THE 7TH INTERNATIONAL CONGRESS OF THE BALTIC MEDICO-LEGAL ASSOCIATION

November 11-13, 2010   Helsinki, Finland

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WELCOME

Dear Friends and Colleagues,

On behalf of the organizing committee I am honored to have the opportunity to welcome you all to the 7th Congress of the Baltic Medico-Legal Association (BMLA). This is the second time that Helsinki has been chosen to host the congress. The theme, “Sudden and unexpected death”, represents the basics of our discipline and covers all aspects of forensic sciences: pathology, toxicology, odontology and biology.

BMLA was founded in 1990 by Estonian, Latvian and Lithuanian colleagues in order to bring together all forensic scientists operating in the Baltic States’ area. In addition to the profession, forensic medicine, the Baltic Sea is a major connective element of the Association. The world looked totally different in the days when the Association was founded. At that time international co-operation was much more difficult and complicated. BMLA opened the doors for a closer exchange of thoughts, knowledge and practices in our profession and gave the opportunity to get to know colleagues working in the same field but in different countries.

Today most of the member states of BMLA belong to European Union, which offers a free forum for communication and development. However, the world is not yet ready and so each country develops on its own basis and follows its own legislation. And yet in every country it is the professionals and the experts who conduct cause- of- death investigations. Thus it continues to be important that we all know each other personally and we know what which kind of potentials and possibilities are available in each country as well as how the different national organizations work. We can share this kind of information only if experts have the chance to meet and learn from each other. This is why our Association and these congresses will live on and, I hope, have a long and rewarding future.

I thank the members of the National Organizing Committee for their eager and hard work. I also thank the board members of the Baltic Medico-Legal Association, especially President Grigory Vabels and Vice President Velta Volksone, for their support and advice. The sponsors and the National Institute for Health and Welfare are acknowledged with gratitude. Finally, I thank Congcreator and Ms Aira Raudasoja for skillful taking care of practical arrangements.

During the next few days we will have excellent opportunities to become acquainted with each other and learn from each others' professional experiences. For personal meetings and discussions, we have also included social events in our program.

You are heartily welcome to autumnal Helsinki!

Erkki Vuori
Professor, President of the meeting
CONGRESS ORGANISING COMMITTEE

- Erkki Vuori, Chair
- Jari Nokua
- Ilkka Ojanperä
- Riitta-Leena Ojansivu
- Anna Pelander
- Helena Ranta
- Merja Ranta
- Ilpo Räsänen
- Antti Sajantila
- Erkki Tiainen
- Aira Raudasoja, Secretary

SUPPORTERS AND SPONSORS

- Federation of Finnish Learned Societies
- Bruker Daltonics Scandinavia AB
- Obelux Oy
- Planmeca Oy
- Siemens Oy
- Waters Finland

GENERAL INFORMATION

Congress Venue
The congress is held in Sylvi Hall at Sokos Hotel Presidentti.

The desk will be at your service on
- Thursday 13-18
- Friday 8-16
- Saturday 8-16

Registration desk phone: +358 (0)500 604 686

Services for congress delegates
Registered delegates are entitled to the following services and material

- admission to congress sessions
- abstract book with the list of participants
- congress bag
- lunch and coffee/tea on Friday and Saturday
- evening programmes
PRACTICAL INFORMATION

Banks
Banks are open 09:30–16:15 except during the weekends. Automatic cash dispensers (OTTO) are widely available. Major credit cards are accepted in shops, cafés, restaurants etc.

Certificate of Attendance
is included in your registration material.

Copying
BW copies 30 cents, colour copies 60 cents per page.

Credit Cards
All major credit cards are in general use in Finland. At the registration desk you can use Visa and Mastercard.

Currency & Exchange
The currency in Finland is the Euro, also used in 11 other European Union countries. 1 EUR is approximately 1.38 USD (October 2010). You can change money at the Helsinki-Vantaa Airport, at banks or at the Helsinki Railway station. There are also many specialised currency exchange locations in the city centre.

Insurance
Delegates are advised to take out their own comprehensive travel insurance as the organisers shall not be liable for personal accidents, illness, losses or damage to private property.

Internet
A password for WLAN can be obtained at the congress desk free of charge.

Language
The official congress language is English.

Lunch and restaurants
Lunch breaks: Thursday-Friday at 12:30-13:30
Lunch is served at the restaurant on the second floor.

Medical assistance
Ambulance services emergency number: 112.
Private health care centres in the city centre:
- Helsingin lääkärikeskus, Mannerheimintie 12 B, tel. (09) 6808 8400
- Lääkärikeskus Mehiläinen Forum, Mannerheimintie 20 B, tel. 010 414 6202

Name Badge
You will receive a name badge on registration. Please wear your badge at all times, as it will serve as your “ticket” to congress events.

Phones
Most of the mobile phones (excluding US and South American phones) are useful in Helsinki; provided your operator has a roaming agreement with a Finnish company.

Organisers recommend to buy a Prepaid and Refill Voucher sold at several dealers e.g. R-Kiosks.
There are public phones at the main railway station. Phoning at the hotel is expensive.

**Police**
Police services emergency number: **112**.

**Sauna**
Most of the hotels in Helsinki have saunas. To experience a sauna bath contact your hotel reception.

**Shopping**
Most department stores and shopping centres are open Monday - Friday at 09:00-21:00, on Saturday at 09:00–18:00, on Sunday at 12:00-18:00. There are also small shops open 24H.

**Smoking**
This is a non-smoking congress. In general, smoking is not permitted inside the congress hotel. Please note that in Finland smoking is restricted in all public places, including restaurants.

**Taxi**
Dial **0100 0700** to call a taxi. Taxis are rather expensive but safe.

**Tipping**
Tipping is not customary in Finland. In restaurants service is included in the bill. You may, however, want to tip for a good service.

**Helsinki Tourist Information**
Phone: **+358 (0)9 3101 3300**, address: Unioninkatu 28

**Finnish Tourist Board/Visit Finland**
Phone: **+358 (0)10 60 58000**,

**Transport**
Helsinki is mostly accessible on foot. A well-integrated, safe local transport system consists of trams, buses, an underground line and commuter train services. Tickets (2,50 EUR per ticket valid through one hour in trams, trains, buses and metro) are purchased from the driver (buses and trams) or at newspaper stands (R-kioski).

When visiting and travelling in the Helsinki area from one day up to seven days, the most valuable practical way to get around is the HKL Tourist Ticket. HKL Tourist Tickets are available from one to seven days for both children and adults.

**Single-charge card, day tickets in Helsinki (EUR)**

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Child</th>
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<tr>
<td>1 day</td>
<td>6,80</td>
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<td>2 days</td>
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<td>5,10</td>
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<tr>
<td>3 days</td>
<td>13,60</td>
<td>6,80</td>
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One-day tourist tickets can be purchased at ticket automats at tram stops, newspaper stands (R-kioski), and at the Stockmann department store. Tourist tickets for several days are purchased at newspaper stands (R-kioski), and at the Stockmann department store.

The route of tram line 3T is ideal for a sightseeing tour. You can get on the tram at any stop and the tour takes about 60 minutes.
SOCIAL PROGRAMME

- **Thursday at 18:00-20:00** Get-together party at hotel Presidentti, Sylvi Hall.
- **Friday at 18:30-19:30** Reception by the City of Helsinki, Old Court House, address: Aleksanterinkatu 20
- **Saturday at 19:30-23:00** Congress Dinner at the Restaurant Loiste, address: Kaivokatu 3, 10th floor.

CONGRESS SECRETARIAT

CongCreator CC Oy
Tel: +358 (0)9 4542 190
Fax: +358 (0)9 4542 1930
E-mail: info@congcreator.com
www.congcreator.com
PROGRAMME

Thursday 11 November

13:00-17:00  Educational visit to Planmeca Ltd. Separate invitation.
13:00 – 18:00  Registration, Hotel President
18:00 – 20:00  Get-together party, Hotel President

Friday 12 November

Symposium I: Forensic pathology
Chairs:  Erkki Tiainen at 9:30-12:30
         Antti Sajantila at 13:30-14:45

9:00 - 09:30  Opening Ceremony

I/1  9:30 – 10:00  Marika Väli (Tartu, Estonia)
      Legal regulation of autopsy and an overview of causes of death in Estonia

I/2  10:00 – 10:15  Riitta Kauppila (Helsinki, Finland)
      Forensic medicine at the National Institute for Health and Welfare

I/3  10:15 – 10:30  Grigory Vabels (Riga, Latvia)
      Medical system and analysis of death in Latvian prisons

10:30 – 11:00  Poster session I and coffee break

I/4  11:00 – 11:30  Marja-Leena Kortelainen (Oulu, Finland)
      Forensic diagnosis of hypothermia fatalities

I/5  11:30 – 11:45  Lasse Pakanen (Oulu, Finland):
      Evaluation of urinary catecholamine concentrations in hypothermia deaths

I/6  11:45 – 12:00  Tapio Kallonen, OBELUX Oy (Helsinki, Finland)
      Detecting and locating body bruises and bodily fluids using a UV light

I/7  12:00 – 12:15  Sirkka Goebeler (Tampere, Finland)
      Medico-legal autopsies on the oldest-old

I/8  12:15 – 12:30  Marija Caplinskiene (Vilnius, Lithuania)
      Data analysis on sudden death in Lithuanian population: Forensic medical aspects

12.30 – 13:30  Lunch break
I/9 13:30 – 13:45 **Olga Egorova** (St. Petersburg, Russia)
Clinical and legal-medical aspects of a trauma in the central area of the face complicated by a phlegmonous eye-socket

I/10 13:45 – 14:00 **Antti Jääskeläinen** (Turku, Finland)
A comparison between the law of forensics in Kosovo and in Finland with respect for the interactions of the society and legislation

I/11 14:00 – 14:15 **Philip Bolechala** (Kraków, Poland)
Multiple homicides committed by insane offenders

I/12 14:15 – 14:30 **Ojārs Teteris** (Riga, Latvia)
Impact pathology on the results of trauma

I/13 14:30 – 14:45 **Ursula Vala** (Helsinki, Finland)
Influenza A (H1N1) (Swine flu) detection in autopsy

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**14:45 – 15:45 Poster session I (continues) and coffee break**

Author(s) should be presenting their poster(s) at 15:15 – 15:45

**PI/1**
**J. Gincman-Dorosenko**, R. Andriuskevičienė (Lithuania)
Death causes of children in Lithuania in 2000-2008

**PI/2**
**G. Grauss**, U. Teibe (Latvia)
Comparison of contact – diffusion imprints method and of roentgen-fluorescent spectral analyses (RFSA) method in examination of shot wounds

**PI/3**
**Marija Jakubėnienė**, D. Fomin, R. Andriuskevičienė, A. Bečelis (Lithuania)
Analysis of potassium and sodium in postmortem heart tissue in the cases of suspected sudden cardiac death

**PI/4**
**J. Jurėnienė**, G. Kisielius (Lithuania)
Experimental investigation of stub-cut injuries in the forensic practice in Lithuania

**PI/5**
**Antti J. Jääskeläinen**, A. Rinne (Finland)
R96-99

**PI/6**
**Heidi Kase, Jana Tuusov** (Estonia)
Sudden unexpected death of a young woman

**PI/7**
**Ojārs Teteris**, K. Nevidovska, J. Vamze, G. Grauss, A. Erglis (Latvia)
Morphological studies of coronary heart diseases and associative factors in the Latvian (Riga) population

**PI/8**
**V. Popov, Olga Egorova** (Russia)
Legal-medical assessment of defects in medical aid with regard to stab wounds in the neck
PI/9  Daniela Roberta Schillaci (Italy)  
Pituitary adenoma and sudden death in adults: a case report

PI/10  Marcin Strona*, Filip Bolechala, Ewa Rzepecka-Wozniak, Tomasz Konopka (Poland)  
Unusual case of pulmonary embolism with vascular material

PI/11  Jolanta Vamze*, Arta Barzdina, Mara Pilmane, Velta Volksone (Latvia)  
Apoptosis in traumatic brain tissue of human and different survival periods

PI/12  N. Sidenko, I. Martinova (Latvia)  
Cases of rare mechanical asphyxia

PI/13  Grazina Sniepienė (Lithuania)  
Drug-related overdose mortality: a 15-year study in Klaipeda County (Lithuania)

Symposium II: Forensic odontology  
Chair: Helena Ranta

II/1  15:45–16:15 Helen Liversidge (London, UK)  
Age assessment: Population differences in tooth formation

II/2  16:15 – 16:45 Helena Ranta (Helsinki, Finland)  
Legal aspects of forensic age assessment

II/3  16:45 – 17:00 Mari Metsäniitty (Helsinki, Finland)  
Forensic age assessment in Finland

II/4  17:00 – 17:15 Jouni Pelkonen (Helsinki, Finland)  
New method for adult age assessment using 3D-scanning

II/5  17:15 – 17:30 Helianna Puhlin-Nurminen, Planmeca Oy (Helsinki, Finland)  
Latest trends in DentoMaxillo Facial diagnostics

18:30-19:30  Reception by the city of Helsinki at Old Court House  
(Aleksanterinkatu 20, a separate invitation in the registration materials)
**Saturday 13 November**

**Symposium I: Forensic pathology (continued)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>9:00</td>
<td>Krzysztof Woźniak</td>
<td>Postmortem examination including CT and MRI imaging in a case assumed as sudden and unexpected death</td>
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<tr>
<td>9:15</td>
<td>Artur Moskała</td>
<td>Postmortem CT examination in violent death cases referring to sharp force injuries – own experiences</td>
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<tr>
<td>9:30</td>
<td>Krzysztof Woźniak</td>
<td>Postmortem CT examination in firearm fatalities: reconstruction of bullet tracks – own experiences</td>
</tr>
</tbody>
</table>

**Symposium III: Forensic Toxicology**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>9:45</td>
<td>Bob Flanagan</td>
<td>Was it poisoning?</td>
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<tr>
<td>10:15</td>
<td>Ilkka Ojanperä</td>
<td>Current trends in forensic toxicology</td>
</tr>
</tbody>
</table>

**10:30 – 11:00 Poster session II and coffee break**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Title</th>
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<tbody>
<tr>
<td>11:00</td>
<td>A. Wayne Jones</td>
<td>Interpretation of post-mortem toxicology results</td>
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<tr>
<td>11:30</td>
<td>Pirkko Kriikku</td>
<td>New designer drug of abuse: 3,4-methylenedioxyxypyrovalerone (MDPV) Findings from apprehended drivers in Finland</td>
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<tr>
<td>11:45</td>
<td>Pirjo Lillsunde</td>
<td>The life course of DUI offenders</td>
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<td>12:00</td>
<td>Kaarina Langel</td>
<td>Comparison of morphine, oxycodone, and fentanyl concentrations in oral fluid and plasma</td>
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<tr>
<td>12:15</td>
<td>Iphigenia Naidis</td>
<td>Improving the quality and performance of drug analysis laboratories: global challenges and achievements</td>
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**12:30 – 13:30 Lunch break**
III/8  13:30 – 13:45 **Anna Pelander** (Helsinki, Finland)
Drug screenings in biological material by accurate mass measurement

