



# *Forensic Medicine at UPJŠ*





***„Forensic Medicine is the key for pastness,  
explanation of presence and indicator of future“***

*Unknown author*

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**Forensic medicine** (*synonym: legal medicine, medical jurisprudence*) is a fundamental and independent part of medicine dealing with the interaction of medical science and practice with the law.

**Forensic medicine** is dealing with living and dead persons, in order to solve these problems:

- examination and evaluation of injury or disease
- evaluation of different kinds of violence
- effects of injury and violence
- cause of death
- identification of living and dead
- pregnancy and abortion
- influence of toxic substances
- medical malpractice etc.



**Branches of medicine which assist in medico-legal solutions are:**

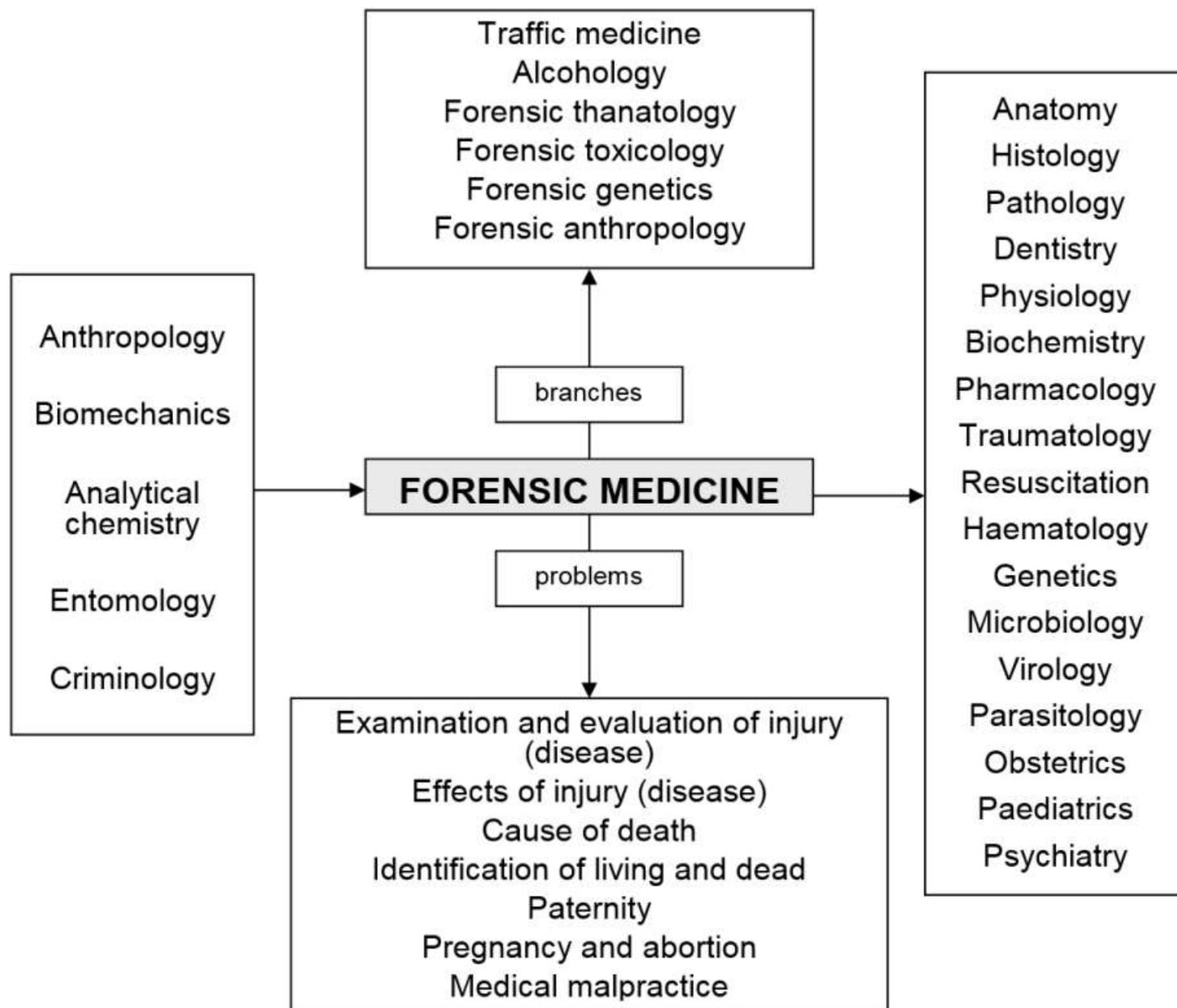
anatomy, pathology, dentistry, physiology, biochemistry, pharmacology, traumatology, resuscitation, haematology, genetics, microbiology, obstetrics, paediatrics, psychiatry, sexuology, etc.

