sup>b</sup>	70	21.98/5.66			13.94/6.11		
	1001-2000 TL (231-461€) <sup>c</sup>	75	19.89/5.06	3.73**	a>d	12.21/4.28	3.10**	a>c,f
	2001-3000 TL (462-691€) <sup>d</sup>	31	18.87/4.86			13.03/5.48		
	3001-4000 TL (692-922€) <sup>e</sup>	16	18.69/8.56			12.50/6.71		
	923 € and over <sup>f</sup>	10	17.20/5.37			9.90/1.73		
Psychiatric diagnosis	Yes	50	22.38/6.11	2.20**		15.74/5.71		3.35**
	No	205	20.30/5.91			12.82/5.43		
Onset age of substance use	Before 18 years <sup>a</sup>	139	27.71/6.03			13.96/5.78		
	18-23 years <sup>b</sup>	62	19.79/5.57			12.97/5.19		
	24-29 years <sup>c</sup>	24	18.46/5.52	3.45*	a>e	12.41/6.08	No	
	30-35 years <sup>d</sup>	13	17.15/5.87			11.07/4.31		
	36 and over years <sup>e</sup>	4	21.63/5.98			14.25/5.60		
Substance use in family member	Yes	96	21.64/6.48	2.16*		13.56/15.75	No significant	
	No	156	20.66/5.69			13.13/5.42		
Substance use in friends	Yes	214	21.88/5.99	2.49**		13.67/5.71	No	
	No	43	18.62/5.58			12.13/4.86		
Exposure to violent	Yes	93	22.89, 6.27	4.63**		15.40, 6.41	4.42***	
	No	164	19.43, 5.45			12.29, 4.76		

N = 256, \*p &lt; .05, \*\*p &lt; .01, \*\*\*p &lt; .001



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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Toward Actionable Intelligence in Cybersecurity Forensic Investigation

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**Available Online:** 15 December 2017

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### ABSTRACT

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Digital forensic science provides scientifically proven methods that can be used to identify, collect, acquire and preserve digital evidence. Setting an absolute standard that dictates “work from an exact copy of the original data” is dangerous from the 2001 first Digital Forensic Research Workshop in conducting cybersecurity forensic investigation [1]. It has ignored the urgent need for first responders to find actionable intelligence immediately at crime scene. Law enforcement agencies need to explore the crime scene, gather digital data in different devices, and find actionable intelligence immediately. Collecting volatile/non-volatile information helps them respond quickly from artifact behavioral analysis. An experiential observation from penetration test will be conducted to pursue investigation leads. This study takes an experiential observation from penetration test and aims at the relevant activities at crime scene. A digital evidence governance strategy is proposed in Table 1 to improve the investigation process.

**Keywords:** Crime Scene Investigation, Cybersecurity Forensic Investigation, Penetration Test

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**Acknowledgments:** This research was partially supported by the Ministry of Science and Technology of the Republic of China under the Grants MOST 106-2221-E-015-002.

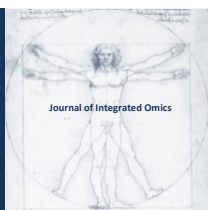
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**Table 1.** Digital evidence governance strategy to improve the cybersecurity forensic investigation.

Process	Body of Knowledge	Type	Sample
Identify	Sources of Digital Evidence	Host	records, files, folders , and logs
		Network	wireshark, e-detective, and diamond a-packetman
	Artifacts	External	the internet, social media, and criminal networks
		Internal	systems, personnel, and communications
Collect	Tools	Native	net, ps, ipconfig, netstat –ano, regedit and so on.
		Third-Party	nmap, tcpview, autoruns, ostriage, and so on.
	Memory	Volatile	registers, cache, routing table, ARP cache, process table, and kernel statistics
		Non-volatile	disk, remote logging, monitoring data, physical configuration, and archival media
Acquire	Location	Scene	actionable intelligence
		Lab	forensic integrity
Preserve	Evidence Collection	Automated	alters-based logging and sweep collection
		Manual	native and third-party
	Forensically Sound	Reliability and Trustworthiness	work from an exact copy of the original data
		Relevance and Sufficiency	find actionable intelligence immediately at crime scene



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## Indicative of Violence in Homicidal Women

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**Available Online:** 15 December 2017

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### ABSTRACT

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The purpose of the multidisciplinary investigation was to analyze the participation of violence in homicidal women [2], from the criminological aspects; through the field work done at the Preventive and Female Rehabilitation Center of Puente Grande, Jalisco, Mexico (2008-2014).

In methodology, criminological, sociological and law research methods were handled; with interviews with female inmates accused of homicide; including their life history, using a sample of 25%, and analyzing the psychobiological and socio-legal variables.

In the discussion and results, there is influence of psychobiological and social aspects in the violent behavior of women, and who have had a life history impregnated with violence, mainly by the family, pattern [2] which is repeated with children and / or against those who come to affect them, feeling threatened in their integrity. In this complex analysis there are several indicators and external and internal agents that encourage women to apply violence. This entails an interfactorial and multifactorial relationship between related causalities, as in the study of criminal victimology.

It is concluded that violent acts carried out by homicides come from a combination of multifactorial aspects, in addition to the change of role from victim to victim, in 90% of cases, which brings with it psychological and social problems in the behavior of the homicides, being added in some of them the mental illnesses and with a high degree of aggressiveness.