III/9  13:45 – 14:00 **Erkki Vuori** (Helsinki, Finland)
A rare case of serial killings by poisoning

**Symposium IV: Forensic biology**
Chair: Jukka Palo

IV/1  14:00 – 14:30 **Manfred Kayser** (Rotterdam, The Netherlands)
Forensic phenotyping: from sample to appearance

IV/2  14:30 – 15:00 **Antti Sajantila** (Helsinki, Finland)
Molecular autopsies – integrating forensic pathology, toxicology and genetics

15:00 – 16:00 **Poster session II (continues) and coffee break**
Author(s) should be presenting their poster(s) at 15:30 – 16:00

IV/3  16:00 – 16:15 **Nadine Kiehne** (Frankfurt, Germany)
Molecular autopsy in cases of sudden unexplained death

IV/4  16:15 – 16:30 **Jukka Palo** (Helsinki, Finland)
Forensic aspects of Finnish population genetics

IV/5  16:30 – 16:45 **Anu Neuvonen** (Helsinki, Finland)
Post-mortem ABCB1 genotyping reveals an elevated toxicity in female digoxin users

IV/6  16:45 – 17:00 **Mikko Putkonen** (Helsinki, Finland)
Identification of Finnish WWII soldiers and factors affecting STR amplification success in poorly preserved bone samples

IV/7  17:00 – 17:15 **Katarina Vaahtera** (Helsinki, Finland)
Ketoacidosis as a cause of elevated blood C-reactive protein levels in forensic autopsy material

IV/8  17:15 – 17:30 **Areta Sabule** (Riga, Latvia)
Genetic study of the 15 STR autosomal and 17 STR y-chromosomal loci in the Latvian population

19:30-23:00 **Congress Dinner at the restaurant Loiste (Kaivokatu 3, 10th floor)**
Poster session II
Author(s) should be presenting their work at 15:30 – 16:00

PII/1 Ojārs Teteris (Latvia)
Life dedicated to forensic medicine – 80 year anniversary of As.prof. Mr Uldis Bērziņš

PII/2 Mihhail Vassin (Estonia)
Case report: Sudden death of 13 y.o. boy

PII/3 M. Pankova, Z. Lutere, G. Pogule, V. Trušus (Latvia)
Echinococcosis as accompanying disease in cases of sudden death

PII/4 Leonas Gogelis, Vidmantas Mikeliūnas, Marija Jakubėnienė* (Lithuania)
Vitreous humor, cerebral fluid, urine and blood as biological specimens for forensic analysis of alcohol: comparative study

PII/5 Tatiana Khodasevitch, N. Poroshina, Yevgeny Volgram* (Latvia)
Ethanol in blood and breath after voluntary tasting of alcohol

PII/6 Jana Tuusov, Mailis Tõnisson, Vitali Vassiliev, Marika Väli (Estonia)
Poisoning with selenium

PII/7 Ann Viitso, Tarmo Barndöök, Aime Riikkoja, Anu Adams (Estonia)
GHB-related deaths in Estonia in 2009

PII/8 Anita Holmgren, Johan Ahlner, A Wayne Jones (Sweden)
Blood-morphine concentrations in heroin-overdose deaths in relation to manner of death and previous drug-related offences

PII/9 Nadine Kiehne*, Silke Kauferstein, Thomas Neumann, Hansjürgen Bratzke (Germany)
Sudden unexplained death – genetic examination in surviving relatives

PII/10 Anna Pehrsson, Kari Vimpari, Tom Blencowe, Teemu Gunnar, Pirjo Lillsunde (Finland)
Performance evaluation of the DrugWipe* 5/5+ on-site oral fluid drug test: comparison with confirmation results in whole blood

PII/11 Tom Blencowe, Kari Raaska and Pirjo Lillsunde (Finland)
Benzodiazepines and sedative-hypnotics in blood of drivers under the influence of drugs, and their association with other common illegal drug use and national sales figures

PII/12 Kaarina Langel, Hannu Uusivirta, Kari Ariniemi, and Pirjo Lillsunde (Finland)
Dried blood spot as a sample matrix in drug analysis – a validated method for screening and quantitation of 23 drugs of abuse by gas chromatography-mass spectrometry

PII/13 Yevgeny Volgram, Tatiana Khodasevitch, Leonid Khodasevitch (Latvia)
New designer drug 1-(3-chlorophenyl) piperazine (MCPP) in Latvia
PII/14


Case report: Identification of two bodies after fire accident
SYMPOSIUM I: FORENSIC PATHOLOGY

I/1
LEGAL REGULATION OF AUTOPSY AND AN OVERVIEW OF CAUSES OF DEATH IN ESTONIA
Väli M
Estonian Forensic Science Institute, University of Tartu, Estonia

Objectives
In Estonia, a forensic pathologist handles mainly the examinations of dead bodies and living persons. In 2004, the new Penal Code took effect and this changed the situation in connection with the examinations of the persons. The main difference in comparison with the previous is that now the examinations of the persons are appointed only in the case of the occurrence of severe injuries. The corresponding characteristics are brought out in the legislation; so that the body conducting proceedings can make the decision on the basis of these characteristics.

The work with the dead bodies changed significantly in 2006, when the Establishment of Cause of Death Act took effect. All cases of death caused by external factors are subject to forensic medical autopsy. An expertise of a dead body is appointed when some evidence of a crime on a body exists or there is a suspicion of a crime. When no crime is suspected and the death is caused by external factors or when there is a suspicion of crime or in the cases of late postmortem alterations or if the identity of the deceased is unknown, a forensic medical autopsy is appointed.

Methods
The statistical analyses were used.

Results
1857 autopsies were performed by forensic medical doctors in 2009, which accounted for 38% of accidents. Injuries and asphyxia prevailed in the causes of death. More than 50% of the dead to be autopsied by forensic medical doctors were intoxicated. In recent years, the high number of drug intoxication raises concerns.

Conclusions
With regard to the changes in the law in Estonia, the number of medical expertises performed has decreased.

I/2
FORENSIC MEDICINE AT THE NATIONAL INSTITUTE FOR HEALTH AND WELFARE
Kauppila R

From 1970-ies until 2010 administrative forensic medicine was carried out by state provincial offices. At The end of 2009 the state provincial offices were closed down and the forensic medicine was moved to the National Institute for Health and Welfare (THL). After this reform THL is the competent authority in charge of forensic medicine in Finland. The statutory responsibilities of medicolegal officers are:

- to perform medicolegal autopsies ordered by the police
- verification of death certificates
- guidance and supervision with regard to establishing the cause of death.

During this first year in THL a national development program for 2010-2015 has been created. The development program identified several challenges in organization of forensic medicine in one national unit. The medicolegal autopsy rate is quite high in Finland, about 25% of the all deceased persons. The actual number of medicolegal officers is too low to maintain this autopsy rate. At present the medicolegal officers are travelling to the other cities to perform the autopsies. The plan is to restrict the amount of autopsy sites and create larger medicolegal units during the next years. The modern data processing system has to be created to get sufficient data on medicolegal autopsies for the wider use for scientists and administrative purposes.
I/3
MEDICAL SYSTEM AND ANALYSIS OF DEATH IN LATVIAN PRISONS
Fedosejeva R1, Skidenko N2, Vabels G2, Vabele-Antokola M2, Volksone V2
1Medical department of Latvian Prisons, Colonel of medical service (Riga, Latvia)
2State Centre for Forensic Medical Examination of Latvia (Riga, Latvia)

Objectives

Methods
We have analyzed cases for the period of 2005-2009 to better understand the picture of deaths among prisoners in prisons of Riga region. In most of the cases the cause of death was mechanical asphyxia through hanging, type of death – suicide. There were 2 cases of natural deaths and also 2 cases of murder were investigated.

Results
In any country in the world people go to prison mainly from socially and economically poor parts of the society, so called marginal layers. They are unemployed, homeless, and illiterate and usually suffer not only from one, but from 3 or 4 illnesses. About 80 % of Latvian prisoners come from marginal layers. Before prison these people usually were deprived of public medicine due to many reasons. Penitentiary medicine sometimes does what public medicine failed to do, and therefore prisons are considered to be sort of shield for the wellbeing of the society.
It all requires correct and well functioning political system.
Also the following is very important:
- professionally built structure of medical facilities
- scheme of medical activities in prisons
- analysis of illnesses and deaths of prisoners
Considering that death in a prison usually occurs without witness there is always a suspicion of violent death, that is why personnel of prison conducts its own investigation of every case, most of the times forensic medical examination is conducted and it takes place at the State Forensic Medicine centre.
That is why medical system in prisons is supposed to be of high standards. It should have correct legislation, sufficient and well trained human resources, up-to-date medical equipment, medicines, disinfectants, medical goods etc.

Conclusions
Analysis of deaths in prisons of Riga region enhances the organization of penitentiary medicine and improves medical care for prisoners.

Key words: penitentiary medicine, prison, death.

I/4
FORENSIC DIAGNOSIS OF HYPOTHERMIA FATALITIES
Kortelainen M-L
Institute of Diagnostics, Department of Forensic Medicine, P.O.Box 5000, 90014 University of Oulu, Finland

Background
Forensic diagnosis of hypothermia fatalities can be difficult due to the lack of any specific autopsy findings. Some external and internal findings may be highly indicative of lethal hypothermia, but in most cases there is a need of multiple methods for assessing the severity of ante mortem cold stress.

Objectives
In order to view time trends in hypothermia-related fatalities and to evaluate the practice of forensic diagnosis of lethal hypothermia two different autopsy series were examined.

Methods
Hypothermia related deaths from 1998 to 2009 were analyzed and compared to an earlier study material from 1973 to 1984.
Results
An overall increase in hypothermia related fatalities was observed. There were also some differences in the age distribution and in the contributory factors between these two autopsy series. Microscopic examinations and toxicological analyses were generally more extensive from 1998 to 2009, and urinary catecholamines had been analyzed in most of the cases during this period.

Conclusions
Certain time trends were observed in hypothermia fatalities. The possible factors behind these changes are discussed and different diagnostic tools are evaluated by using some autopsy cases as examples.

I/5
EVALUATING THE SIGNIFICANCE OF URINARY CATECHOLAMINE CONCENTRATIONS IN HYPOTHERMIA DEATHS
Pakanen L*1, Kortelainen M-L1, Särkioja T2, Porvari K1
1Institute of Diagnostics, Department of Forensic Medicine, P.O.Box 5000, 90014 University of Oulu, Finland
2National Institute for Health and Welfare, Aapistie 5B, 90230 Oulu, Finland

Background
The lack of specific markers make hypothermia deaths often challenging to diagnose in medico-legal examination. There are some data suggesting that urinary catecholamine concentrations are higher in hypothermia than other deaths.

Objectives
The main purpose of the study was to evaluate the significance of urinary catecholamine concentrations in post mortem diagnosis of hypothermia deaths.

Methods
The urinary adrenaline and noradrenaline concentrations of 358 autopsy cases were measured using high-pressure liquid chromatography. They were divided into hypothermia, suspected hypothermia and control groups according to the main and contributory causes of death. Comparison and analysis was done with statistical methods.

Results
There was no correlation between the catecholamine concentrations and the length of the post mortem period. The adrenaline to noradrenaline ratio was more effective in detecting hypothermia than adrenaline and noradrenaline concentrations independently. Differences in the catecholamine concentrations between groups were more prominent regarding adrenaline than noradrenaline. The median adrenaline concentrations were significantly higher in hypothermia deaths than in the controls. The median noradrenaline concentrations were, however, comparable between hypothermia groups and the control group containing mostly sudden cardiac deaths.

Conclusions
The adrenaline to noradrenaline ratio is a superior tool in post mortem diagnosis of hypothermia deaths compared with using adrenaline and noradrenaline concentrations independently. These findings can be helpful when determining the cause of death in unclear cases in which hypothermia is suspected.

I/6
DETECTING AND LOCATING BODY BRUISES AND BODILY FLUIDS USING A UV LIGHT
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(Abstract not included)
MEDICO-LEGAL AUTOPSIES ON THE OLDEST-OLD
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Background
Our population is aging rapidly. Currently, 0.7% of the population are 90 years old or older. The death of the oldest-old is usually caused by an illness and is often expected. Medico-legal autopsies are performed in suspicion of unnatural death and when the course of events leading to death is unclear. A common belief is that the oldest-old are rarely autopsied. There are very few autopsy studies on nonagenarians.

Method
This study is presenting an autopsy series of 102 consecutive medico-legal autopsies of 90 years old or older during the years 2007-2009 in Tampere, Finland. Of all medico-legal autopsies, 5.7% were performed on people aged 90 or older, which is about ten-fold the proportion of the nonagenarians in the population. Of the cases, 38% were men – nearly twice the proportion of men among the nonagenarians.

Results
The underlying cause of death was illness in 66% of the cases, and trauma – usually accident – in 34% of the cases. Two cases were studied because of an occupational disease, one cause of death was determined to be iatrogenic, and one homicide was included. Of the nonagenarians studied, 26% died at home, 29% in a nursing home or a health center, 23% in a general hospital, and 21% in a central or a university hospital. Of all cases, 27% had gone through an operation within four weeks prior to death.

Conclusions
In Finland, the cause of death is examined on legal basis, and the age of the deceased does not seem to have a major influence on the medico-legal autopsy rate. In advanced age, poor physical condition related falling accidents and increased risk of complications in surgical operations are important factors leading to medico-legal investigation.

DATA ANALYSIS ON SUDDEN DEATH IN LITHUANIAN POPULATION: FORENSIC MEDICAL ASPECTS
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Introduction and objectives
Lithuania is the largest and the southernmost country of the Baltic States with population of 3.4 million people. In the year 2005-2009 forensic medical investigations show a high rate of sudden deaths - 51 % of the total number of autopsies done in the Institute of Forensic Medicine.

Methods and preliminary results
The data on sudden deaths investigations by death causes was collected following the International Classification of Diseases, version 10 (ICD-10) in the mortality statistics correlated to the autopsy rate. In the ICD-10 number group IX - the circulatory system diseases death rate was - 67.32 %, in the ICD-10 number group XVIII - the sudden infant death rate was - 0.24 %. During the recent 5 years the forensic autopsy rate in Lithuania varied from 23 to 26 %.

Conclusions and discussions
In the sudden death investigations critical role was attached to the establishment of the nature of the fatal disease or injury and correlation of this information with the circumstances surrounding death. Within the sudden death structure in Lithuania deaths caused by cardiovascular system diseases prevail. The epidemiological data on sudden cardiac death will be discussed in details. The research in sudden death investigations requires the application of molecular technology tools in the cases without any morphological determinants.