**Forensic medicine borrows methods of investigation from various natural and other sciences:**

anthropology, biomechanics, analytical chemistry, entomology (science about insects), criminology, etc.

**Own subjects of forensic medicine:**

traffic medicine, alcoholology, forensic toxicology, forensic genetics, forensic anthropology, etc.





„*Forensic*“ means „placed on *Forum Romanum*“ (Roma, Italy)



*Forum Romanum* was a **market-place in Roma** from ancient times (VII<sup>th</sup> - V<sup>th</sup> century B.C.), which played an important part in law and administrative activities that time.

Sessions and courts on *Forum Romanum* **were characterized by interaction of medical science with the law**. Medical science assisted the administration of justice both in criminal matters and in civil matters.



Model of the autopsy room



Instruments using for the autopsy



- 1919** - the first **Department of Forensic Medicine of J. A. Komenský University in Bratislava** was established
- 1948** - **Department of Forensic Medicine P. J. Šafarik University in Košice**
- 1965** - **Department of Forensic Medicine in Martin**
- 1960** - **Departments of Forensic Medicine in Hospitals (Bratislava, Banská Bystrica, Žilina, Nitra, Nové Zámky, Lučenec, Poprad, Prešov)**
- 1997** - **The 1st Concept of Forensic Medicine in Slovakia**
- 01.01.2005** - **Healthcare Surveillance Authority - Medico-Legal and Pathological-Anatomical Departments** were established
- 2006** - **The New Concept of Forensic Medicine in Slovakia**



## VESTNÍK



MINISTERSTVA ZDRAVOTNÍCTVA  
SLOVENSKEJ REPUBLIKY

Osobitné vydanie

Dňa 31. augusta 2006

Ročník 54

### O B S A H:

#### Koncepcia v odbore súdne lekárstvo

Koncepcia zdravotnej starostlivosti v odbore paliatívna medicína vrátane hospicovej starostlivosti

Koncepcia zdravotnej starostlivosti v odbore hematológia a transfuziológia

Koncepcia zdravotnej starostlivosti v odbore klinická farmakológia

Koncepcia odboru revízne ošetrovateľstvo

#### Koncepcia v odbore patologická anatómia

Koncepcia zdravotnej starostlivosti v odbore urológia

Koncepcia zdravotnej starostlivosti v odbore liečebná pedagogika

Koncepcia zdravotnej starostlivosti v odbore medicína drogových závislostí

Koncepcia v odbore klinická mikrobiológia

Výnos Ministerstva pôdohospodárstva Slovenskej republiky a Ministerstva zdravotníctva Slovenskej republiky z 26. júla 2006 č. 2063/2006-100, ktorým sa mení výnos Ministerstva pôdohospodárstva a Ministerstva zdravotníctva Slovenskej republiky z 25. novembra 2005 č. 3445/2005-100, ktorým sa vydáva hlava Potravinového kódexu Slovenskej republiky upravujúca metódy odberu vzoriek a analytické metódy skúšania na úradnú kontrolu niektorých kontaminantov v potravinách

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**The Concept of Forensic Medicine**  
No: 17570-1/2006-OZS  
**accepted by Ministry of Health**  
**on 31.08.2006.**

### Participation in prevention against negative social phenomena:

- criminal violence towards health and life
- traffic accidents
- occupational accidents
- chronic alcoholism
- drug abuse
- suicides etc.