**Keywords:** Violence, homicides, victimology, life history, indicatives.

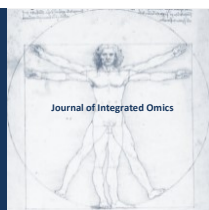
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**Acknowledgments:** Thanks to the authorities of the Penitentiary Centers of Puente Grande, Jalisco, Mexico, to the Attorney General of Human Rights of the State of Jalisco, to collaborators and family for the support.

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## Death by adjustable plastic clamp: a singular case of suicide ligature strangulation

José Vieira de Sousa\*, Diogo Calçada, Ana Sofia Coelho, Carla Carreira

Delegação do Centro do Instituto Nacional de Medicina Legal e Ciências Forenses, IP

**Available Online:** 15 December 2017

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### ABSTRACT

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Asphyxia encompass all conditions caused by the failure of cells to receive or utilize oxygen. They are common in forensic practice. Strangulation is a form of asphyxia characterized by closure of the blood vessels and/or air passages of the neck as a result of external pressure to the neck. In ligature strangulation the pressure on the neck is applied by a constricting band tightened by a force other than the gravitational weight. Etiology is often problematic, as suicide by ligature is suggestive for homicide. Investigation of the scene is paramount as external and internal findings may provide clues to better understand the circumstances involved.

The authors present a singular case of a 48 years old man, found by his wife and child at home, lying in ventral decubitus, with an adjustable plastic clamp around the neck which was cut off by the victim's wife. Technical police processed and photographed the scene, finding an alleged suicide note near the body. Interviewing the family revealed a social context of unemployment and a clinical setting of depression.

Examination of the clothes revealed no sign of trauma. External examination of the body revealed an ecchymotic mask and conjunctival petechiae. On the neck there were two shallow ligature marks, below the thyroid cartilage, which intersected one another with an incomplete furrow on the back with an hemorrhagic crest measuring 0,7 cm of width. Bruising of the posterior aspect of the parietal region was observed as well as two bruises on the upper left arm. Although the first's location was not in accordance with the position in which the body was found, due to scarce circumstantial information, it could not be excluded that the lesion could have resulted from a fall to the ground.

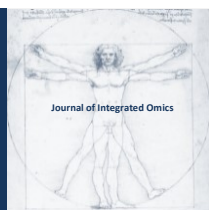
Internal examination showed a condensation line along the neck in correlation with the external ligature mark, associated with infiltration of the neck muscles. No fracture on the hyoid bone or thyroid cartilages was identified and there was visceral congestion of the lungs, kidneys and larynx. Auxiliary exams revealed 0,18 g/L of alcohol and anti-depressive in therapeutic/toxic dosage.

To better examine and interpret the characteristics of the ligature marks on the neck, the medical team requested the plastic clamp (initially not recovered). Although atypical in number and conformation, after presented with the constricting element, and considering the ventral decubitus position, compatibility was determined between the two.

Considering the information provided by the police, the autopsy findings and the results of the complementary exams, the cause of death was due to asphyxia caused by ligature strangling in a likely suicide setting. With this presentation the authors intend to emphasize the importance of good cooperation between the police and the medical experts who conducted the autopsy

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## Potential pharmacogenetic inference in post-mortem investigation

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**Available Online:** 15 December 2017

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### ABSTRACT

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The potential strength of pharmacogenetics in medico-legal context has been reported, even if the application in the medico-legal casework and the courtroom transposition need more scientific studies. When the cause of death (CoD) and/or the manner of death (MoD) are unclear or the toxicological results are difficult to explain, the pharmacogenetic investigation can be performed and the results need to be evidence-based interpreted [1]. Inter-individual variability in drug response derives from genetic polymorphisms in drug metabolizing enzymes which affect their function and lead to altered drug responses to a very large extent. In this respect, polymorphisms of the cytochrome P450 (CYP) enzymes play a major role being responsible for the metabolism of 70-80% of all phase I metabolism of clinically used drugs and participating in the metabolism of several xenobiotics [2]. The genetic bases of the polymorphism are single nucleotide polymorphisms, insertions/deletions and gene copy number variations and CYP2C9, CYP2C19 and CYP2D6 are the most polymorphic enzymes which mediate about 40% of P450-mediated drug metabolism [3]. The most extensively studied is the highly polymorphic CYP2D6 gene with up to date 109 allele variants permits to distinguish individuals in ultra-rapid metabolizers (gUM) normal metabolizers (gNM), intermediate metabolizers (gIM), and poor metabolizers (gPM) [4]. The extreme phenotypes (gPM and gUM) are the most important as they could lead to fatal adverse drug reactions or metabolic toxicity.

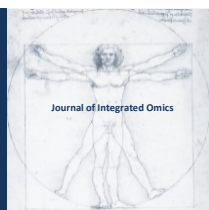
Here we describe cases of drug addiction and fatal drug intoxication in which pharmacogenetic testing was applied for the interpretation of past organ failure and post-mortem toxicology results.