Keywords: sudden death, population data, forensic medical investigation.
CLINICAL AND LEGAL-MEDICAL ASPECTS OF A TRAUMA IN THE CENTRAL AREA OF THE FACE COMPLICATED BY A PHLEGMONOUS EYE-SOCKET

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The research objective
Was to determine the severity of damage to a person’s health resulting from of a trauma in the central area of the face, complicated by a phlegmonous eye-socket.

The research was carried out on seven patients with various injuries to the central area of the face, complicated by inflammation and a phlegmonous eye-socket resulting from the suppuration of a haematoma in the retrobulbar cellular tissue and in all cases there was a direct relationship of cause and effect between the trauma and the phlegmonous eye-socket.

The damage to the health of three of the patients as a result of a trauma in the central area of the face was rated as serious in view of the development of a phlegmon in areas of facial cellular tissue, with an involvement in the process of the cellular tissue of the eye-socket, and in one case it was necessary to remove the eyeball in connection with panophthalma. The trauma, which was in the form of a comminuted fracture of the bones in the bottom of the right eye-socket with damage to the mucous membrane of the nose, had led to a phlegmon in the eye-socket, so the damage to the person’s health was assessed as serious.

The damage to the health of four patients was assessed as moderate on the basis of a health disorder beyond the 21st day.

Thus, traumas of maxillofacial area show substantial variations, and their expert assessment is frequently fundamentally different.

A COMPARISON BETWEEN THE LAW OF FORENSICS IN KOSOVO AND IN FINLAND WITH RESPECT FOR THE INTERACTIONS OF THE SOCIETY AND THE LEGISLATION

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The aim of this study is to demonstrate the interactions between the political and socio-economic factors and the application of the legislation on forensics. The opportunity to analyze this interplay was created when independent Kosovo began the building of its forensic medical systems.

A comparison has been made with the legislation and organization of Finland’s well established forensic medical law and system.

The results provide some hints for minimizing unpractical solutions by developing international concepts of medico legal cooperation and uniform legislation within the European Union.

Forensic medicine is an applied medicine tightly bound to the state. In Kosovo international politics continue to play an important role even in the formulation of the law on forensics and in the structure of the legal medicine. In Finland the forensic medicine has been built chiefly to meet the practical needs of the society, which requires evidence for the court and information for the public health and well fare.

This has been accomplished by recently performed renewals in the forensic medical organization and administration. The basic legislation is from the middle of the 1970s. The forensic medical organization is bound to different levels in these states and the functions of forensics are connected to the organization differently. In Kosovo the legislation on forensics is covering all activities and the law is very detailed. In Finland
the legislation is managing the system with fewer and less strict regulations. The analysis is recommending flexible legislation, which can easily be modified according to the changing tasks.

I/11

MULTIPLE HOMICIDES COMMITTED BY INSANE OFFENDERS
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Homicides committed by insane offenders have been rarely investigated from the forensic point of view in comprehensive and detailed manner. The aim of these study was to describe and characterize the modus operandi and personal features in cases when more than one victim was killed and insanity of the perpetrator was convicted in judicial proceedings. Differences between single and multiple victims homicides in the population of insane murderers were also examined. Crime and forensic examination reports of 21 homicides committed by 9 individuals were retrospectively analyzed. Comparative control group were 41 cases with only one victim killed by single insane perpetrator. Offence and offender variables were subjected to comparative analysis by t – Student test and Pearson’s Chi-square goodness-of-fit test, where border level p<0.05 was accepted, and significance level was presented with Phi-coefficient. Results indicated some specific factors, that can be regarded as distinctive features. There was significant correlation between female gender of perpetrator, psychosis with depressive delusions, emotional motivation, common domicile, child as a victim, positive emotional offender/victim relationship, actions with elements of planning, approach to sleeping person, attack not from the front direction, concentration and clustering of injuries in one region of the body and multiple psychotic homicides. Results and conclusions of this study can bring practical, useful implications for homicide investigations, offender profiling or forensic psychiatry and psychology evidence.

I/12

IMPACT OF PATHOLOGY ON THE RESULTS OF TRAUMA
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The main criterions used in clinical forensic medicine as well as in forensic pathology (for death of trauma) for evaluation of heaviness of trauma: dangerousness to life, length of health disorders, amount of permanent loss of working abilities.

Basic principles of criminal rights state: for offence to any person equal punishment is due to everyone apart of age, gender, health condition or disability. Criterions for statement of heaviness degree of bodily injuries by making medical expertise state: exacerbation of previous illnesses after the made bodily injuries as well as complications of bodily injuries occurred due to accidental circumstances or as a result of individual peculiarities of organism, or treatment mistakes, is not reason to increase degree of heaviness of the bodily injuries. At the same time it state, that by evaluating heaviness of bodily injuries to children or elderly persons after age of 60, expert take into account only medical characteristics of the bodily injuries apart of length of the treatment.

In cases of death when non-lethal wound cause death, usually there is discussed impact of pathology on result of trauma: peculiarities of organism which make injury as lethal, longer period from trauma till death (can be impacted by quality of treatment).

Topical question regarding impact of side pathology – what kind of individual peculiarities of organism can be considered as important for the worst result of trauma, is it also age and gender of victim – as many traumas of similar character for elderly people cause higher lethality, but osteoporotic fractures most often occur to elderly women. Is age pathology? What are normal and logical changes caused by age? What is “standard of age”?
How to evaluate lethal cases when non-lethal wounds cause death? There is no consensus for court and investigator. In one case – it is closed by adjudicating that death is caused by pathology, in other case – as negligent homicide. 
Characteristic sample – rupture of intracranial aneurysms connected with facial trauma. 
Similar problems cause ruptures of organs with different pathologies occurred in traumatic episodes.

I/13
INFLUENZA A (H1N1) (SWINE FLU) DETECTION IN AUTOPSY
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Influenza A (H1N1) epidemic started in Finland in October 2009. In the whole country there were 7669 cases of swine flu, which were confirmed by a laboratory test. In the hospital district of Helsinki and Uusimaa there were 15 confirmed cases of swine flu in the forensic autopsies. The poster deals with the autopsy results, cause of death and contributing factors of those cases.

I/14
POSTMORTEM EXAMINATION INCLUDING CT AND MRI IMAGING IN A CASE ASSUMED AS SUDDEN AND UNEXPECTED DEATH
Forensic Medicine, Jagiellonian University Medical College, Kraków, Poland

Objectives
Application of modern technology in forensic postmortem medical examination and its relationship to standard procedures in autopsy cases referring to sudden and unexpected death.

Methods
Examination of the body of a middle-aged male (the testimonies gave the reason for assuming that the deceased was a victim of sudden and unexpected death because of illness) was performed at the Chair of Forensic Medicine of the Jagiellonian University Medical College in Kraków (Poland) and included postmortem computer tomography (CT) and magnetic resonance imaging (MRI) prior to the forensic autopsy. RESULTS: The authors present 2D and 3D reconstructions of pathologic changes observed in the deceased and compare them to the results obtained by conventional inspection that included microscopic examination.

Conclusions
The postmortem CT and MRI examination gives the opportunity to expand diagnostic and documentation techniques. They can be useful even in cases of deaths due to chronic disease. Using them as standard screening technique should be considered.

Key words: postmortem CT examination, postmortem MRI examination, forensic autopsy, sudden and unexpected death
15. POSTMORTEM CT EXAMINATION IN VIOLENT DEATH CASES REFERRING TO SHARP FORCE INJURIES – OWN EXPERIENCES
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Objectives
To obtain additional information in sharp force injuries autopsy cases in order to reconstruct the stab wound track and give an opportunity to describe the direction of injury in a way that is easier to understand.

Methods
Numerous deceased victims of sharp force injuries (stab and/or cut wounds) had been examined at the Chair of Forensic Medicine of the Jagiellonian University Medical College in Kraków (Poland), including postmortem computer tomography (CT) before conventional forensic autopsy, as part of a typical procedure since the beginning of the year 2010. Multi-slice CT images had been obtained as DICOM files and processed for the purpose of two and three-dimensional (2D and 3D) reconstructions.

Results
The authors present 2D and 3D reconstructions, focusing on the images of the stab wound tracks and the most interesting injuries due to sharp objects.

Conclusions
The 2D and 3D images of sharp force injuries obtained by postmortem CT examination give aid in better reconstruction and result in visualization of higher quality. Such evidence allows to answer questions regarding the event reconstruction more easily and to present findings in a way that is better understood by non-professionals.

Key words: postmortem CT examination, sharp force injuries reconstruction, forensic autopsy

POSTMORTEM CT EXAMINATION IN FIREARM FATALITIES: RECONSTRUCTION OF BULLET TRACKS – OWN EXPERIENCES
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Objectives
To gather additional information for the purposes of obtaining foreign bodies (bullets etc.) as important pieces of evidence and for reconstruction of bullet tracks with better visualization in autopsy cases of firearm fatalities.

Methods
Victims of firearm deaths had been examined at the Chair of Forensic Medicine of the Jagiellonian University Medical College in Kraków (Poland). Since the year 2009, the institution mentioned above has been performing postmortem computer tomography (CT) routinely before every conventional forensic autopsy in gunfire injuries cases. Multi-slice CT images had been obtained as DICOM files and processed for the purpose of making two and three-dimensional (2D and 3D) reconstructions.

Results
The authors present 2D and 3D images, focusing on the reconstruction of the bullet tracks and some most interesting injuries due to gunfire.

Conclusions
The 2D and 3D images of gunfire injuries obtained by the postmortem CT examination give the opportunity for better reconstruction and visualization of bullet tracks. Data processed before the conventional forensic autopsy supplies information for additional concentration on important findings.

Key words: postmortem CT examination, firearm fatalities, reconstruction of bullet tracks
II/1

AGE ASSESSMENT: POPULATION DIFFERENCES IN TOOTH FORMATION

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It is unclear if population differences exist in tooth formation. The aim of this study was to compare mean age of permanent tooth formation in world groups. Archived dental radiographs (N=8221) of individuals in London, UK, South Africa, Japan, Malaysia, New Zealand and Nigeria were assessed. Ethnic groups included English and Bangladeshi in London, Xhosa/Zulu in South Africa, English, Maori and Pacific Islanders in New Zealand, Malay, Kadazan and Chinese from Malaysia. Radiographs from two previous growth studies on Australian Aborigines and Inuits were also assessed. Age range was 2-25 years. Left mandibular permanent teeth were staged according to Moorrees, Fanning and Hunt (1963, J Dent Res 42: 1490-502). Mean age was calculated using logistic regression for each tooth stage, for each sex and group. Results show that the variation within each group was considerably greater than the difference between groups. Mean age entering some tooth stages tended to be earlier in Pacific Islanders, Maori, South and West African groups compared to groups from UK and Asia. Mean ages could differ by up to a year between advanced and delayed groups. However, most tooth stages display large standard deviations and the 95% confidence interval of mean age for an individual from different groups overlapped considerably. This suggests that population specific reference data are not necessary to predict age from developing teeth in different world groups.

II/2

LEGAL ASPECTS OF FORENSIC AGE ASSESSMENT

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Objective
Critical evaluation of current legislation of forensic age assessment in relation to Convention on the Rights of the Child, Alien Act and radiation protection

In Finland, first forensic age assessments were conducted in the late ‘90s, when it became evident that in some cases of international adoptions, personal data of a child was incorrect. The Finnish Radiation Protection Authority was consulted and the Dept. Forensic Medicine was authorized to use ionizing radiation for non-medical purposes (panoramic tomogram and wrist). During the last 3 years, the number of unattended minors seeking asylum in Finland has increased considerably. Also, there are indications of incorrect dates of birth among individuals already having been issued a permit of residence. The legislation has been amended this year in relation to forensic age assessment. Police and frontier guard authorities in addition to Immigration Service are authorized to refer asylum seekers and immigrants for age assessment, including individuals entering the country based on family reunification. The amendments came into power this year and responsible authorities have been informed of the limitations of method applied in age assessment. Age assessment is always conducted by two independent experts.
FORENSIC AGE ASSESSMENT IN FINLAND
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Due to the increasing number of immigrants and unattended minors, the need for forensic age assessment has also grown. Many of the immigrants or asylum seekers do not possess documents to prove their identity and therefore the police authorities refer them to the Department of Forensic Medicine, University of Helsinki, for age assessment. The forensic age assessment is always performed by two forensic odontologists. The person has to give his/her consent for the x-ray and other examination and if under 18, his/her representative must also agree. Any nutritional or medical information related to growth is recorded. The weight and height are measured. In Finland, the Radiation Protection Authority has issued a special permit to the Department allowing the use of ionizing radiation for non-medical purposes. The examination includes panoramic tomograms and x-ray of the left wrist. Sometimes periapical x-rays are needed. The x-rays are studied by two forensic odontologists. The most commonly used references for dental development are Mincer et al. (1993), Demirjian et al (1973), Nyström et al. (2007), Orhan et al. (2007) and Kvaal et al. (1995) and for bone Greulich and Pyle (1959). The total number of forensic age assessment examinations was 133 in 2009 and this year 37 assessments have been completed by the beginning of July. The countries of origin are most frequently Somalia, Iran and Afghanistan.

NEW METHOD FOR ADULT AGE ASSESSMENT USING 3D-SCANNING
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In adult age assessment, various methods have been used to estimate age at death in cadavers or to estimate the age of immigrants. These methods consist of both invasive and non-invasive techniques, i.e. X-ray imaging and microscopical examination of longitudinal thin sections of extracted teeth. In X-ray imaging the latest development in age assessment is the Kvaal-method, in which X-rays of six single rooted teeth are measured for several factors such as tooth/root height, tooth/pulp height and root/pulp width. Interpretation of such images is laborious and subjective. Methods using the physical measurements of the teeth such as Bang-method require the expertise of a well-trained dental histologist, leaving the method laborious. Even when precision is followed in the measurements, the mean error of such methods is around ±10 years.

Subjects, materials and methods
The aim of the Huhtiniemi excavation in Lappeenranta was simple, to investigate if the site contained human bones from the alleged military executions in June and July 1944.

The total of 11 skeletal remains were excavated, and afterwards examined by the Department of the Forensic Medicine, Helsinki University. For the age at death assessment three different methods were used; 1) anthropological age assessed from the epifysis of the long bones, the medial end of the fourth rib, the sternal end of the clavicle, the joint surface of the in nominate bone (facies auricularis) and the joint surface of the pubic bone. 2) The Kvaal-radiological method; to estimate the chronological of an adult from measurements of the size of the pulp on full mouth dental radiographs. 3) 3D-method; the correlation between the angle of wear at the occlusal surface on the second molars and the age at death.