1. Autopsies
  - sudden and unexpected deaths
  - violent deaths
  - „*mors in tabula*“
  - deaths caused by medical malpractice
  - due to identification
  - after exhumation
2. The presence of a forensic doctor at the scene of crime. External examination of dead body.





## Examination of dead bodies by forensic doctor





3. Forensic toxicology and drug analysis (living and dead persons)
4. Forensic serology, haematology and genetics  
(examination of blood and other biological materials and DNA profiling for identification)
5. Forensic alcoholology  
(the measurement of alcohol in blood, urine and other biological fluids)



## 6. Forensic anthropology

(identification of fresh, decomposed or skeletalized human remains by anthropological methods)

## 7. Participation in mass disasters



## 8. Investigation of living persons:

- examination of wounding, injury and trauma,
- examination of pregnancy and abortion,
- examination of sexual offences,
- examination of abuse of alcohol and drugs of dependence

## 9. Medical reports and statements, expert opinions

## 10. Clinical seminars and case analysis

(regularly at the Clinics of Traumatology, Surgery, Pediatrics, AIM)

## 11. Pregradual and postgradual education, scientific research





External and internal examination of a corpse by GM students



- **Faculty of Medicine: Departments of Forensic Medicine –**

Košice, Bratislava, Martin

The main task: education and research

+

- **Health Care Surveillance Authority (HCSA): Medico-Legal and Pathological-Anatomical Departments**

The main task: autopsies, examination of death bodies on the scene of crime, living persons (injuries, physical, mental and sexual status)



HCSA was established in Slovakia **by the Act No. 581/2004** Coll. on Healthcare Insurance Companies and Surveillance over Health Care, 1st January 2005.

The Authority is not entered in the commercial register and its registered office is Bratislava, Želova 2.

Reports on activities of the Authority are submitted to the Government of the SR.

HCSA introduces a new element into healthcare that is independent, the aim is the satisfaction of a patient.

HCSA acts fairly and independently of state authorities, local government authorities and public authorities and of other legal persons.



- **Health care supervision**
- **Public health insurance supervision**
- **Arbitration on the level of the relationship:**
  1. health insurance company ↔ provider
  2. policyholder ↔ provider
  3. policyholder ↔ health insurance company
- **Allocates numerical codes to health insurance companies**
- **Allocates numerical codes and provides personal stamps to doctors and healthcare providers**
- **HCSA holds registry of persons who refused autopsy, of person who refuse donation of organs after death**



- health
- care
- surveillance
- authority

Text version

[English](#) [Slovensky](#)



[Welcome at the HCSA web site](#)

[About the HCSA](#)

[Health Insurance in the EU](#)

[Access to Health Care](#)

[Contacts](#)

[Useful Links](#)



Welcome at the HCSA web site

[Welcome at the HCSA web site](#)

## Welcome at the Health Care Surveillance Authority web site

Let me welcome you at the Health Care Surveillance Authority web site. The Health Care Surveillance Authority (hereinafter "HCSA") supervises the public health insurance and provision of health care.

Health service concerns each of us. The HCSA endeavours to keep balance and principle of equality and fairness in relations between patient-doctor, insured person-health insurance company, health care provider-health insurance company. Ambition of the HCSA is to reach balance in these relations



## **Headquarter (the main office) - Želova 2, 829 24 Bratislava**

- Chairperson's office
- Deputy Chairperson's office
- Section of Surveillance over Health Care Insurance
- Section of Surveillance over Provision and Purchase of Health Care
- Section of Economy
- Section of Medico-Legal and Pathological-Anatomical Departments
- Legal Department
- Department of Internal Control
- Personal Department

## **Branch offices (8 cities):**

- Banská Bystrica
- Bratislava
- Košice
- Martin
- Nitra
- Prešov
- Trenčín
- Trnava