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## Post mortem eye temperature measurement in time of death estimation – the presentation of new series of cases with exactly known time of death

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### ABSTRACT

Estimation of the TOD is an important issue for forensic pathologist examining the body at death scene. The TOD estimation methods based on post mortem changes such as hypostasis, rigor mortis, rectal temperature, or different supra-vital reactions or even biochemistry, molecular biology etc. are still of not satisfactory precision. In the current study single (20 patients) or double (within 1 hour interval in 10 patients) eyeball and rectal temperature measurements were taken in patients who died in Medical University of Gdańsk Hospital Intensive Care Unit. The actual TOD in each patient was exactly known and the body temperature was recorded shortly later (between 0.5 h to 3.5 h). The temperature was measured using pin probes connected to a high precision electronic thermometer. The measured eye temperatures ranged from 29,7 to 33,6 °C. Ambient temperatures in all cases was stable (22 °C) what corresponded to usual room temperature. TOD was calculated using a formula based on Newton's law of cooling previously successfully applied in comprehensive studies on pigs and recent studies on humans:

$$t = - \frac{\ln(\frac{T - T_a}{T_0 - T_a})}{kc}$$

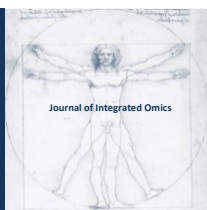
where t is the time since death, T is the temperature of the body site, Ta is the ambient temperature (constant: 22 °C in the present study), T0 is the initial human eye temperature (assumed to be 35 °C), kc is a first order cooling rate constant. Thanks to stable ambient temperature and knowledge of the exact time of death the actual study allowed to adjust the mean value of kc= -0.2 h<sup>-1</sup> in comparison to the recent studies. Thanks to both the significantly faster postmortem decrease of eye temperature and the residual or lack of plateau effect in the eye, also no influence of body mass, TOD in the human death cases using eq. 1 could be estimated with quite a good accuracy. The maximum TOD estimation error during the post mortem intervals up to 3.5 h was slightly higher than 1 h min in 4 cases among 30, while for the rest of 27 cases it was less than 1 h, while mean error for all 30 cases was ± 24 min. The actual results from 30 new cases with exactly known TOD show that the presented method of TOD estimation may be of satisfactory accuracy in the early postmortem period, particularly when applied to bodies found at room temperature and in normal environmental conditions (still air, normal humidity).

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## A semantic platform for radicalization analysis in social streams

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**Available Online:** 15 December 2017

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### ABSTRACT

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During last years, terrorist organizations make use and exploit widely the social media networks to promote their ideas and recruit new foreign fighters. Syria is probably the first conflict in which many Western fighters have been documenting their involvement in conflict in real-time, and where – in turn – social media represents an essential source of information and inspiration to them. The early detection of foreign fighters' recruitment by terrorist groups on social media has become a key point for governments and researchers to counter this phenomenon. In this paper, we present Safapp, a semantic platform to support early detection of foreign fighters' recruitment by terrorist groups in analysing both the literature and the messages posted on social networks. In Safapp, we use syntactic and semantic technologies to support the building of a knowledge base which can then be used to analyse data extracted from social network in the context of research in sociology or in intelligence. The whole Safapp system consists of five main components:

- An advanced, big-data compliant data collector by adapting open source crawlers to fit the need of the project
- A categoriser to filter out irrelevant messages
- A syntactic engine to detect Foreign Fighters and in general terrorism related information
- A semantic engine to complement the detection of Foreign Fighters and in general terrorism related information
- A graphical user interface allowing users to explore, discover and visualize the enriched and analyzed data.

The different level make use of natural language processing and machine learning to detect named entities, basic relevant concepts and categorize noisy messages. Safapp also provides a novel navigation design of the enriched and analyzed data dealing with recruitment and radicalization on Twitter and their evolution in time.

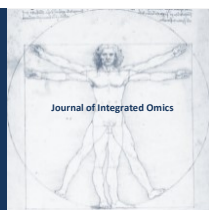
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**Acknowledgements:** This work is Co-funded by the Internal Security Fund of the European Union

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## The paradox of non-motivated + intentional homicide. A case in forensic psychiatry

Teresa Silva

Mid Sweden University

**Available Online:** 15 December 2017

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### ABSTRACT

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The motivation for violence against other persons, and homicide in particular, can be classified as reactive or instrumental [1]. Reactive homicide explains a behavior emotionally driven by fear, anger or rage and less often by disgust or sadness. On the other hand, an instrumentally motivated homicide indicates that the deadly behavior is a mean to achieve a different purpose, not always evident for crime analysts, but in general clear in the mind of the perpetrator [2]. The characteristics of the crime scene (CS) are, in general, in accordance with the main motivation. ‘Disorganized’ CS are more likely to find when reactive homicide occurs, when emotions overwhelmed the perpetrators and overflow to the physical environment itself. Conversely, ‘organized’ CS are more frequent among instrumental homicide [3] indicating that the perpetrator have prepared him/herself to a certain extent (i.e. shows premeditation). However, those who work as investigators have the experience that real homicides do not fit such academic dichotomies. Very often organized and disorganized elements are found on the same CS. Similarly, forensic psychiatrists/psychologists have to deal with offenders that show a mix of reactive and instrumental motives and behaviors, that sometimes intricate with preexistent severe mental disorder or drug abuse. Seldom, we have to deal with criminal behavior that does not fit any taxonomy or classification system. In such rare cases, homicide is intentional but no underlying motivation can be unmistakably identified. The case we propose to analyze in this paper follows no pattern, no rationality. The crime dynamic and perpetrator’s behavior afterwards are bizarre, as are the explanations provided by himself during interrogation and forensic expert assessment. Nguyen was only 17 years old when one day he came to school as any other normal day. He had in mind no intention to assault or find a victim. But he had a jackknife in his pocket which he used to kill an unknown woman in an unknown (for him) place. Three times he stabbed her, in the neck and chest, in an unlikely crime. Afterwards he cleaned the knife in a closer creek and walked serenely until the local police headquarters where he turned himself in. The total lack of any emotional experience not only in relation to the crime committed or the victim but also in relation to himself, to his social and physical environment, and to his life as a whole seem what best can explain Nguyen’s conduct. The crime is not susceptible of being classified as instrumental or reactive and the CS could not be characterized as organized nor as disorganized. We will provide arguments for why Nguyen should not be considered a severe mentally disordered offender but rather an authentic case of the “mask of sanity” [4], that situates him in an extreme of the psychopathic spectrum.