The total of 12 second molars from 6 individuals were used for 3D-scanning. The method itself is nonintrusive unlike radiological methods or CT-scans. A dental stone cast made from a silicon impression of the teeth was scanned to GIS (Geographical Information System)-map of the tooth. Age assessment was calculated from the anthropological age assessment using a mean slope of a regression curve.

Results and conclusions
We studied changes of mean slope of the attrition facet on the occlusal surface of the tooth. We found a linear regression between wear angle and age at death. The 3D-method introduces a new non-invasive way to assess the adult age at death. The method is fast, easy to use, objective (absolute quantitative data, small inter observer errors) and can be calibrated to different populations.
III/5

**LATEST TRENDS IN DENTOMAXILLO FACIAL DIAGNOSTICS**

Puhlin-Nurminen H
Planmeca Oy

DentoMaxillo Facial diagnostics has in recent years been changing drastically with the introduction of Cone Beam Volumetric Tomography (CBVT). CBVT technology makes high resolution volumetric information available for a multitude of diagnostic tasks, at a higher resolution and with lower dose cost than what was possible when working with traditional medical CT equipment. The introduction of 3D imaging in the dental field is an ongoing process, and in the future other advanced diagnostics tools, such as 3D cameras combining texture and shape imaging with cone beam data, and rapid prototype models of cone beam data, will further complement CBVT and enable new diagnostics applications.

Planmeca Oy, established in 1971, designs and manufactures a full line of high technology dental equipment, including dental care units, panoramic and intraoral X-ray units, and digital imaging products. Planmeca Oy, the parent company of the Finnish Planmeca Group, is strongly committed to R&D. Planmeca is the largest privately owned company in the field and the third largest dental equipment manufacturer in Europe. CBVT equipment is already one of the corner stones of Planmeca’s product portfolio, while new development is still taking place concerning 3D photography and modelling of X-ray data. One company within the Planmeca Group, Planmed, is also at the forefront of introducing CBVT imaging for applications outside of the DentoMaxillo Facial region.

CBVT, 3D photography and modelling in diagnostics are presented by a specialist from Planmeca’s Research and Development department.

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**SYMPOSIUM III: FORENSIC TOXICOLOGY**

III/1

**WAS IT POISONING?**

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The aim of post-mortem toxicology is to help establish the role that drugs or other poisons played in a death, or in events immediately before death. If self-poisoning is suspected then the diagnosis may be straightforward and all that may be required is confirmation of the agents involved. If the cause of death is not immediately obvious, however, then suspicion of possible poisoning is of course crucial. Blood sampling (needle aspiration, peripheral vein, e.g. femoral, ideally after proximal ligation) before opening the body minimises the risk of sample contamination with, for example, gut contents or urine. The site of blood sampling should always be recorded. Other specimens (stomach contents, urine, liver, vitreous humor – detailed guidelines are available) may also be valuable. The availability of ante-mortem specimens should not preclude post-mortem sampling. Appropriate sample preservation, transport, and storage are mandatory (again, detailed guidelines are available).

Interpretation of post-mortem toxicology must take into account what is known of the clinical pharmacology, including pharmacokinetics, and toxicology of the agent(s) in question, the circumstances under which death occurred including the possible mechanism(s) of exposure, and other factors such as the sample(s) analysed and the analytical methods used. It was thought that concentrations of poisons measured in blood obtained at autopsy reflected the situation peri-mortem. However, we now know that changes may occur in the composition of body fluids, even peripheral blood, after death. Such changes are likely to be minimised by prompt refrigeration of the body and performing the autopsy quickly.
Better training in analytical toxicology is needed for pathologists and others who may be called upon to interpret toxicological data in Court. Undue reliance on quantitative results is likely to confuse sooner rather than later, especially in the case of centrally-acting drugs with large volumes of distribution given chronically. Remember that the question is normally ‘was it poisoning?’ or ‘was it an overdose?’, and not ‘is it a fatal level?’

III/2
CURRENT TRENDS IN FORENSIC TOXICOLOGY
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The purpose of forensic toxicology is to produce scientifically valid, analytical-toxicological information for the administration of justice and to improve the legal protection of individuals and society. The discipline is closely associated with forensic medicine. The three established specialties are a) post-mortem toxicology for cause-of-death investigations, b) clinical forensic toxicology, comprising driving under the influence of alcohol or drugs, other “under the influence” issues, child welfare and drug-facilitated crime, and c) drugs-of-abuse testing in hospitals, the workplace, prisons, the military etc. Additional application areas can be found in occupational, veterinary and environmental toxicology, sports drug testing, and terrorism investigations. Due to the high cost of competent instrumentation, the most cost-effective forensic toxicology laboratory service is obtained by centralising the activities in a sufficiently large and well-established organisation. Current trends include the following four issues:

1. **Quality and accreditation:** A high standard is set for sampling, handling and analysing evidence, ensuring the chain of custody is intact. Validated analytical methods are required in order to obtain robust and unambiguous results. The personnel should be adequately educated and participate in a continuous training program. Laboratory accreditation by ISO/IEC 17025 is recommended.

2. **New or persisting analytical challenges** include topics like post-mortem insulin, general unknown screening, low-dose compounds (LSD, antipsychotics, natural toxins), emerging designer drugs (mephedrone, MDPV, methylene, Spice), alternative matrices (hair, oral fluid, meconium, sweat, vitreous humour) and alcohol biomarkers (ethyl glucuronide). Liquid-chromatography – mass spectrometry techniques provide the most exciting prospects for development. Poor availability and/or the high costs of reference standards for new drugs, designer drugs and metabolites present an additional analytical challenge.

3. **Interpretation of results** differs from clinical toxicology in that it is based mainly on analytical results without clinical data. Knowledge of the performance of the methods used is emphasised in interpretation. In post-mortem toxicology, redistribution and reference values in post-mortem blood need to be considered in order to commenting on the question, “Was it a poisoning?”

4. **Database research, epidemiology and drug safety:** Comprehensive toxicology laboratory databases of high quality allow database research on alcohol-drug and drug-drug-interactions, pharmacogenetics, pharmacoepidemiology, drug related deaths, fatal toxicity indices (deaths vs. sales), smoking prevalence, and presumably many yet undiscovered research topics.

INTERPRETATION OF POST-MORTEM TOXICOLOGY RESULTS
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Objectives
Interpreting the concentration of drugs determined in post-mortem blood in terms of toxicity and risk for poisoning death is fraught with difficulties. Poly-pharmacy is widespread in today’s society increasing the risk for an adverse drug-drug or drug-alcohol interaction.

Methods
An in-house database (TOXBASE) was used to list the drugs most frequently identified in femoral venous blood when pathologists had classified the death as drug poisoning. Demographics of the deceased were compared with the concentrations of the drugs identified in blood samples.

Results
The average age (± SD) of all victims was 49.1 ± 15.9 y (men 47.4 ± 15.6 y and women 52.2 ± 15.8 y), p<0.01. Mono-intoxications were dominated by acute alcohol poisoning (N = 976); accidents (81%), undetermined (64%) and suicides (7%) at mean (median) concentrations of 3.05 g/L (3.10 g/L). The number of pharmacologically active substances in blood ranged from 1-12 per case (median 3-4) depending on cause of death. The most prominent non-alcohol drugs in mono-intoxication deaths were morphine (N = 93) mean and (median) concentrations 0.5 mg/L (0.2 mg/L), amphetamine (N = 39) 2.0 mg/L (1.2 mg/L), dextropropoxyphene (N = 33) 3.9 mg/L (2.9 mg/L), propiomazine (N = 32) 1.6 mg/L (1.0 mg/L) and flunitrazepam (N = 28) 0.4 mg/L (0.3 mg/L). The morphine finding almost always represented a heroin-related death as evidenced by presence of 6-acetyl morphine (6-AM) in body fluids.

Conclusions
The concentrations of drugs determined in PM blood should not be interpreted in isolation. The autopsy findings, police investigation, and eyewitness statements are all important elements in the case. Moreover, the toxicology report fails to reveal information about extent of prior exposure or the degree of pharmacological tolerance to drugs.

NEW DESIGNER DRUG OF ABUSE: 3,4-METHYLENEDIOXYPYROVALERONE (MDPV).
FINDINGS FROM APPREHENDED DRIVERS IN FINLAND
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3LADR GmbH Medizinisches Versorgungszentrum Dr. Kramer und Kollegen, Geesthacht, Germany

Objectives
To assess the incidence and impact of the use of MDPV, a psychoactive designer drug with stimulant effects, in drivers suspected of being under the influence of drugs (DUI) in Finland.

Methods
Since autumn 2009, blood samples from drivers suspected of being under the influence of drugs in Finland have been analysed for the presence of MDPV. In MDPV positive cases, drug and alcohol findings were compared with data from the clinical examination carried out while the suspect was under arrest. The psycho-physical achievement deficiency information was used to evaluate the significance of the presence of MDPV.

Results
Between September 2009 and May 2010 there were nearly 200 positive MDPV cases from apprehended drivers in Finland (nearly 6 % of all DUI cases), the trend being upward. In 76 % of the cases, in which MDPV was found, amphetamine was also present. Benzodiazepines were also frequently found together with MDPV. In many MDPV positive cases the concentrations of amphetamine or other drugs were comparatively low and it could be concluded that MDPV was the main reason for the psycho-physical achievement deficiency.
**Conclusions**

These results show that MDPV use is a growing problem in DUI cases in Finland. Since the first seizure of MDPV in Finland in 2008 there have been some MDPV-related deaths and the police have reported that persons under the influence of the drug very often act violently and unpredictably. MDPV has not yet been classified as an illegal drug in most European countries. However, the Finnish government is currently preparing new legislation, which should be in force by summer 2010, which would allow for accelerated classification of future designer drugs.

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**III/5**

**THE LIFE COURSE OF DUI OFFENDERS**

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**Objectives**

The main questions in ‘The life course of DUI offenders’ study were: 1) what are the factors that lead to driving under influence of alcohol and/or drugs? 2) what happens to DUI offenders during their subsequent life span in terms of health and social position? 3) what kind of preventive conclusions can be drawn? The project is part of the Addiction Research Programme of the Academy of Finland in 2007-2010.

**Methods**

As the principal data set, the study employed the register of all suspected DUI cases in Finland during 1977–2007 The data included over 450,000 DUI offenders apprehended by the police with positive finding for alcohol and/or illicit/licit drugs. The DUI register was linked with other national registers, e.g. Census files of Statistics Finland, Police Statistics, Motor Vehicles Registration Centre, National Prescription Register, Hospital Discharge Register, Pension Statistics and Causes of Death Register.

**Results**

The changes in the number of drink driving cases during 1989–2007 followed changes in trends of economic development and changes in overall alcohol consumption. Young men aged 18–19 years were at the highest risk of committing drink-driving offences. The incidence of suspected drugged driving cases increased 18-fold during 1977–2007. The most frequently found drugs were benzodiazepines, amphetamines, cannabinoids and opioids. Poly-drug findings were common (77%). Drivers with amphetamines only had the highest re-arrest rates. Also young age, male sex, high blood alcohol level, arrest during the night time and during weekdays were the factors that constituted the risk for re-arrest. DUI suspects had an increased risk for premature death overall, and for all observed causes of death. Disadvantaged social background was a significant predictor of DUI.

**Conclusion**

A comparison of results would be interesting with other countries where these kinds of linked, register-based studies are possible.

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**III/6**

**COMPARISON OF MORPHINE, OXYCODONE, AND FENTANYL CONCENTRATIONS IN ORAL FLUID AND PLASMA**

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**Introduction**

Opioids are used to treat cancer related pain of moderate or greater severity. Because there are interindividual differences in drug absorption, it is very important to monitor the level of opioids in patients to ensure that a sufficient amount is transferred into the blood circulation. Monitoring is usually performed by measuring the
drug concentrations in plasma samples. Collecting plasma samples can be uncomfortable to the patient and requires trained personnel. Finding an easy and non-invasive sample collection technique would enable routine monitoring of drug concentrations that could be done, for example, at home. Oral fluid (OF), which is a filtrate of blood, is one possible alternative sample matrix. In order to estimate the drug concentrations in plasma, the OF/plasma (OF/P) ratios of the drugs have to be determined. For morphine, OF/P ratios vary in the literature, with values ranging from 0.4 to >100. The ratios for oxycodone and fentanyl have not been determined.

**Aim**

The aim of this study was to determine the concentration of morphine, oxycodone and fentanyl in plasma and OF of cancer patients, in order to estimate the right dosage and route of administration of the drugs, and to calculate the OF/P ratios for these substances to establish whether or not OF could be used to monitor opioid concentrations in plasma.

**Methods**

Samples were collected from cancer patients taking known doses of one of the three opioids studied as their main pain medication. Samples were collected after 5 t½ since the medication was administered, ensuring the concentration was in a steady state. OF samples were collected in plastic tubes by spitting. The opioids were extracted from the OF and plasma samples with LLE and analysed with GC–MS.

**Results**

The OF/P ratio for oxycodone ranged from 0.79 to 82.94 (mean 16.26, median 10.84, N=129), for morphine from 0.07 to 8.21 (mean 2.24, median 1.86, N=42), and for fentanyl from 0.61 to 10.84 (mean 2.88, median 2.03, N=39). There was a statistically significant correlation between the OF and plasma concentrations for all three substances.

**Conclusion**

The mean OF/P ratios for all three substances were more than unity, which indicates that the concentrations of these opioids are higher in OF than in plasma. In particular, the concentrations of oxycodone in OF were typically much higher than in plasma. Even though there was significant correlation in the opioid concentrations between the two matrices, the variation in the individual OF/P ratios was considered too high for determining an exact OF/P ratio for the purposes of monitoring the plasma concentrations.

**Key Words**: plasma, oral fluid, opioids, GC–MS

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**II/7**

**IMPROVING THE QUALITY AND PERFORMANCE OF DRUG ANALYSIS LABORATORIES: GLOBAL CHALLENGES AND ACHIEVEMENTS**

Naidis I

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Forensic science provides objective information and remains an integral part of effective criminal justice systems. However, the use of the forensic sciences in most countries is often hampered by unprepared and ill-equipped institutions. Only a limited number of countries have the requisite infrastructure, knowledge, expertise and training to properly investigate and prosecute crimes. The Global Scientific and Forensic programme of the United Nations Office on Drugs and Crime (UNODC) seeks to ensure the worldwide availability and accessibility of international accepted standards and also assist forensic science providers in to meet internationally accepted standards.

The presentation looks at current challenges to development of effective and sustainable forensic science services in developing countries and highlights UNODC contribution to the forensic community through the development and dissemination of forensic tools and standards, advocacy for international cooperation in the forensic sciences and quality assurance. It gives special focus to UNODC’s International Quality Assurance Programme (IQAP) which aims in supporting Member States to implement quality management system in the forensic laboratories and improve their performance. It highlights challenges and achievements of the International Collaborative Exercises (ICE) that, as part of IQAP, allow laboratories from both developing and
developed countries to continuously monitor their performance in drug testing on a global scale, offers a worldwide overview of capacities of forensic laboratories, and enables tailored technical support and assistance.