**Medico-Legal and Pathological-Anatomical Departments (9):**

- Banská Bystrica
- Bratislava (2)
- Košice
- Martin
- Nitra
- Poprad
- Prešov
- Žilina

**The organizational setup of the Medico-Legal and Pathological-Anatomical Departments:**

- necropsy (autopsy) section
- forensic histopathology section (microscopic diagnostics)
- forensic toxicology and alcoholology section
- forensic serohematology and genetics section
- room for the examination of living persons
- section of fotodocumentation (macrofotography, microfotography, video- and X-ray documentation)
- computer database archive and library



Faculty of Medicine UPJŠ – Department of Forensic Medicine



The old autopsy room of Medico-Legal and Pathological-Anatomical Department



Autopsy room of Medico-Legal and Pathological-Anatomical Department



## The new building of MLPA Dept. (in reconstruction)





**Autopsy** is full post-mortem external and internal examination of the body with the objective to estimate the cause, manner and mechanism of death.

The autopsy is a highly specialized procedure which should ideally be taken only by the experienced forensic doctor or doctor pathologist.

### **The value of autopsy:**

- Certification of death may be incorrect or inaccurate in 50 % of cases.
- Autopsy will ascertain the cause of death and should prevent concealment of homicide.
- It is source of information, that can be helpful in the process of identification.



- verifying of clinical diagnostics and treatment
- *mors in tabula*
- infectious diseases
- contamination by radioactive substances
- after harvesting of organs for transplantation
- suspicion of medical malpractice
- industrial or other poisoning
- occupational disease or accident
- traffic accident
- violent death including suicide
- death abroad
- death in a prison
- if by external examination or by another way, it was not possible to determine the cause of death



**Number of deceased persons** in Slovakia: approx. **50 000 – 53 500**

**Number of inhabitants** in Košice region: approx. **775 500**

**Number of autopsies** in Košice region:

approx. **7 500 – 9 500**, i. e. **14 - 19 %** of the total number of deceased

**Number of inhabitants** in Košice: **233 700**

**Number of deceased persons** in Košice region: approx. **7300 - 7500**

**Number of autopsies** performed at the Medico-Legal and Pathological-Anatomical Department of HSA in Košice:

approx. **1200**, i.e. **16 - 17 %** of the total number of deceased



# Košice region, Slovakia



Annual autopsy rate in the region: 14 – 19 %



- 1. Anatomical autopsy:** for academic interest, teaching and research purposes.
- 2. Pathological (clinical) autopsy:** it is performed by doctor-pathologist if the cause of death is known with the objective to confirm the diagnosis, to discover the extent of the lesions and to exact complications.
- 3. Medico-legal autopsy by Medical Care order:** it is done by forensic doctor in cases of violent or non-violent death, where the suspicion of the other person's guilt is excluded.
- 4. Medico-legal autopsy by Criminal Law order:** it is done by two forensic doctors-experts in cases of violent death, where the suspicion of the other person's guilt is not excluded. The result of the autopsy and additional investigations is an expert opinion.



Medico-legal autopsies both by Medical Care order and by Criminal Law order discover following things:

- the identity of the body
- the cause of death
- the nature, number and extent of injuries
- the time of death
- the presence of toxic substances in the dead body
- the expectation of duration of life
- the presence of natural disease and its contribution to death
- the interpretation of the mechanism of death
- the interpretation of the mechanism of injuries
- the interpretation of any other unnatural conditions, including those associated with surgical and medical procedures

# Introduction

**Conception of Forensic Medicine in Slovak Republic (2006)**

**Rules of Healthcare Surveillance Authority (last edition – 2011)**

**The most important tasks of the medico-legal expert:**

- *evaluation of the violence and injury mechanism*
- *finding cause and mechanism of death*

Using the complex of visual investigative methods makes up to 70% of medico-legal activities

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## Visual investigative methods in FM