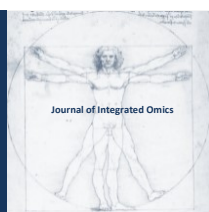
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**Acknowledgements:** My acknowledgements are for Mr. Robert Schött (Sundsvall district attorney) who gave me the authorization to read the interviews and forensic assessments, which are confidential information, and also for the personnel of Sundsvall Tingsrätt who friendly provided me a place and everything I needed while I was analyzing all the documents and materials.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Implication of psychiatric and psychologic assessment in forensic observation

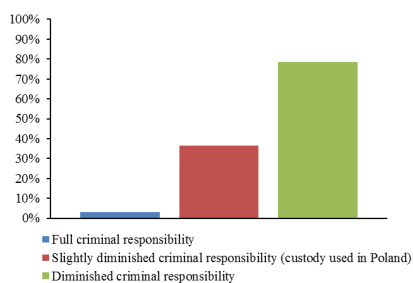
Anna Sieradzk<sup>1</sup>, Konrad Jankowski<sup>2</sup>

<sup>1</sup> Dermed Medical Services of Lodz Poland; <sup>2</sup> Department of Adult Psychiatry D Babiński Memorial Hospital of Lodz Poland

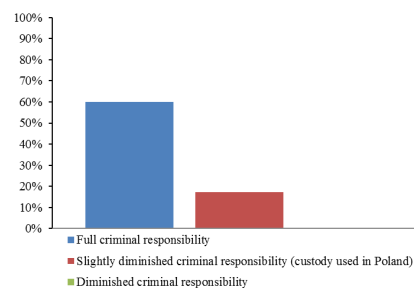
Available Online: 15 December 2017

### ABSTRACT

Intoxication with ethanol is widely recognized as a risk factor for a crime perpetrating. In nearly 70 % of delinquents committed murder or a serious injury of a victim's body consumed alcohol 24 hours before a violent act. The study evaluates the relationship between the results of psychological examination and of alcohol intoxicated perpetrators of a homicide or a serious bodily harm in relation to assessment of diminished criminal responsibility by court experts in psychiatry field. The examined group consisted of 90 offenders in the public prosecutor investigation. The perpetrators were referred to the six weeks forensic observation. (suspected for homicide, attempted homicide and grievous bodily harm). The medical records gathered during conducted observation were retrospectively assessed. Unambiguous forensic reports of two courts witnesses were also analyzed. All respondents had undergone an extensive, psychological investigation. The level of intellect was determined by means of Wechsler Test, scored in full IQ scale and ranged from 53 to 130 points. In 62% of evaluated individuals, psychologists could not excluded organic lesions the of the central nervous system. Examinations used in the assessment of a brain organic damage were Benton and L. Bender tests. The majority of perpetrators manifested various personality disorders. The most commonly used tests were MMPI or Diagnostic DKO Questionnaire. In 30% cases organic personality disorders were diagnosed. The Antisocial personality disorder was examined in 31% of individuals. Other personality disorders were observed in 26% of evaluated. Only in 11% of the defendants no personality disorder was examined. The results of psychological investigations have significantly correlated with the ruling of diminished criminal responsibility in the assessment of experts in psychiatry field. Diminished responsibility was evaluated mainly in cases of the offenders who presented clinical symptoms of organic personality disorders,. The full criminal responsibility more frequently was assessed in delinquents with diagnosis of personality disorders included antisocial personality disorder. The Study found that none of the offenders was assessed as insane. In 15% of the respondents the diminished responsibility was evaluated. Influence of alcohol at the time of the act, was evaluated as additional circumstances of the criminal acts.



**Figure 1.** Diagnosis of the organic brain disorder evaluated in psychological examination



**Figure 2.** Diagnosis of the antisocial personality disorder evaluated in psychological examination

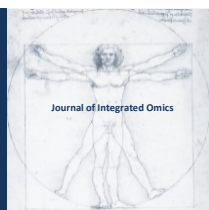
Correspondence: Email - absier@tlem.pl

**Table 1.** . Description of population - quantitative variables IQ assessment in the psychological examination

Variable	N*	Average	Median	Minimum	Maximum	SD
<b>IQ full scale</b>	90	90,57	90	53	130	15,36
<b>IQ verbal scale</b>	72	89,65	90	43	124	15,37
<b>IQ non-verbal scale</b>	72	91,26	91,5	49	137	17,29

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## The use of Kalashnikov (AK-47) in 'Ndrangheta murders: The firearm of the clan

Aquila Isabella <sup>1,2\*</sup>, Chiaravalloti Giuseppe <sup>3</sup>, Raffaele Roberto <sup>1</sup>, Ottolino A. <sup>3</sup>, Gratteri Santo <sup>1</sup>, Ricci Pietrantonio <sup>1</sup>