III/8
DRUG SCREENINGS IN BIOLOGICAL MATERIAL BY ACCURATE MASS MEASUREMENT
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Introduction
Accurate mass based methods are gaining ground in small molecule identification in various fields including clinical and forensic drug screenings, doping control, food and veterinary analysis, and environmental monitoring. Accurate mass measurement by liquid chromatography time-of-flight mass spectrometry (LC-TOFMS) is applied to forensic drug screening at the University of Helsinki on a routine basis, and applications for various biological materials, including urine, vitreous humor, hair, liver, and muscle samples, have been developed. Mass accuracy below 5 ppm and 2 mDa is routine, and instrument performance is stable and robust.

Study design
The presentation will combine experiences from LC/TOFMS qualitative drug screening based on automated data analysis and reporting. The method evaluation was based on the laboratory’s statistics in terms of number of cases, findings, and different analytes for a two year period.

Methods
The workflow included the following steps: 1) mixed mode solid phase extraction (after enzymatic hydrolysis of urine samples), 2) liquid chromatographic separation of components by a 19 min gradient elution in a reversed phase pentafluorophenyl column, 3) full scan accurate mass data acquisition with mass range 50-800 Da, 4) automated post-run calibration and reverse search against a 900 compound database, 5) application of identification criteria including mass accuracy, peak area, isotopic pattern fit, and retention time, if known, 6) reporting with metabolic information included. The liquid chromatograph was a 1100 series instrument from Agilent, and the mass spectrometer was a micrOTOF from Bruker Daltonik.

Results
The number of cases analyzed by LC/TOFMS in 2008 and 2009 were 5923 and 6163, respectively. The corresponding figures for different reported substances were 224 and 223. The total number of reported findings were 26 191 and 28 836. In addition to the high-frequency compounds including benzodiazepines, beta blockers, analgesics, antidepressants etc, the unexpected findings included rarities like psilocin, fluoromethamphetamine, MDPV, methylene, and aconitine.

III/9
A RARE CASE OF SERIAL KILLINGS BY POISONING
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A home-care nurse reported finding an 80 year old lady comatose on the floor on 14 March 2009. At hospital the benzodiazepine screening of patient’s urine was found to be positive. She was treated with an antidote, flumazenil, and recovered straight away and denied having used any benzodiazepines, stating that those drugs were not included in her medication. She remembered, however, that the nurse had fed her a bad tasting yoghurt.

The police went to the lady’s apartment and discovered a plate containing yoghurt remains in the sink. They brought the plate to our laboratory. The analysis of the patient’s plasma sample taken in hospital on admission and the remains of the yoghurt revealed similar findings: oxazepam, diazepam, and chlordiazepoxide.
The case alerted the police and consequently the fate of the nurse’s past patients underwent intense scrutiny. From 2004 to 2009, a total of five patients had died under suspicious circumstances. Originally only one case was medico-legally investigated; in the rest of the cases, a medical cause-of-death investigation was performed. One of the suspicious cases had died so recently that exhumation was realistic to perform. In the remaining three cases, the bodies of the deceased had been cremated. Fortunately, histological investigations had been performed in two of the previous cases, and we received paraffin liver blocks of the victims. Utilizing a special method, the presence of drugs that had not been prescribed to the patients were detected.

The only medico-legally investigated case died after cardiac surgery. She had been recovering fine and was moved from intensive care unit to a normal ward. However, the nurse in question reported finding the patient suddenly unconscious. She called for resuscitation, but the patient was lost. In the toxicological investigation, high concentrations of digoxin and dixyrazine were detected. These findings caused confusion among the doctors responsible for the treatment since such medications were not used in treatment of the patient. After many disquisitions performed by the medical authorities, questions remained. Nobody had considered the possibility that the death was intentional. Later on several other crimes came to light: at least seven attempts of murder, several assaults by poisoning, one larceny and arson in a hospital lift.

Common to all cases was that the suspected nurse was always present when the patients’ condition suddenly worsened, thus resembling Münchausen syndrome by proxy. All patients were old and most were also seriously ill. In most cases the drugs used were repetitive, typically involving several benzodiazepines. The nurse lied to the paramedics and doctors that the patients had been suicidal and that they had been abusing drugs.

The case went to court and the nurse was found guilty. She is now in a state mental hospital for evaluation of her state of mind. The good co-operation of police, forensic pathologist and forensic toxicologists made possible the exposure of this rare case of serial killing by poisoning.

**SYMPOSIUM IV: FORENSIC BIOLOGY**

**IV/1**

**FORENSIC PHENOTYPING: FROM SAMPLE TO APPEARANCE**

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As long as police investigation is incomplete and criminal DNA databases are not fully representative of the criminal population there always will be forensic cases where the evidence STR profile is not matching that of a known suspect or any in a criminal DNA database. Wishing to solve such cases, one future possibility is to retrieve information about the appearance of the crime scene sample donor directly from the biological sample. Such information is expected to be useful in investigative intelligence for tracing unknown persons by limiting the number of potential suspects based on the most likely appearance characteristics predicted from the left behind sample. This presentation will give an overview on the current availabilities in predicting human appearance traits from biological material. In summary, recent research activities to understand the biological basis of human appearance have already delivered predictive markers for some group-specific appearance traits, whereas the understanding of many others, including individual-specific facial morphology, is still in its infancy. Notably, if individual-specific facial appearance can ever be accurately estimated from biological samples, criminal DNA databases and comparative DNA profiling would be buried in oblivion.
MOLECULAR AUTOPSIES – INTEGRATING FORENSIC PATHOLOGY, TOXICOLOGY AND GENETICS
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Molecular autopsies in medico-legal setting are considered in situation, where - after a full medico-legal autopsy and related microscopical examination and/or toxicological analysis – no cause and/or manner of death can be established. In these cases additional information can be obtained by DNA analysis targeted to reveal genetic alterations that constitute a risk for sudden unexpected death. Such alterations can be found e.g. in the long QT syndrome related genes, low-density-lipoprotein genes, and blood clotting related genes. It has also been shown that pharmacogenetic investigations can be useful in post mortem settings, where pathological or toxicological analysis cannot fully explain the case. This overview discusses the potentials and pitfalls of the use of DNA testing in the post mortem cases, and medico-legal consequences of such testing with case examples.

MOLECULAR AUTOPSY IN CASES OF SUDDEN UNEXPLAINED DEATH
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Objectives
At least 4 % of sudden deaths are unexplained (SUD) at autopsy and a quarter may be due to inherited cardiac diseases. In the present study arrhythmia-related genes in patients with unexplained sudden death were investigated.

Methods
Using polymerase chain reaction, denaturing high-performance liquid chromatography and direct DNA sequencing, mutation analysis was conducted for six LQTS related genes (SCN5A, KCNH2, KCNQ1, KCNE1, KCNE2, KCNJ2) and 18 Exons of the RyR2 gene encoding the cardiac ryanodine receptor.

Results
In the cases presented the cause of sudden death of a 33 years old healthy woman and 20 years old boy was not elucidated by autopsy. Using a postmortem-molecular screening, we identified the LQT-3 associated mutation II768V in the cardiac sodium channel gene SCN5A of the woman. This defect seems to be of heterozygous nature. Voltage clamp studies on the expressed ion-channel revealed that this mutant enhances the recovery from the inactivation state of the channel, which increases the channel availability. Thus, this mutation alters the “window” that is critical to maintain the plateau phase of the cardiac action potential. In the case of the boy, a novel missense mutation in the KCNJ2 gene (coding effect A371G) encoding the inwardly-rectifying potassium channel was detected. Mutations in this channel are very rare and are associated with LQT 7 (Anderson-Tawil syndrome) and the short LQT-syndrome. Voltage clamp studies on the expressed mutated ion channel are to be performed.

Conclusion
An accurate diagnosis derived from molecular autopsy may potentially provide a pathogenic basis for SUD and establish the cause of death. Research on the genetic basis of sudden cardiac death and investigating the molecular mechanism that lead from the gene defect to the clinical phenotype will help to prevent sudden cardiac death.
IV/4

FORENSIC ASPECTS OF FINNISH POPULATION GENETICS

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The Finnish population has been a target of extensive genetic studies during the last decades. The population is considered as a homogeneous isolate, well suited for e.g. gene mapping studies because of its reduced diversity and homogeneity. The low diversity especially in the Y-chromosome, however, entails reduced discrimination power in forensic casework, also hampered by substantial differences between the eastern and western parts of the country. In contrast, the levels of autosomal STR and mtDNA variation are relatively high and evenly distributed.

Here we discuss the Finnish genetic architecture, the problems it causes for forensic casework, as well as different ways to circumvent these difficulties.

IV/5

POST-MORTEM ABCB1 GENOTYPING REVEALS AN ELEVATED TOXICITY FOR FEMALE DIGOXIN USERS

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Background

P-glycoprotein, a common transporter molecule, is known to affect metabolic functions in humans. Polymorphisms of the multidrug resistance gene (ABCB1/MDR1) coding for P-glycoprotein have been linked to changes in the processing of several commonly used medications in patients. Here, we have evaluated the impact of ABCB1 single nucleotide polymorphisms on digoxin fatality, through investigation of the relationship between post-mortem digoxin concentration and ABCB1 genotype.

Methods

The effect of three ABCB1 SNPs (3435C>T, 1236C>T, and 2677G>T) on digoxin concentration was examined in 112 deceased Finnish subjects through RT-PCR genotyping of post-mortem blood samples. These subjects were selected on the basis of digoxin findings during the post-mortem toxicology screen, and categorized by digoxin concentration into three distinct groups. The distributions of mutant alleles and haplotypes in the deceased were compared to a random sample of 142 healthy Finns.

Results

Mutant genotype frequencies showed a positive relationship with post-mortem digoxin concentration for all SNPs. Female subjects showed a more emphatic pattern, suggesting a higher risk of digoxin intoxication.

Conclusions

These findings demonstrate a link between ABCB1 polymorphisms and increased mortality, and suggest that individualized genotyping should be considered prior to digoxin treatment. This research also exemplifies the value of gender-segregated genotyping studies in helping establish drug safety parameters, while allowing more decisive determination of cause of death in a medico-legal context.
IV/6
IDENTIFICATION OF FINNISH WWII SOLDIERS AND FACTORS AFFECTING STR AMPLIFICATION SUCCESS IN POORLY PRESERVED BONE SAMPLES
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During the last 17 years, the Laboratory of Forensic Biology at the Hjelt Institute has participated in anthropological investigation and identification of repatriated Finnish WWII soldiers. The research as well as the field searches of war victims is coordinated by the Association for Cherishing the Memory of the Dead of the War, which is funded by the Ministry of Defense.

In the anthropological investigations, the minimum number of individuals (M.N.I) is defined and any possible injuries are examined. DNA is extracted from bones and a comparison of mitochondrial DNA profiles is made with a suitable relative from the mother’s family. Occasionally additional information for identification is acquired from genotyping of the Y-chromosome or autosomal STRs. As taphonomic conditions can vary, the bones to be identified can at times be poorly preserved. This results in degradation and/or chemical modifications of the DNA, impeding the DNA amplification. To better control the DNA analysis and predict the analysis results, constant development and research of DNA extraction and other protocols is carried out. In the presentation I will show results of a systematic analysis by which we were assessing relative significances of different factors hindering DNA amplification, for example DNA quantity, DNA degradation and inhibitors present, which helps us to estimate the validity of STR data.

Developmental work as described above also assists in our attempts to investigate the population history of Finno-Ugric people. We research ancient DNA (aDNA) from different Finnish archaeological bone findings from the Merovingian to Medieval periods. During the past year, the Hjelt Institute has equipped an aDNA laboratory, which meets the stringent needs of low copy number DNA work. We aim to elucidate the processes leading to the relatively well-studied contemporary distribution of genetic diversity in Finland with population genetic methods.

IV/7
KETOACIDOSIS AS A CAUSE OF ELEVATED BLOOD C-REACTIVE PROTEIN LEVELS IN FORENSIC AUTOPSY MATERIAL
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C-reactive protein (CRP) is an acute phase response protein synthesized in the liver as a response to various tissue destroying stimuli such as infection, trauma, ischemia and infarction. Its application in forensic medicine diagnostics has been established and it may be used in postmortem examinations as a marker for inflammatory processes and as an indicator of a vital reaction. CRP has been noted to rise in diabetic ketoacidosis and nonketotic hyperglycemia. Stenz et al reported that the rise in CRP levels returned to control values with the administration of insulin and resolution of hyperglycemia, indicating that the rise in CRP is not just due to the chronic inflammatory state of diabetes. Alcoholic ketoacidosis is a common disorder among alcoholics, which differs from diabetic ketoacidosis by the lack of hyperglycemia. The condition can be fatal, and it has been considered as a possible cause of sudden death for chronic alcoholics with sparse autopsy findings. We present a study on the effect of both alcoholic and diabetic ketoacidosis on blood CRP elevation in a large forensic autopsy material (n=113).
GENETIC STUDY OF THE 15 STR AUTOSOMAL AND 17 STR Y-CHROMOSOMAL LOCI IN THE LATVIAN POPULATION
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Introduction
Short tandem repeat (STR) loci are very important in forensic genetics for identification purposes and for paternity testing. Allele frequencies are significant for the calculation of match probability and credibility of paternity testing. It is very important to use precise allele frequencies to improve calculation for the certain population. The goal of this work was to investigate and to present the alleles frequencies data of 15 STR autosomal and 17 Y-chromosomal STR loci in Latvian population.

Materials and methods
450 unrelated anonymous population samples for autosomal STR alleles and male samples from 113 individuals for Y-chromosomal STR allele’s detection were investigated. DNA extraction was done according standard Chelex 100 DNA extraction or QIAamp®DNA Micro Kit (Qiagen) protocols, Polymerase chain reaction was performed using AmpF/STR® Identifiler™ and AmpF/STR® Y-filer™ PCR Amplification Kits (Applied Biosystems), results were detected with capillary electrophoresis on the ABI PRISM® 310 Genetic Analyzer, and fragment sizes were automatically estimated by using GeneMapper® ID Software Version 3.2. Statistical analysis was performed by SSPS, Microsoft Excel and Arlequin software programs.

Results and discussion
Allele frequencies distribution for 15 STR loci was established. The estimated allele frequencies have provided the Latvian legal system with tool that virtually offers individualization of biological stains and accuracy of paternity calculation. 100 Y-chromosomal haplotypes were determined. Genetics variability of analysed 17 Y-chromosomal STR loci was ranged from 0.4451 for DYS389I to 0.7566 for DYS385a/b. Haplotype diversity for 17 Y-STRs was observed 0.9998. Results demonstrate the usefulness and informative power of this Y-STR set.