### The classification of visual investigative methods in forensic medicine:

#### 1. Based **on the stage** of method application:

- *ante mortem* visualization
- *post mortem* visualization

#### 2. Based **on the sequence** technique:

- visual fixation (forensic imaging)
- visual dynamics (forensic video and animation)

#### 3. Based **on the physical principle** of visualization:

- light, UV and IR rays, X-rays, magnetic resonance, ultrasonography

## Material and methods

- A **complex** of visual investigative methods at the process of autopsy external and internal examination.
- **Visual fixation** methods (forensic imaging): photographic, sonic and ray.
- **Visual dynamics**: at crime scene investigation and at autopsy.
- Autopsy findings **were supplemented** by clinical ray and sonic investigations (USG, X-ray, CT, MRI images and descriptions).
- The mechanism of injuries in some cases **was highlighted** by computer reconstruction and simulation methods (PC-CRASH road traffic accident software, FORTIS calculating program).
- The **complex** of video, macrophoto and microphoto documentation showed to be valuable for the estimating of structured medico-legal diagnosis.

## Results – reported case No. 1

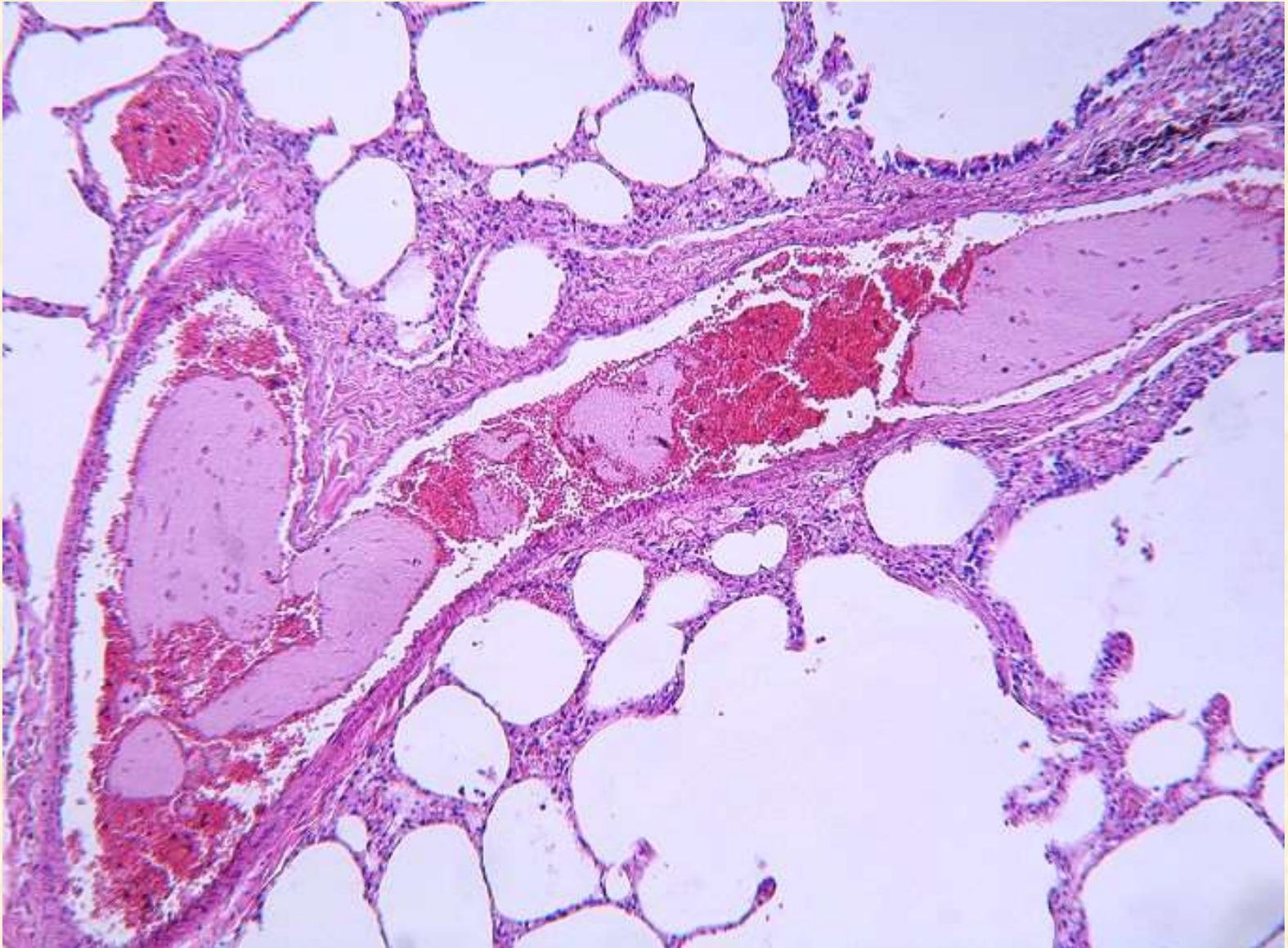


The repeated devastated blunt injury of the head of a 17-year-old woman who was found dead on the forest edge. Cause of death was brain contusion and laceration at fragmented fractures of skull base and roof