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**Available Online:** 15 December 2017

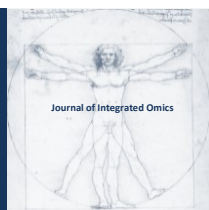
### ABSTRACT

Ndrangheta is a mafia criminal organization, hailing from Calabria, Italy. This organization is able to use any kind of weapon and the choice depends on the type of murder to commit. So, even bazooka have been used when the victims, judges or rival mafia clan boss, travelled by armored cars. Kalashnikov is not only used "normally" to commit mafia ambushes, but often it has been found carbonized with the car used by killers. This act confirms that mafia clan have available vast arsenals of weapons and it is a demonstration of what this organization is able to do. Gunshot wounds cause significant mortality and morbidity. The analysis of the features of injuries makes it possible to establish which kind of weapon has been used. The AK-47 is a selective-fire, gas-operated assault rifle and it uses a long stroke gas system. In order to shoot, who uses a AK-47, inserts a loaded magazine, pulls back and releases the charging handle, and then pulls the trigger. It can be semi-automatic, when the firearm fires only once, or full-automatic, if the rifle continues to fire automatically and cyclically fresh rounds into the chamber. AK-47 rifle bullet injuries present with uncharacteristically large entry wounds and cause complex structural injuries. The consequent trajectory is difficult to predict making regional examination and radiological investigations. Bullets may be retained, leaving no exit wound. Kalashnikov is not a frequent weapon, so the wounds are not so common to see in the forensic practice. But, in 'ndrangheta homicides, this firearm is preferred for its high harmful power that ensure a murder "without mistakes" and with devastating consequences on the shot body. Case Report: We reported a case of young man killed by a Kalashnikov. The corpse was in the prone position. Six holes of a firearm on the body were observed; particularly to the back, chest and left arm. The lesion situated on the chest was the size of 3x2 cm. At the time of inspection the planimetric for ballistic calculations was performed in the following manner: shooting cameras, integrated with the satellite images of the crime scene extrapolated from the website <http://www.bing.com/maps/>; identification of the location of the discovery of the corpse throughout the use of cadastral maps; measurement of the building and the land in front of the building in the crime scene; pads planimetric and 3D views of the crime scene; shoe-pads and biological agents; evidence collection of shells and cartridges found on the ground; location of shell casings and measurement of distances from the site of the discovery of the corpse. The measurements were used by the ballistic engineer to make the vector calculations. On the scene the ballistic elements were collected. An external examination of the body was carried out, and subsequently a CTMS and autopsy were performed. On the corpse was found a single fatal blow whose trajectory was: 1-rupture of the dorsal vertebrae, 2-laceration of the left lung with hemorrhage, 3-outbreak of the heart and pericardium and massive hemothorax. The ballistic calculations have allowed us to establish that the subject was facing the shooter at first and then, in an attempt to escape, he was back than killer. In the case presented the speed and violence of this firearms have caused an explosion of the heart. These data show the potentially devastating effects of this weapon. Often, this harmful effects make the shooting dynamics reconstruction difficult. For this reason we underline the importance of multidisciplinary approach in assessment of the murders in these cases. Only a careful evaluation within the inspection and the performance of vector calculations on the crime scene and the corpse allows a reconstruction of the murder and becomes a scientific evidence in the court for obtaining a correct reconstruction of the events.

**Keywords:** Forensic Science, Kalashnikov, Multidisciplinary Approach

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Linguist markers to early detection of radicalization in Social Networks

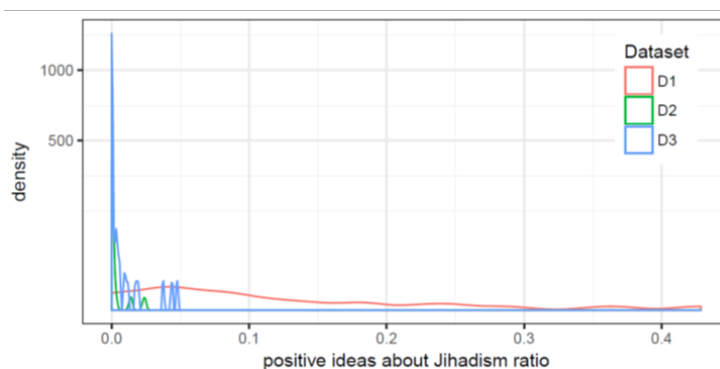
Raúl Lara-Cabrera, Antonio Gonzalez-Pardo, David Camacho

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**Available Online:** 15 December 2017

### ABSTRACT

Nowadays, social networks are essential communication tools that produce a large amount of information about their users and their interactions. Spreading propaganda in digital environments is a good way for various extremist groups who want to reach out with their messages, and it is considered to be an important part of the terrorist group Islamic State (IS) success in recruiting supporters from all over the world. Although propaganda is not the sole cause of radicalisation or recruitment to violent extremist ideologies, interactions on social networks can be an important component of a radicalization process due to its easy accessibility and the ability to capture and retain an individual's interest. Even though it is not clear what role Internet and social media plays in radicalization, some previous studies have focused on measuring the risk for individuals to radicalization [1,2] and the possibility to detect individuals or groups that engage in violent extremism [3]. In this work, we focus on identifying a set of linguistic indicators that can be used to measure frustration, the perception of discrimination, and the declaration of negative and positive ideas about the Western society and Violent extremism respectively. The indicators have been tested on three different datasets: tweets by pro-ISIS users, tweets from users flagged as radicals by the Anonymous collective and a random sample of tweets gathered from the public Twitter stream.