Novelty of the research – the first investigation of allele’s frequencies for 15 autosomal STR loci and 17 Y-chromosomal STR loci in Latvian population.

Key words: 15 autosomal STR loci, 17 Y-chromosomal STR loci, allele frequencies, haplotype diversity, Latvian population.

Acknowledgment: Project has been granted from ESF program.
Results
During 2000-2008 there were 5595 children death cases in Lithuania. 3615 (64.6%) were boys and 1980 (35.4%) were girls; 3268 (58.4%) were children living in towns and 2327 (41.6%) in villages. Sudden death case number was similar to that caused by violence: 2811 (50.2%) vs. 2784 (49.8%). Analysis of the cases shows both general number of children deaths and number of sudden deaths decreased from 10.5 to 6.7 and 8.4 to 5.0 (per 1000 children) respectively. Differentiating by age (five age groups: under 1, 1-4, 5-9, 10-14 and 15-18), most children death cases were of age under 1 year 36.1%. Most causes of children deaths were: innate formation defects (16.9%), perinatal periods diseases (12.6%) and diseases of respiratory track (3.5%).

Conclusions
Children deaths analysis is important by all means: causes, examination, treatment, consequences, prevention etc.

PI/2
COMPARISON OF CONTACT – DIFFUSION IMPRINTS METHOD AND OF ROENTGEN-FLUORESCENT SPECTRAL ANALYSES (RFSA) METHOD IN EXAMINATION OF SHOT WOUNDS
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Objectives
During expertises of shot wounds it is necessary to determine not only kind of damage but also distance and metallisation of shot. Aim of the experimental work was to compare methods of contact-diffusion imprints and methods of roentgen-fluorescent spectral analyses (RFSA) in examination of shot wounds.

Methods
Experimental shots with Margolina kind of sports pistol were made from various distances and through different kind of material surfaces (putoplast, rubber, different kind of cloth, etc.). The shot damages were examined with routine contact-diffusion method as well as with RSFA method. Acquired data were statistically processed by using the statistical package PASW.

Results
Objective evaluation with contact-diffusion method of shot entrance opening and of surrounding region only let qualitative determination of shot metal. In comparison - RFSA method give possibility quantitatively to evaluate degree of metallisation in various spots and increase determination of metallisation district borders. RFSA method also let approximated to judge on distance of shots in cases of close shots. Advantages of RFSA method are in cases when concentration of adjacent factors of shot is small and if shot is made on surface with relatively small density when due to large enough kinetic energy metal micro parts have embedded into the material.

Conclusions
1. Both of the methods can be used in examination of shot entrance damages – in identification of entrance opening as well as in determination of distance in cases of close shots.
2. Advantages of RSFA method can be noticed in cases when concentration of adjacent factors of shot is small and if shot is made on surface with relatively small density.

Keywords: shot wounds, method of contact-diffusion, RFSA
ANALYSIS OF POTASSIUM AND SODIUM IN POSTMORTEM HEART TISSUE IN THE CASES OF SUSPECTED SUDDEN CARDIAC DEATH

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Objectives
Sudden cardiac death (SCD) is the major cause of death in Lithuania, making about 33% of all natural deaths each year. Due to poor morphological evidence a part of SCD remains unexplained after forensic medical investigation and these cases are referred to as sudden unexplained death. The aim of present study was to verify the usefulness of the determination of potassium (K) and sodium (Na) in heart tissue defining SCD.

Methods
Concentrations of K and Na in autopsy samples were determined applying flame atomic emission spectrometry. The study involved the 280 autopsy cases in which the SCD was suspected and the control group of 60 persons who died due to mechanical injuries, asphyxia, and acute poisoning. We compared the concentration of K and Na, as well as the K/Na ratio, in seven cardiac tissue samples which were taken during the autopsy from different sites of the left heart ventricle. The influence of victim’s inebriety at the time of death on the occurrence of SCD was analyzed.

Results
In subjects with suspected SCD the shift of electrolytes was detected in 88% of cases. Myocardial level of potassium was depressed and level of sodium was elevated in 51% of cases. Significantly increased concentration of potassium (over of 100 μmol/g) was obtained in 11% of cases, and in 26% the level of Na was noticeably decreased. We found that inebriety of victims at the time of death significantly influence the value of K/Na ratio in cardiac tissue.

Conclusions
Contents of myocardial potassium and sodium in regard to the shift of electrolytes in cardiac tissue could be useful supporting the final diagnosis of SCD, as well as differentiating SCD ant death due to acute alcohol intoxication.

EXPERIMENTAL INVESTIGATION OF STUB-CUT INJURIES IN THE FORENSIC PRACTICE IN LITHUANIA

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Objectives
The successful investigation of the tool of crime largely depends on the experimental and comparative investigation of the body and/or clothing injuries. The result of the tool identification essentially depends on the conditions of the experimental investigation. The main purpose of our study was to compare the morphological features of experimental stub-cut injuries and to select a most proper substructure for the experimental study.

Methods
The mechanical injuries were performed using various substructures. Morphological features of stub-cut injuries were analyzed under the light microscopy.

Results
The information about sharp tool (the highest width of the submerged part of the blade, features of the spike zone, characteristics of the blade’s blunt side: thickness, presence or absence of edges, sharpness of edges, asymmetry in the operation of edges, spike’s characteristics) were collected from the experimental injuries made in the polyethylene membrane and in clothing injuries placed on various substrata (cardboard or synthetic material).
Conclusions
The morphological features of experimental stub-cut injuries made on various substructures enabled us to select the most suitable material which reflects the main characteristics of the sharp tool.

PI/5
R96-99
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These codes are in ICD-10 reserved for undefined or unknown causes of death including sudden unexpected deaths. In praxis this classification has been used as a dustbin, although its use should be as thoroughly pondered as in other instances, when the cause of death is diagnosed. In Finland on the average approximately 100 cases are yearly classified in this group. This presentation will analyse this material, which includes also sudden unexpected deaths. The diagnosis of senility as a cause of death is discussed. On the ground of the study recommendations for a more specific use of these codes and some proposals for the renewal of the classification are presented.

PI/6
SUDDEN UNEXPECTED DEATH OF A YOUNG WOMAN
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Objectives
23 year-old woman was found dead in the morning laying in her bed. From the preliminary data it was known that she had party with her friends the night before. The cause of death was sudden cardiac arrest.

Methods
Investigation of the dead body included autopsy, histology, toxicology and her previous medical history was also overviewed. According to the information gained from her parents, the deceased had tried intensively to lose weight and used cosmetic procedure Transion for this purpose. Transion uses electronic muscle stimulation to produce movements of muscles without brain’s order. One minute of this kind of procedure is equal to 30-40 minutes of training same muscle groups with fitness equipment.

Results
At the age of 13 she had been diagnosed adiposity (174 cm tall, weight 124 kg). The weight loss during past 1.5 years was 60 kg. Two months before death she started with Transion. She had this procedure 40 times, each time for 40 minutes (permitted is 12 time cycle – 25 minutes per each session). Last procedure took place on the day she died. At the autopsy any pathology was not found in internal organs, the deceased was 174 cm tall and her body mass 85 kg. Histology revealed signs of acute cardiac failure, there was no specific pathology. Blood alcohol concentration was 0.99 mg/g, no drugs (GHB incl) were found from her body fluids.

Conclusions
The cause of death of 23-year old woman was sudden cardiac arrest, it is confirmed by no presence of specific pathology of internal organs. It cannot be excluded that the rapid weight loss combined with the procedure Transion (which duration exceeded permitted time and frequency) had lead to the overload of heart muscle and acute heart failure.
PI/7
MORPHOLOGICAL STUDIES OF CORONARY HEART DISEASES AND ASSOCIATIVE FACTORS IN THE LATVIAN (RIGA) POPULATION
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Preface
As one of the most often diseases coronary heart disease essentially impact health and endanger life of the inhabitants of Latvia, diminish length of life and impact life quality. Researches of the last years testify that more often and much earlier women have cardiovascular diseases. It is indicated that coronary heart disease have one of 8 women at the age of 45 up to 54 years and one of 3 women at age after 65 years.

Goal
Goal of the study: parallel to the clinical researches to determine relatively prevalence of heart diseases among inhabitants of Latvia (Riga) in different groups of age and gender, connectedness with associative and risk factors: hypertension, obesity, kidney and liver diseases, usage of alcohol, smoking, as well as to improve morphological diagnostics of cardiovascular diseases.

Materials and methods
In the framework of State Research Programme on the bases of autopsies and histological examinations there is established data base on occurrence of cardiovascular diseases and its associative factors in cases of violent and sudden death in Latvian (Riga) population, as well as by using archive data of State Centre for Forensic Medical Examination of years 2007-2009.

Results and discussions
In the data base by separating male and female in the age groups - 25-34 years, 35-44 years, 45-54 years, 55-64 years, 65-74 years, 75 years old and older, there are enlisted the following parameters: weight, height, body mass index (BMI) = weight (kg)/ height (m²), by assuming that normal BMI is 18.5-24.99, with excessive weight - 25-29.99, above 30 – as obesity. Pathomorphology of heart changes are registered by determining heart mass, symptom of myocardium hypertrophy, stenosis of coronary artery large branches (%), changes in myocardium (infarction; peri-vascular, diffuse fine-focus cardiosclerosis, post-infarction (large-focus) cardiosclerosis, symptoms of heart obesity, cardiomyopathy), sclerosis of valves. There are stated changes in large blood vessels – aorta, cerebral arteries; enlisted pathologies of kidney, liver, lung and endocrine organs, symptoms or chronic dipsomania, concentration of alcohol in blood, usage of other stuff (medicaments, drugs). First results are summarised on 1300 cases of death.

Conclusions
In cases of sudden death by evaluating connectedness of death with coronary heart diseases pathologists don’t have common opinion on how expressed is coronary stenosis and what changes of myocardium are criterion for the possible cardiovascular failure.
It is necessary to elaborate united cardiovascular examination protocol by indicating scope of macroscopic and histological inspection and evaluation criterions. New heart (myocardium) examination methods – histochemical, immuno-histo-chemical, ultramicroscopic and angiography should be introduced and examined.

PI/8
LEGAL-MEDICAL ASSESSMENT OF DEFECTS IN MEDICAL AID WITH REGARD TO STAB WOUNDS IN THE NECK
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The purpose of our research was to analyze unfavorable outcomes in neck wound cases and their expert assessment. Incomplete diagnoses and belated surgical assistance in the case of a trauma in this area leads to the development of mediastinitis. We observed four patients with stab wounds to the neck that had been
complicated by a purulent-septic process: in two of them rear mediastinitis had developed as a result of damage to the gullet wall, and one of them had sepsis, bacterial-toxic shock and bilateral septic pneumonia.

The outcome of this trauma was fatal. In the fourth case front and rear mediastinitis had developed as a result of an injury to the trachea, but, thanks to a timely diagnosis of this complication, the patient recovered. In all cases the reason for the occurrence of serious septic complications was the deficient testing of patients with neck injuries before carrying out the primary surgical processing of the wound as a consequence of underestimating the seriousness of the trauma, leading to serious purulent-septic complications. There was, therefore, a direct causal relationship between diagnostic and treatment errors on the one hand, and the occurrence of serious purulent-septic complications with a fatal on the other. There is no doubt that the difficulty of a timely identification of wounds to the neck organs in mechanical injuries and the assessment of the timeliness and completeness of medical benefits dictates the necessity of an assessment of each patient in co-operation with specialists in the field of maxillofacial surgery.

PI/9
PITUITARY ADENOMA AND SUDDEN DEATH IN ADULTS: A CASE REPORT
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Objectives
Pituitary adenomas are benign and slow growing intracranial tumors, but sometimes they remain clinically silent and are diagnosed only at autopsy. Sometimes before death a medical control for unspecific symptoms has been made and from a forensic point of view the relevance of this medical check must be examined.

Methods
A 28 years-old man was found dead in his apartment. About two months prior to his death he presented to an Emergency Department with headache and dizziness. Clinical neurological examination was normal; no abnormalities of the cardiorespiratory function. Neither a plain skull radiograph, nor a CT-scan were performed and the diagnosis was hypotensive crisis; rest and liquid integration were prescribed. Five days later he presented to the same ED complaining of head-neck pain and anorexia. The clinical evaluation reveals: hypotension (95/65mmHg), no fever and normal cardiorespiratory function. He was dismissed with cervical tension syndrome diagnose and prescription of analgesics.

Results
Autopsy revealed an excavation of the sella turcica (depth: 4cm) containing a capsulated asymmetric (dx>sn) rounded formation containing a tan-brown mush; the brain was swollen without other intracranial lesions. Chest and abdominal organs were macroscopically normal. Death was due to a brain generalized ischemia secondary to a pituitary apoplexy.

Conclusions
In our case despite the mass of the pituitary tumor they were not classical clinical symptoms and no signs of hormone overproduction. Retrospectively analyzed the symptoms presented in the two close ED evaluations were signs of the progressive enlargement of the tumor and the correct diagnose was not obtained because of the lack of a skull radiography. The omitted X-ray is not to be considered as a medical malpractice in this case with pituitary adenoma’s attenuate symptoms.

Keywords: pituitary apoplexy; sudden adult death; medical malpractice.
UNUSUAL CASE OF PULMONARY EMBOLISM WITH VASCULAR MATERIAL
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In the literature relating to deaths from pulmonary artery embolism cases of classic thrombotic material, fatty tissue or bone fragments congestion are widely reported. The paper presents an unique case of pulmonary artery embolism with vascular material. The submitted medical records indicated that the 50 years old man suffered a deep penetrating stab wound of the left thigh when he felt down from the balcony of his house. After the accident he was hospitalized on the general surgery ward in Cracow. He was frequently consulted by the vascular surgeon who found no signs of damage to major peripheral vessels. On the third day of treatment there was a sudden drop of temperature of the left leg, and several minutes later cardiac arrest occurred. During the autopsy fragment of vessel was found in the right pulmonary artery. It was identified as a 7 cm segment consisting of artery and vein. Preparation of the primary wound revealed extensive cavity filled with clotted blood in the left thigh muscles and a lesion of deep femoral artery and vein, accompanied with extensive necrosis of the muscles of thigh and left shank. Medical implications of the case were discussed in the study.

APOPTOSIS IN TRAUMATIC BRAIN TISSUE OF HUMAN AND DIFFERENT SURVIVAL PERIODS
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Objectives
Detection of apoptotic changes in human brain tissue of the deceased persons after different survival periods.