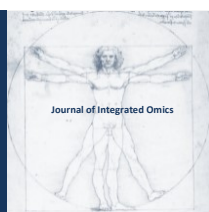
**Figure 1.** Density distribution of the ratio of tweets expressing positive ideas about Jihadism according to the studied indicators and their respective metrics .

**Acknowledgements:** This work has been supported by RiskTrack (JUST-2015-JCOO-AG-7231809) and EphemeCH (TIN2014-56494-C4-4-P) projects. The contents of this publication are the sole responsibility of their authors and can in no way be taken to reflect the views of the European Commission.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## The importance of Online Social Networks on the radicalisation risk assessment

Javier Torregrosa, David Camacho\*

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**Available Online:** 15 December 2017

### ABSTRACT

With the growth of the Islamic terrorism and groups like Islamic State or Al Qaeda, academics have focused on detecting risk factors to understand the radicalisation phenomena and, thus, preventing it. Even though there is not a single profile of an Islamic radical, most of the authors point to several conditions that are partially shared by most of those radicals. Moreover, the development of the Online Social Networks, such as Facebook or Twitter, along with the Internet, has created a new field for the radicals to start their radicalisation paths, but also a new chance to detect the behavioral changes they present there. With this change on the rules in mind, this paper focuses on assessing the behavioral traces that can represent a sign that a person is becoming radicalised on the Online Social Networks. Both theoretical [1] and empirical information [2, 3] will be taken into account in order to create a final report of the radicalisation risk factors and their indicators presented on the Online Social Networks

**Table 1.** Personal risk factors.

Generation of migrant	Educational level	Age	Mental health	Attitude towards politics	Religious orientation	Social isolation
Pro-terrorism attitude	Psychological factors	Criminal record	Social isolation	Exposure to radical propaganda	Economical level	Travel to a conflict zone

**Table 2.** Group risk factors.

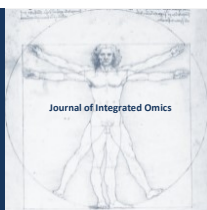
Family conflicts	Perceived discrimination	Sense of belonging to a group	Use of radical rhetoric
Identification with Muslim victims	Relationships with radicals	Presence of a charismatic leader	

**Acknowledgements:** This work has been supported by RiskTrack (JUST-2015- JCOO-AG- 7231809) and EphemeCH (TIN2014- 56494-C4- 4-P) projects. The contents of this publication are the sole responsibility of their authors and can in no way be taken to reflect the views of the European Commission.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Representation of information in Social Network to Perform Community Finding Tasks

Antonio Gonzalez-Pardo\*, Raúl Lara-Cabrera, David Camacho

Computer Science Department, Universidad Autónoma de Madrid, Spain

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### ABSTRACT

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The unstoppable growth that Social Networks (SN) have suffered in the last years, has produced that the data stored in those networks grows exponentially. This data appears from the information that the users provide in their corresponding profile, the different connections that they established while they are using the SN, and also due to the different interactions that the user perform within the SN. All this data has become in a great opportunity to extract information from the SN and also from the users. One of the most typical information that can be extracted from this data is the different groups, or clusters, of users. The main idea is to gather users in one or more groups in such a way users belonging to the same group are similar, whereas there are several differences among the users of the other groups. This problem is commonly known as *Community Finding Problems*, and the different groups of users are called “*communities*” [1]. The data used to perform the community detection task is critical because it will affect to the quality of the communities found by the algorithms. In this way, it is possible to detect the different communities based on data extracted from the network (such as relation between users), or based on the information provided by the users in their profiles [1]. But it is also possible to compute other metrics related to the users behaviour in order to define the different communities [2, 3, 4]. The goal of this paper is to analyse the different approaches that can be used to perform the *Community Finding Tasks* taking into account the different types of data available in the most popular Social Network.

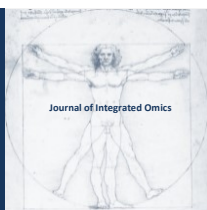
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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Spinal cord injury in Penal Law – a singular case of serious bodily harm

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**Available Online:** 15 December 2017

### ABSTRACT

Spinal cord injury is an insult to the spinal cord resulting in a change, temporary or permanent, in the cord's normal motor, sensory or autonomic function, resulting in usually permanent and often devastating neurologic deficits and disability [1]. Epidemiologically is frequently associated with road traffic accidents, affecting mostly young males [2, 3]. In Portugal Penal Law, bodily harm is divided in simple and serious based on four points regarding injury to the body itself and its function from the moment of the event and its after effects. In Forensic Clinic, the vast majority of cases regard simple bodily harm injury; nevertheless it is of utmost importance to recognize and describe to the court complex cases indicating the extent of injuries and the repercussions it brought and bring at the moment of our evaluation [4].

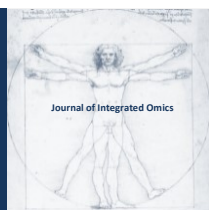
The authors present a case of a young male (29 years old), salesman, victim of motorbike accident of which resulted spinal cord injury due to comminuted fracture T7-T8, multiple rib fracture and kidney, spleen and genital tract trauma. Hypotension and agitation at the site, reverted with IV fluid, blood transfusion, morphine and oxygen. At admission without muscular strength and sensitive level T6. Submitted to surgery T7-T8, without functional gain. Transferred to rehabilitation with progressive recovery, regaining static and dynamic balance of the trunk. Medicated for muscular spasm on lower limbs and antibiotics due to repetitive urinary tract infection. Follow up in Neurosurgery, Physical and Rehabilitation Medicine and Urology (due to erectile and ejaculatory dysfunction). At the discharge date (283 days after the event) the patient presented with a paraplegia ASIA A T5 with no muscular strength on lower limbs (moved in a wheel chair), without voluntary anal sphincter contraction and suprapubic probe. Several auxiliary items for daily activities and medication were prescribed and routine check-ups were scheduled. From a medico-legal perspective, despite further follow-up the injuries, the neuromotor condition is fixed, therefore some conclusion can be elaborated. Regarding Portugal Penal law this case presents the characteristics of a serious bodily injury situation as the lesions were severe, causing a permanent disfiguration and affecting its ability to use the body, to perform its job and have sexual fruition. The characteristics surrounding the event, mainly in the emergency room the patient was in a life threatening situation. As for permanent help for the future the patient will need technical, medical and 3rd person assistance to cope with the after effects (as well as an eventual Urology surgery) to improve his quality of life.

In conclusion, it is vital for the forensic doctor to be prepared to analyze in a medical point of view but also in the scope of the area of the Law involved the case presented, articulating with other areas of expertise so that it may transmit to the court with exemption, impartiality and objective the consequences of bodily harm.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Post-mortem civil law evaluation – a challenging approach regarding two cases

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Delegação Centro do Instituto Nacional de Medicina Legal e Ciências Forenses, IP

**Available Online:** 15 December 2017

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### ABSTRACT

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According to Civil Law in Portugal, whom who is obliged to repair an injury must do so in order to restitute the situation previously verified being compulsory the indemnity of the injured party. Damage may classified in temporary or permanent as well as pecuniary and non-pecuniary [1,2]. Civil law evaluations are frequently performed to victims of road traffic accident regarding monetary compensation. The authors present two cases on which this evaluation was performed after the victim has deceased, with its inherent challenging approach.

Case 1 – male, 57 years old, victim of road traffic accident in 2008 which resulted amputation left leg and deformity on the right ankle. Treated by Orthopedics, Pshysical and Rehabilitation Medicine and Psychiatry (depression). Follow up in clinical services of the insurance company, submitted to several surgeries. In 2012 was diagnosed with retroperitoneal leiomyosarcoma with metastases. The medical experts were asked if a correlation between the event and the cause of death could be made.

Case 2 – male, 43 years old, victim of road traffic accident in 2010, with serious brain injury and skull fracture (Glasgow scale 6 at admission). Conservative neurosurgery follow-up followed by hospital discharge two months later to rehabilitation clinic with reasonable functional gain. Evaluated two years later regarding Penal Law with severe cognitive handicap (frontal syndrome) as well as motor dysfunction of left arm. The medical experts were asked about Civil repercussions of the event, namely if the victim (meanwhile deceased in 2013) died due to after effects of the accident.

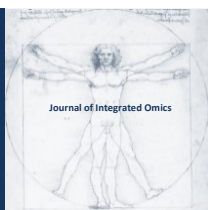
In both cases a Civil report was made regarding the injuries and consequences due to the accident based on Portugal Civil Law. On case 1, based on clinical records no clinical correlation was established between the accident and the tumoral lesion. On case 2 the last written clinical record dated two weeks before the date of death. For that reason a natural cause of dead was not possible to be excluded and medical experts had not information do correlate the after effects and the cause of dead. Despite the specificity of Legal Medicine Civil evaluation, other clinics should be aware of the importance to document clinical information as it may be important even after the patient life has ceased.

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Forensic Science and Law Discourse: On the Linguistic Difficulties for Translators and Interpreters

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**Available Online:** 15 December 2017

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### ABSTRACT

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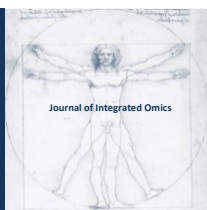
Forensic Science (or Forensics) holds various fields of science (Psychology, Pathology, Odontology, Toxicology, Digital Forensics, to cite a few) involved in solving crimes and offences at any stage in criminal proceedings and researches. On the other hand, Forensic Law is a legal branch that involves issues related to forensic techniques in a justice system (being thus linked to Criminology, Criminal Law, and Civil Law). The intersection of Science and Law contributes to finding out the truth of a case, either criminal or civil, and they both have undergone dramatic progress in recent years. The aforementioned intersection provides specialists with a considerable amount of documents, either electronic or paperback...and they often need to be translated or interpreted into other languages. The high level of technical terms, complex nouns and phraseology, hamper their translation, interpreting, and proofreading services. In this paper we will provide the reader with the main linguistic features of Forensic Science and Law Discourse, matched with source texts and target texts. By means of the use of original Forensic documents, we will provide translators and interpreters with strategies and alternatives for facing their translation and proofreading

**Keywords:** Forensic Science; Forensic Law; Linguistic difficulties; Translation; Proofreading

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Trends in diagnostic of fatal traumatic brain injuries

Jan Dressler, Benjamin Ondruschka

Institute of Legal Medicine, Medical Faculty University of Leipzig

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### ABSTRACT

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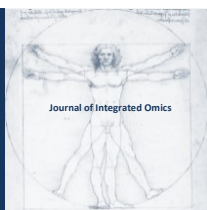
Traumatic brain injuries (TBI) affect people of all ages and genders and contribute to a substantial number of deaths or cases of long-term disability. Therefore, such injuries are an important part in daily routine of legal medicine. The morphological and biochemical demonstration of marker profiles after TBI is of considerable interest in legal medicine for determining the causes and mechanisms of traumatic death. Whenever possible, a precise estimation of the survival time after TBI is necessary to solve forensic questions.