Methods
During the study there were examined 16 deceased persons and they were separated in four groups, i.e., 1st group – children till the age of 18 and who died at the place of an accident, 2nd group – treated children with survival period of 3 days, 3rd group – adult persons who died at the place of an accident, 4th group – adults with survival longer than 3 days. From the sites of impact and contrecoup there were taken brain tissue, there were routinely fixed and stained by hematoxilin/eosin and was used TUNEL kit by immunohistochemical staining. Data was processed by SPSS program by using group and correlation statistic methods.

Results
High correlations rates of apoptotic cells between the sites of impact and contrecoup were observed just at the 1st group of patients – to children who died at the place of an accident.

Conclusions
Amount of apoptotic cells (AC) at the sites of impact to children is lesser extent than to adults. At the contrecoup regions the amount of AC is variable to all groups and short – term treatment of patients doesn’t make substantial effect to apoptosis.
CASES OF RARE MECHANICAL ASPHYXIA
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Introduction
Statistically, the mechanical asphyxia as one of the type of suicides is most frequent acute form of the respiration hypoxia in the forensic medicine practise. About 70-80% cases of the mechanical asphyxia are the hanging by the noose.

Materials and methods
There were summarized and analyzed statistical data of the Latvia State Centre of Forensic Medical Examination on suicides in Riga and in Riga district during 2005-2009. There were shown some interesting cases of mechanical asphyxia from practise.

Results
From data of researches there is seen that the amount of the mechanical asphyxia correlates with the general suicide amount. In 2008, 2009 (in the years of economic crisis) it gradually increased. Men committed suicide averagely 4 times more frequent than women. Averagely half of the suicidal cases of mechanical asphyxia are done in the state of alcohol use and (or) other psychotropic substances intoxication. Usually the noose is constructed from anything that is handy: ropes, wires, belts, scarfs etc. In these cases the noose tighten by the own weight of the body. Nature of the ligature marks proves it.

Case Report
In 2010, in Pathology department there was a forensic medical examination of two similar young men dead bodies. These were two cases of mechanical asphyxia. In both cases, an individual as the noose used a plastic lock–tie to strangle himself. A plastic lock–tie had rifled internal surface and one-way fastener. The noose was tightened around the neck because lock–tie mechanism didn’t permit to get it easily free. Ligature marks were horizontal, locked up, even and location over thyroid cartilage. The corpse pose and circumstances of these cases were evidence for suicide.

Conclusions
1. During the time of economic crisis amount of the suicides and the hanging by the noose gradually increases.
2. Men committed suicides averagely 4 times more frequent than women.
3. Averagely half of the suicidal cases of the mechanical asphyxia are done in the state of alcohol use and (or) other psychotropic substances intoxication.
4. In previously described cases the noose of the plastic lock–tie doesn’t permit to change the decision shortly before death.

Key words: suicide, mechanical asphyxia, hanging by the noose, a plastic lock–tie.

DRUG-RELATED OVERDOSE MORTALITY: A 15-YEAR STUDY IN KLAIPEDA COUNTY (LITHUANIA)
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Objective
The aim of this work is to review the time trends of drug-related overdose mortality, based on the data of the forensic medicine autopsies in 1993–2007 in Klaipeda County.

Material and methods
Research material is the data on the deceased due to narcotic drugs and psychotropic substances intoxication in 1993–2007, selected out of archival copies of forensic medicine examinations. The data was collected according to the questionnaire of the primary data on drug users’ age, gender, territory of living, and drugs found during the toxicological analyses.

Results
According to the data on forensic medicine autopsies, the lowest drug-related overdose mortality was registered in 1993 and was equal to 0.5 cases per 100 thousand of population; however the highest one, equal to 3.1 cases per 100 thousand of population on average was in 2000. From 1993 to 2007 there was an increase in 0.0238 cases annually. However, this increasing tendency has not been statistically reliable (p>0.05). In the biological samples of the deceased the following materials were established most often: 64.9% of opiates, 46.8% of benzodiazepines and 13.0% of psycho stimulators. The combined poisoning cases formed 66.2%, most often with the combinations of opiates-benzodiazepines which formed 18.2%. The average age of deceased due to drug intoxication was 30.46 years.

Conclusions
The drug-related overdose mortality totaled 1.46 cases per 100 thousand of population on average. A statistically significant tendency of the increase of this rate has not been determined. The biggest number of overdose-related deaths was associated with the substances of the groups of opiates and benzodiazepines. Neither increase nor decrease tendency has been observed when analyzing the dynamics of the average age of deceased due to intoxication drug users.

Keywords: mortality, overdose, opiates.

POSTER ABSTRACTS
SESSION 2

PII/1
LIFE DEDICATED TO FORENSIC MEDICINE – 80 YEAR ANNIVERSARY OF AS.PROF. MR ULDIS BĒRZIŅŠ
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Between BMLA congresses on 22nd February, 2008 doctors and forensic experts of Latvia remarked 80 year anniversary of Associate professor Mr Uldis BĒRZIŅŠ - the long-term associated professor and chairman of forensic medicine chair, father of forensic medicine for several generations of Latvian doctors and person, whose length of service is already 55 years!

On year 1958 associated professor Mr U.Bērziņš has defended dissertation for Candidate of Medical sciences “Finding of plankton elements in blood and internal organs in meaning of forensic medicine in cases of drowning”; has made studies on death cases during operations (1961–1964) pathologies of mitral valves (1963,1966), possibilities of macro-microscopic thematic wounds and strangulation fissures (1966, 1970,1974), diagnostics of traumatic toxicosis (1970), reanimation pathology (1973), damages of health at hypothermia, embolism of tissues as symptom of wounds got during the life, participated in translation of text book by A. Matiševs “Forensic Medicine”. During the renewed Latvia has published articles on violence in the Latvian army; on identification by remains of thorax; qualification of wounds made by sharp weapons; lethal complications of anaesthesia; on sexual violence towards children in Latvia; on mistakes made by medical stuff; on history of academic forensic medicine; on problems of deontology in contemporary forensic medicine; on international cooperation in forensic medicine. During his working life Mr U. Bērziņš has published more than 80 scientific publications, has been chairman of the board of Latvian Forensic Medicine Scientific Society from year 1967-1985, long-term employee of trade-union committee of Riga Medical Institute and Latvian Medical Academy. U.Bērziņš has shared experience and reported in 36 scientific congresses and conferences in different continents. Currently As. Prof. U.Bērziņš still continue his professional activities by carrying out forensic medicine expertises in the most complicated expertises – in cases of violation of law made by medical stuff, carry out active scientific work as well as continue reading lectures to medical students and residents.
For excellence in development of forensic medical sciences and pedagogy on year 2008 has been awarded with medal of honour of Latvian Forensic Medicine Expert association and RSU Chair of Forensic Medicine “Latvijas zvans (Bell of Latvia)”. Bell is one of the oldest symbols of civilisation: signal of danger, invitation to come together, ring in of birth, love and death, symbol of life dialectics, integral attribute of school and pedagogy, symbol of sonority of people name, life and work and such life as our teacher Mr Uldis BĒRZIŅŠ!

PII/2
CASE REPORT: SUDDEN DEATH OF 13 Y.O. BOY
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Arrhythmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D) is a cardiomyopathy characterized pathomorphologically by patchy replacement of myocardium by fatty or fibrofatty tissue primarily of the right ventricle and clinically by life-threatening ventricular arrhythmias in apparently healthy young people. ARVC/D is a genetically heterogeneous disorder, since it has been linked to several chromosomal loci. Myocarditis may also be a contributing etiological factor. Progression of ARVC is manifested by right ventricular dilatation and left ventricular echocardiographic abnormalities both considered as main risk factors of fatal ventricular arrhythmias and sudden cardiac death. This paper is a case report of 13 years old patient with arrhytmogenic right ventricular cardiomyopathy/dysplasia (ARVC/D) whose sudden death occurred at football training.

PII/3
ECHINOCOCCOSIS AS ACCOMPANYING DISEASE IN CASES OF SUDDEN DEATH
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Introduction
Echinococcosis – a parasitic disease that affects people and animals caused by the larval stages of a tapeworm of genus Cestida – is characterised by damaging liver, lungs, other organs and tissues. As a foreign body, it
presents a type of granulomatosis. Penetration of larval vermin into gastrointestinal canal of a human starts their development. Oncosphere echinococcus moves with the flow of venous blood or lymph into portal system and settle in liver. It is echinococcus oncosphere that penetrates into the small blood circle to damage lungs, and to the large blood circle to damage other organs and tissues. An oncosphere settles in tissues for 5 months to develop into a nymph – 5 to 20 mm long echinococcus cyst.

Cases report
In our material 3 echinococcosis patients of elderly age was investigated: on two cases death was caused by cardiovascular failure due to ACF (acute coronary failure), and on one case it has been impossible to establish the cause of death with full certainty due-to express massive putrefaction changes of the corpse; preliminary ACF has also been present, however, as blood vessels and heart muscles display express sclerotic changes. No signs of echinococcosis are identified in anamnesis, however, in all of the three cases. Histomorphological investigation of material in liver, kidney and lung identified characteristic echinococcus signs.

Conclusion
It is therefore evident that pre-clinical echinococcosis may be identified in forensic investigation, mostly in the 1st development stage of an echinococcus cyst, without express inflammation, signs of pain syndrome, etc. Echinococcus cysts are resistant to putrefaction changes, and they may be detected by histological examination even in putrescent corpses.

Keywords: Echinococcosis

PII/4

VITREOUS HUMOR, CEREBRAL FLUID, URINE AND BLOOD AS BIOLOGICAL SPECIMENS FOR FORENSIC ANALYSIS OF ALCOHOL: COMPARATIVE STUDY

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Objectives
The analysis of the alcohol in postmortem material in Lithuania during the last decades (1985-2008) showed that about half of victims were under the state of inebriety at the time of death. Determination of alcohol contents in body fluids remains of major importance in forensic analysis but are not always easy established due to various postmortem artifacts. The purpose of our study was the comparative analysis of alcohol concentration and distribution in various biological specimens.

Methods
Alcohol (ethanol) concentration in blood (BAC), urine (UAC), vitreous humor (VHAC), and cerebral fluid (CFAC) was determined applying the headspace gas-chromatographic technique. Biological specimens were collected from 41 persons who died due to intoxication with ethanol (n=12), acute myocardial infarction/ischemia (n=10), asphyxia (n=3), mechanical injuries (n=8), alcohol related damage of liver (n=4), and other (n=4).

Results
The mean concentration of ethanol in investigated specimens was: in blood 272 mg/dL (range 14-686), urine 374 mg/dL (range 51-755), vitreous humor 282 mg/dL (range 14-657), and cerebral fluid 313 mg/dL (range 17-776). The high correlation was obtained for VHAC and CFAC (r = 0.958), VHAC and UAC (r = 0.938), CFAC and UAC (r = 0.963) results. Notably, that CFAC and UAC results are highly correlated (r = 0.976) in the state of alcohol elimination.

Conclusions
The relationship between alcohol concentrations in various biological specimens might give a valuable clue about the stage of alcohol distribution at the time of death particularly in the cases when blood is unavailable or contaminated.
PII/5
ETHANOL IN BLOOD AND BREATH AFTER VOLUNTARY TASTING OF ALCOHOL
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2Latvia State Centre for Forensic Medical Examinations

Objectives
The main purpose of our study was to compare blood alcohol concentrations (BAC) and breath alcohol concentrations (BrAC) after voluntary drinking of different amounts of 40 % vodka by means of alcometer, head space gas chromatography (HS-GC) and enzymatic immunoassay technique (EMIT).

Methods
5 healthy volunteers ingested 50, 100, 150 and 200 ml of 40% alcohol (vodka). Breath alcohol testing was performed by means of AlcoQuant 6020 5min-3 h after ingestion, blood alcohol concentrations were determined by means of HS-GC and EMIT (blood serum) using standard operation procedures. Enzymatic immunoassay was performed by means of V-Twin instrument and Siemens reagents. Gas chromatograph: Unicam 610 with flame ionization detector. Steel column 1.5 m x 4 mm (I.D) filled with Chromaton N-AW-DMCS and 10% Carbowax 20 M. Column temperature 100 °C. Carrier gas flow (nitrogen) of 30 ml/min. N-propanol was used as internal standard. “Peak simple” program (USA) was used for chromatography data analysis.

Results
Results of BrAC and BAC are presented in table. BrAC and BAC (HS-GC) were in good correlation. Serum alcohol concentrations (EMIT) gave enhanced levels, comparing with BrAC and BAC (HS-GC).

<table>
<thead>
<tr>
<th>40% ethanol Ingested, ml</th>
<th>BrAC, ‰</th>
<th>BAC ‰ (HS-GC)</th>
<th>Serum alcohol concentrations, ‰ (EMIT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>0,11-0,23</td>
<td>0,12-0,20</td>
<td>0,18-0,35</td>
</tr>
<tr>
<td>100</td>
<td>0,31-0,54</td>
<td>0,35-0,45</td>
<td>0,30-0,70</td>
</tr>
<tr>
<td>150</td>
<td>0,63-1,11</td>
<td>0,60-0,85</td>
<td>0,75-1,20</td>
</tr>
<tr>
<td>200</td>
<td>0,79-0,89</td>
<td>0,86-1,00</td>
<td>1,20-1,50</td>
</tr>
</tbody>
</table>

The cause of the different results of blood and breath alcohol testing after ingestion 50-200 ml 40% ethanol have been discussed.

Conclusion
Tasting of 40 % ethanol (vodka) seems to imply substantial risk of exceeding the statutory driving limits for alcohol concentration in blood in Latvia ( 0,5 ‰) 30 min-1,5 h or more after the end of tasting.

PII/6
POISONING WITH SELENIUM
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Objectives
In 2009 elderly couple died within a short time interval at their home. The cause of death was poisoning with selenium. According to the literature, acute poisonings with selenium, occur extremely rarely in humans and have never been diagnosed by Estonian forensic pathologists before.

Methods
To determine the cause of death autopsy was performed, histology and toxicology were done and selenium was determined from gastric content and blood samples.

Results
65 year-old male’s histology revealed micronodular cirrhosis based on steatosis and viral hepatitis, blood alcohol concentration was 2,07 mg/g. 62 year-old female who had died one day later had liver steatosis and
steatohepatitis, her blood alcohol concentration was 0.43 mg/g. In autopsy they both had similar macroscopic findings: oral mucosa covered with orange-reddish oily substance, similar substance in gastric content and duodenum, dehydrated appearance of internal organs and their orange colour. High concentration of selenium was found from the sample of gastric content of the male and both blood samples.

Conclusions
Due to the insufficient police investigation it remained unknown exactly what substance containing selenium was ingested. Public Prosecutor came to the conclusion that it had been a homicide of the man followed by suicide of the wife. The only fact to prove it was the phone call woman had made to her friend after the death (killing) of her husband.

PII/7
GHB-RELATED DEATHS IN ESTONIA IN 2009
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Introduction
In Estonia GHB (gammahydroxybutyrate) was placed on Schedule 1 of the Narcotic and Psychotropic Substances in 2002. The method of determination of GHB in blood and urine by gas chromatography - mass spectrometry was accredited in 2009. No GHB–related deaths were diagnosed in Estonia before 2009.

Methods
Analysis of toxicology results, autopsy findings and background information.

Results
In 2009 post-mortem toxicological analyses for determination GHB in blood and urine were performed in six cases in all, each time there was preceding information about the doubt of using GHB given by police or the relatives. The GHB-findings were positive in three cases of the six and in two cases the cause of death could be determined as GHB-related. One of these two victims was 22-year-old female and the other was 27-year-old male and in both cases the concentration of GHB in post-mortem femoral blood as well as in urine was >200 µg/ml. In the first case GHB was found along with lidocaine and traces of tramadol. In the second case GHB was found along with ethanol, cocaine, atropine and diazepam. In the third case with positive GHB-finding the concentration of GHB in post-mortem femoral blood was 74 µg/ml but in this case death resulted from closed head injury.

Conclusions
Those two GHB-related death cases in Estonia are in accordance with the data in literature, which describe the GHB easily to be deadly in interaction with alcohol or any other depressants due to the synergistic effect. As GHB-determination is carried out as a non-routine analysis, the diagnosis depends to a great extent on background information.

PII/8
BLOOD-MORPHINE CONCENTRATIONS IN HEROIN-OVERDOSE DEATHS IN RELATION TO MANNER OF DEATH AND PREVIOUS DRUG-RELATED OFFENCES
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Objectives
Heroin is the most dangerous recreational drug in terms of acute toxicity. Toxicological evidence of a heroin-related death comes from finding the unique metabolite 6-acetyl morphine (6-AM) in body fluids along with a high concentration of morphine. Interpreting the concentrations of morphine in blood in these cases is not easy owing to poly-drug use and varying degree of tolerance to opiates. Here we report blood-morphine (B-Mo) concentrations in femoral blood (free-morphine) when 6-AM was also verified present giving proof of heroin intake. We also looked at manner of death and previous arrests for drug-related crimes in these victims.
Methods
We searched an in-house database (TOXBASE) to find cases in which 6-AM was verified present in femoral venous blood in all types of drug-fatalities. The concentrations of free-morphine in mono-intoxications were compared with poly-drug users and in relation to the type of poisoning death (suicide or otherwise) as well as prior arrests for drug-related crimes.

Results
Of 766 heroin-related deaths 669 were classified as poisoning (median B-Mo = 0.25 mg/L) and 97 were non-poisoning deaths (B-Mo = 0.23 mg/L). Of 63 mono-intoxication deaths involving heroin B-Mo was 0.25 mg/L compared with 0.24 mg/L in 703 poly-drug users. In poisoning deaths classified as suicides (N = 21), the median B-Mo was 0.30 mg/L compared with 0.24 mg/L in heroin-related non-suicide deaths (N = 745). The police in Sweden had arrested 50% of the women and 63% of the men on one or more occasion for a drug-related offence.

Conclusions
Median concentrations of free morphine in blood were similar when heroin was the only drug present as well as in poly-drug deaths. Furthermore, the B-Mo concentration did not differ significantly between heroin overdose deaths and other causes of death in heroin users. The median concentration of morphine was highest in heroin-related suicides, suggesting taking a higher dose or a more rapid death before much was metabolized. Interpreting B-Mo concentrations in relation to toxicity and overdose is complicated because of wide variations in tolerance to opiates.

PII/9
SUDDEN UNEXPLAINED DEATH – GENETIC EXAMINATION IN SURVIVING RELATIVES
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\textsuperscript{2}Kerckhoff Heart Center, Bad Nauheim, Germany

Objectives
As the cause of sudden death may be hereditary, the genetic testing of relatives is crucial to identify other individuals, who may have an increased risk of sudden death. We performed a postmortem molecular study on cardiac ion channels to determine the cause of sudden cardiac death (SCD) in a family with a history of similar events.

Methods
Using polymerase chain reaction denaturing high-performance liquid chromatography and direct DNA sequencing, mutation analysis was performed on six long-QT-syndrome related genes (SCN5A, KCNH2, KCNQ1, KCNE1, KCNE2, KCNJ2) and on 18 exons of the ryanodine receptor gene (RyR2) encoding the cardiac ryanodine receptor.

Results
A novel RyR2 mutation was identified in two relatives of the deceased. One of them had already cardiac problems, the other person was in good health. The mutation identified (R420Q) is located in the N-terminal region of the receptor protein and was absent in 400 reference alleles. The amino acid R420 is highly conserved in the RyR2 genes of various species, but is not highly conserved between the different RyR isoforms (RyR1, RyR2 and RyR3). Therefore, the position 420 seems to be crucial for cardiac functions.

Conclusion
The elucidation of a channelopathy mutation in a postmortem sample may provide molecular confirmation regarding the cause of death and a prospective live saving clue for the clinical management of those left behind.
PERFORMANCE EVALUATION OF THE DRUGWIPE® 5/5+ ON-SITE ORAL FLUID DRUG TEST: COMPARISON WITH CONFIRMATION RESULTS IN WHOLE BLOOD

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Objectives
Oral fluid (OF) is a preferable matrix for on-site testing of drugs in DUI cases. A number of devices have been developed for testing of drugs in OF. The aim of this study was to evaluate the reliability of the DrugWipe® 5/5+ device by comparing its results with confirmation results in whole blood by GC-MS as a reference method.

Methods
The performance of the DrugWipe 5/5+ device was evaluated for amphetamines, cannabis, cocaine and opiates. Data were based on 1809 cases in which the Finnish police had conducted the DrugWipe® 5/5+ tests in suspected DUI cases. Only cases with at least one positive screening result were included. Based on the GC-MS confirmation results and cut-offs used in the laboratory, the cases have been classified as true positives (TP), true negatives (TN), false positives (FP) and false negatives (FN). Sensitivity, specificity and accuracy were calculated based on these classifications.

Results
Amphetamines (amphetamine, methamphetamine, MDA, MDMA) were the most frequent findings in the studied population (1510 confirmed positive cases, 83%). By the DrugWipe® 5/5+ device, amphetamines were detected in 1610 cases. Calculated values for sensitivity, specificity and accuracy were 97 %, 50 % and 89 %, respectively. Specificity (the ability to pick up the true negatives from all the negatives) was low, because only DrugWipe positive findings were included in the study. For cannabis (197 confirmed positive cases), sensitivity, specificity and accuracy were 43 %, 87 % and 82 %, respectively. Evaluation of the cocaine and opiates tests resulted in low sensitivity values, but these substance groups were encountered quite infrequently.

Conclusions
DrugWipe® 5/5+ performed quite well in the group of amphetamines while this is the most widespread group of illicit drugs in Finnish traffic. Sensitivity for cannabis needs to be improved.

Key words: on-site drug tests, oral fluid, drugs of abuse, driving under the influence

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BENZODIAZEPINES AND SEDATIVE-HYPNOTICS IN BLOOD OF DRIVERS UNDER THE INFLUENCE OF DRUGS, AND THEIR ASSOCIATION WITH OTHER COMMON ILLEGAL DRUG USE AND NATIONAL SALES FIGURES

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Objectives
One of the key drug groups encountered in Finnish driving under the influence (DUI) cases is benzodiazepines and related sedative-hypnotics. The aim of this study was to examine positive DUI cases in this category in Finland from 1997-2008. The associated use of amphetamine and cannabis in these DUI cases was investigated and the relationship between DUI cases and Finnish sales for pharmaceuticals.

Methods
Information about drug driving cases positive for such sedative drugs in the period 1997-2008 was obtained from the laboratory database of the Alcohol and Drugs Analytic Unit, THL. Sales figures for the years 1997–2008 were obtained from the Finnish National Agency for Medicine.
Results
The drugs studied were present in the majority of all positive DUI cases in each year from 1997 to 2008, typically at rates of over 60%. Although this proportion has decreased the actual number of such positive cases continued to increase. Diazepam was the single most commonly detected benzodiazepine in each year of the study. The introduction of ‘zero tolerance’ legislation in 2003 corresponded with a significant increase in the number of benzodiazepines DUI cases, as well as in the number of DUI cases in which associated use of sedative drugs and amphetamine was observed, which can be partially explained by the use of effective on-site screening devices for amphetamine, in conjunction with a more efficient DUI legislative framework. Ratios for DUI cases to pharmaceutical sales showed both yearly variation for individual benzodiazepines and variation between the individual pharmaceuticals. Clonazepam consistently exhibited the highest ratio, which increased sharply from 2003.

Conclusions
Benzodiazepines and sedative-hypnotics, often in combination with illicit drugs - particularly amphetamine, constitute a major hazard in Finnish DUI. The number of cases involving these compounds continues to rise. Enforcement for use of these legally available pharmaceuticals in Finnish traffic needs to be improved.

Key words: driving under the influence, benzodiazepines, sedative-hypnotics, amphetamine, cannabis, drugs sales figures

PII/12
DRIED BLOOD SPOT AS A SAMPLE MATRIX IN DRUG ANALYSIS – A VALIDATED METHOD FOR SCREENING AND QUANTITATION OF 23 DRUGS OF ABUSE BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY
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Objectives
The stability of the analytes as well as the easy storage and handling of samples makes using dried blood spots (DBS) an interesting alternative to traditional blood sampling in drug analytics. Blood spot samples have been used in clinical settings for decades but very few applications have been published for drugs of abuse. The objective of this study was to develop a quantitative method for analysing several drugs of abuse from DBS samples with GC-MS. The drugs analysed include amphetamines, opiates, cocaine, cannabis, zopiclone, and benzodiazepines.

Methods
DBS (100 µl) containing the analytes were cut into smaller pieces and 500 µl of saturated borate buffer (pH 10) and 2 ml of BuAc, with the deuterated internal standards, were added. The samples were mixed and centrifuged, and the solvent was separated into fraction A (benzodiazepines and zopiclone) and fraction B (other substances) and evaporated to dryness. Samples were reconstituted in 30 µl of BuAc:ACN 1:1 and derivatization was done with 10 µl of MTBSTFA/MSTFA (fraction A/B). Fraction A was analysed with GC-NCI/MS and fraction B with GC-EI/MS. Total run times for fractions A and B were 4.5 min and 7.8 min, respectively.

Results
The linear concentration range ($R^2 > 0.98$) in ng/ml was 5-100 for THC and buprenorphine, 5-250 for lorazepam, 5-500 for alprazolam, clonazepam and THC-COOH, 10-1000 for codeine, morphine, methadone, zopiclone, midazolam and nitrazepam, 20-2000 for amphetamine, methamphetamine, MDA, MDMA and nordiazepam, 20-1000 for phenaepam, 50-1000 for cocaine, 50-5000 for diazepam, temazepam and tramadol, and 50-1250 for oxazepam. The intra- and inter-day precision and accuracy was within the required limits (<15% and <20% at LOQ). Extraction recoveries were >75% for all but THC, THC-COOH, morphine, and buprenorphine.

Conclusion
This sensitive and simple analysis method enables a quantitative determination of 23 drugs of abuse and medicinal drugs from a low volume DBS sample by GC-MS.
PII/13
NEW DESIGNER DRUG 1-(3-CHLOROPHENYL) PIPERAZINE (mCPP) IN LATVIA
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Objectives
The purpose of our study was to investigate seized mCPP (146.4 g blue tablets with logo „Bird”) by means of different methods of analysis.

Methods
Gas chromatography-mass spectrometry (GC-MS), thin-layer chromatography (TLC), spectral, enzymatic immunoassay (EMIT) and colour reactions have been used.

Results
GC-MS   Equipment: Agilent 6890N GC coupled to Agilent 5975 N MSD.
Column HP-5MS (30 m x 0,25 mm x 0,25 μm).
Temperature program: 80°C (1 min), 20°C/min to 280°C (5 min.).
Carrier gas: Helium, flow rate of 1 ml/min.
MS mode : EI (70 eV)
Sample: 1µl in methanol.

In the mCPP mass spectrum (RT 6,608 min), the principal ions (m/z) were 154 (base peak), 196, 156, 56 and 138. Starch and blue dye were also identified.
mCPP does not react with common EMIT reagents and is unlikely to be detected in urine samples by common drug immunoassay screening systems. mCPP does not react with Marquis, nitropruside or Scott’s reagents, but can be detected on the TLC plates with nitric acid (bright yellow colour), 1% potassium permanganate (pale yellow colour), 0,5% sodium nitrite in concentrated sulphuric acid (rose colour), 0,5% sodium nitrite in concentrated perchloric acid (rose colour). After 5 min all coloured spots turned yellow (sensitivity of reactions 1-2 µg in spot). UV-spectra in 96% ethanol (λmax at 255 nm), 0,1 N. HCL (λmax at 246 nm), 0,1N NaOH (λmax at 248 nm) can be used for identification. Average mCPP contents in tablets ~20 mg.

Conclusions
GC-MS and other analytical techniques were used to determine the identity of the active component of seized tablets. Mass spectrometric analysis revealed mCPP as active component. This study reports the first illegal appearance of mCPP in Latvia.

PII/14
CASE REPORT: IDENTIFICATION OF TWO BODIES AFTER FIRE ACCIDENT
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Introduction
After fire accidents mortal remains of victims often have been found. Most of them are from unknown persons. Experts and police officers together have to find answers for some questions including such as: how person is dead, who is this victim.

Materials and methods
A lot of small pieces of bones and 2 separate fragments of backbone (base of skull with brain and sacral region with some soft tissue) were found after fire accident. The first opinion was that parts of body are from one person. The gender of mortal remains was disputable. Genetic investigation was able to resolve this question. The biological material was in poor condition. Therefore in the same time both items from backbone were
investigated. DNA extraction was done by using QIAamp® DNA Micro Kit (Qiagen) according protocol “Isolation of Genomic DNA from Tissues”, Polymerase chain reaction was performed using AmpFISTR Identifiler™ PCR Amplification Kit and AmpFISTR Y-Filer™ Amplification Kit (Applied Biosystems), results were detected with capillary electrophoresis on the ABI PRISM® 310 Genetic Analyzer, fragment sizes were automatically estimated using GeneMapper® ID Software Version 3.2.

Results and discussion
Two different DNA autosomal profiles from males and two different Y haplotypes were obtained. Those results were most important in complex of the mortal remains investigation. They were helpful for successful police case recovery and identification of both dead persons.

The case has demonstrated:
How important is cooperation between all laboratories of Latvia State Centre for Forensic Medical Examination and between Centre and other State institutions involved in case investigation;
that always is necessary to investigate all possible biological material in such alike cases.

Key words: fire accident, fragments of backbone, DNA profiling, case recovery, identification of two persons.
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