A lot of our studies describe the time course of expression of different markers of the central nervous system via histological, immunohistochemical, immunofluorescence, biochemical and molecular genetic methods, which may be used for estimation of the wound age after TBI and to get further insight in the molecular pathways of so-called secondary injury to the brain with inflammatory response, brain swelling, hypoxia and oxidative stress changes over hours, days to months.

In an overview the authors will present useful signs to estimate the vitality of fatal head impacts and to differentiate short and longer survival times of TBI. They will demonstrate the damage of neuronal and glial cells by time-dependent changes of necrosis, apoptosis, receptor regulation and proliferation. Our research findings emphasize the potential of detailed forensic examinations in cases of suspected TBI

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SPECIAL ISSUE: SELECTED ABSTRACTS OF THE 1 INTERNATIONAL CAPARICA CONFERENCE IN TRANSLATIONAL FORENSICS (FORENSICS 2017)

## Global Responsibility: The Role We Play in Developing Forensic Science

Kevin Lothridge

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### ABSTRACT

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Forensic science works to support justice. It doesn't belong to just one nation, but is critical to the global community. In the United States, we are fortunate to have a strong understanding and history of utilizing investigative principles and emerging technologies to serve our communities. It's time our scientists reach out to work with global laboratories to share our best practices and knowledge.

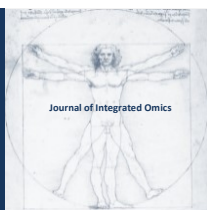
Through our work with the United States Department of State, the National Forensic Science Technology Center is seeing firsthand the discrepancies in forensic science practice that need to be addressed. By creating relationships between laboratories, in sister cities or via similar programs, we can encourage discussions about improving forensic science practice worldwide.

Our partnership with ANAB and ANZPPA allows us to use our two decades of experience in helping international laboratories achieve accreditation. Most recently, we've joined forces with Florida International University. Our clients, current and future, will now not only have our talent pool, but the entire staff of American's fourth largest university, providing unparalleled access to top tier subject matter experts.

It's our responsibility to share the impact forensic science can play on a global scale.

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## Nanotechnology: Identification of early time passed since death

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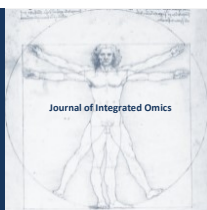
### ABSTRACT

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The breakthroughs of fluorescent nanosensors have paved the way for biomedical research. Moreover, the reported sensibility and specificity of the chemo- and biosensors opened the door to more investigations which will introduce new applications either by optimization of already developed sensor or discovery of new ones. Most of nano researches are directed towards medical applications, although it could also be introduced towards medico-legal applications. In this direction, new nanosensor was designed and examined to detect postmortem changes in blood. The newly designed sensor could be used as a marker to detect changes happened in blood postmortemly.

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(FORENSICS 2017)

## A case of homicide by captive-bolt gunshot

Palazzo Chiara\*, Fais Paolo, Pelotti Susi

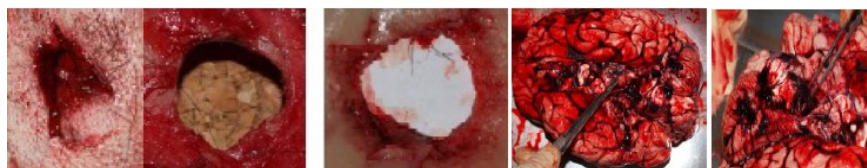
Department of Medical and Surgical Sciences (DIMEC), Institute of Legal Medicine, University of Bologna, Bologna, Italy

### ABSTRACT

Captive-bolt guns are used as weapons for human slaughtering of animals in meat industry and should be paced against the animal's forehead to induce immediate unconsciousness before slaughtering livestock. They consist of a simple cylindrical metal tube (barrel) with a metal bolt placed in the centre (approximately 7-15 cm long and 1-1.5 cm wide). The bolt is actuated by a trigger pull and is propelled forward by compressed air or by the discharge of a blank powder gun cartridge. Violent death inflicted by captive-bolt guns are rarely reported in forensic pathology and are predominantly suicidal, while accidents and homicides are unusual events. We have observed a case of homicide with head injury by a captive bolt type of slaughterer's gun, brand mark "Humanitas" (Fig.1). In the occipital region we found a contused wound, oval shaped, with irregular contused edges. The edges were bent inwards with a small blackish-red abrasion collar and underlying gap in the skull with caudocephalic diameter of approximately 1.3 cm, clean edges on the outer table of the bone and slightly flared edges on the inner table (Fig.2). At the bottom of the wound within the cerebellar matter, there were several small fragments of bone and hair, punched inward (Fig.2). We appreciated subarachnoidal bleeding and laceration of meninges with serious encephalic and cerebellar injury, causing death.



**Figure 1.** Slaughterer's gun "Humanitas"



**Figure 2.** Autopsy findings

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