# Results – reported case No. 1

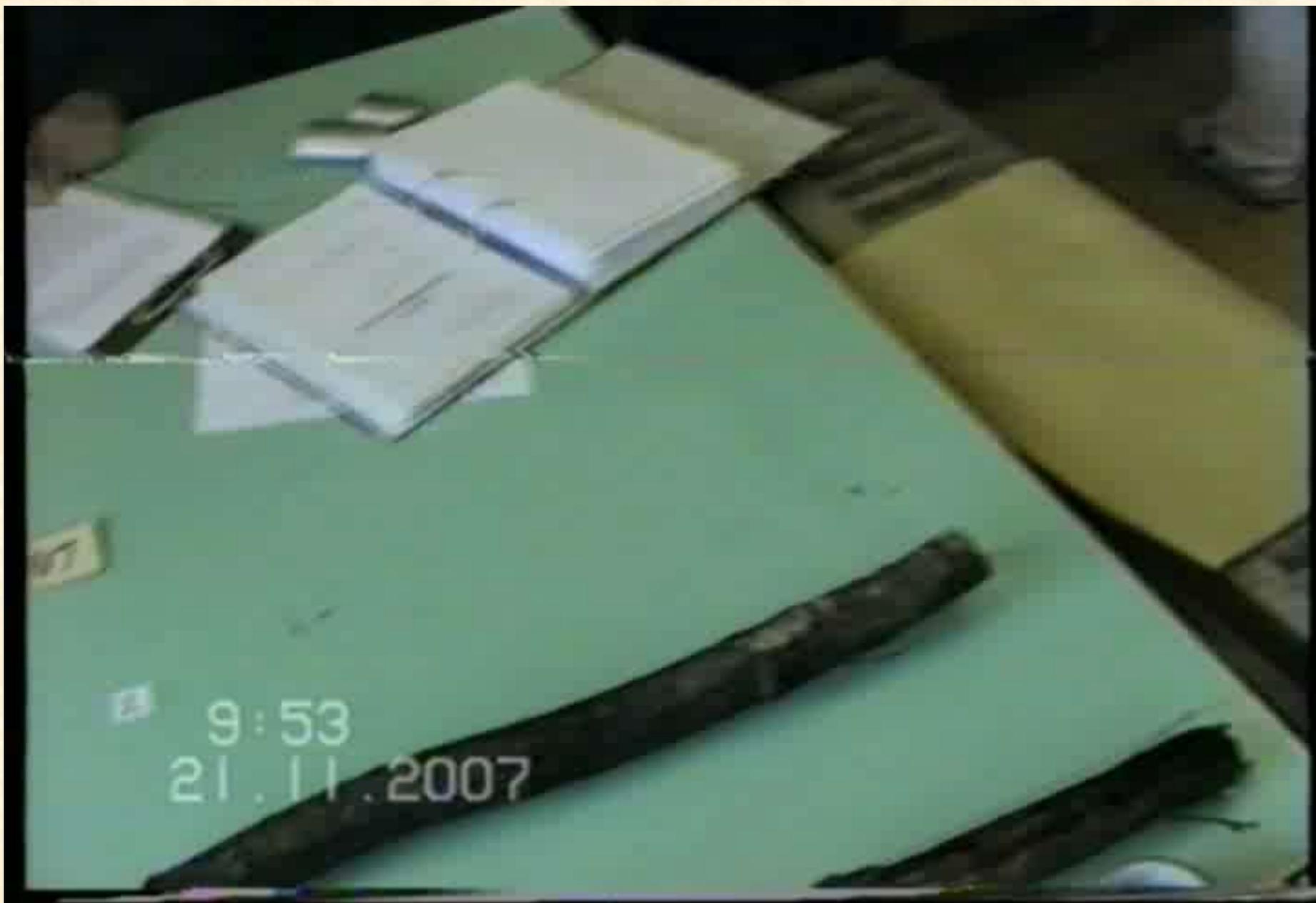


Blunt injury – devastation of the head. Fly eggs and maggots from the head.



Embolism of lung arteries by contused brain tissue. HE, 100×

# Case No. 1 – police investigation experiment



## Results – reported case No. 2



## Results – reported case No. 2

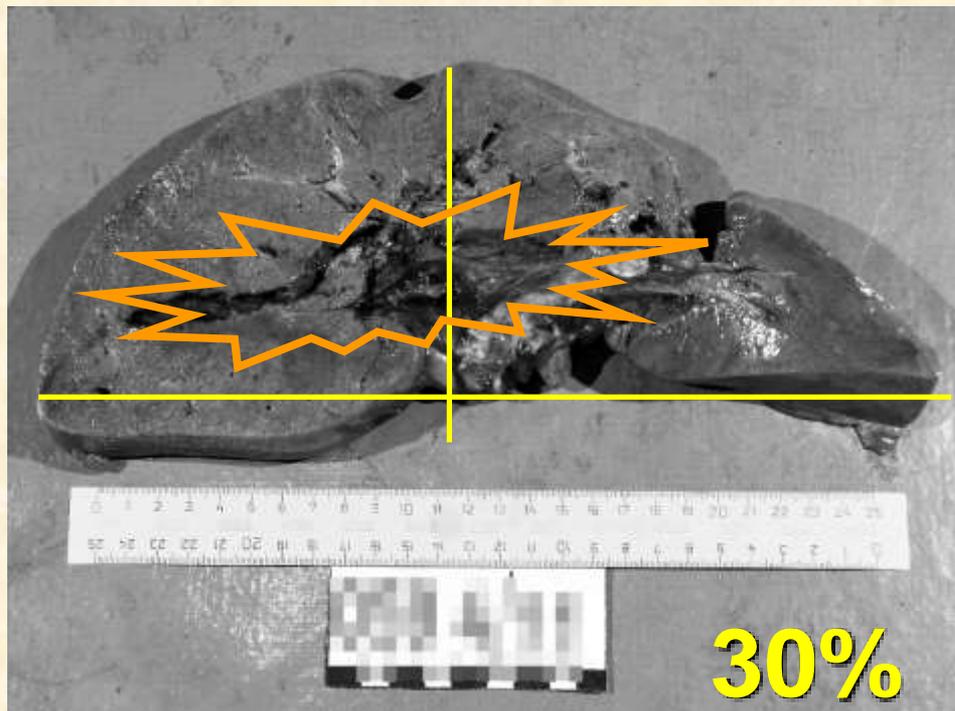


**Video:** positive pneumothorax to the right

**Video:** ribs and thoracic vertebral column fractures, dislocation of right kidney



## Reported case No. 2 – liver damage calculation (TIR)



**Total injury range** calculation is performed on liver sections in respect of total number of sections ( $n$ ) and shape index  $I_{sh}$  (central sections up to 0,8, peripheral sections – 0,6)

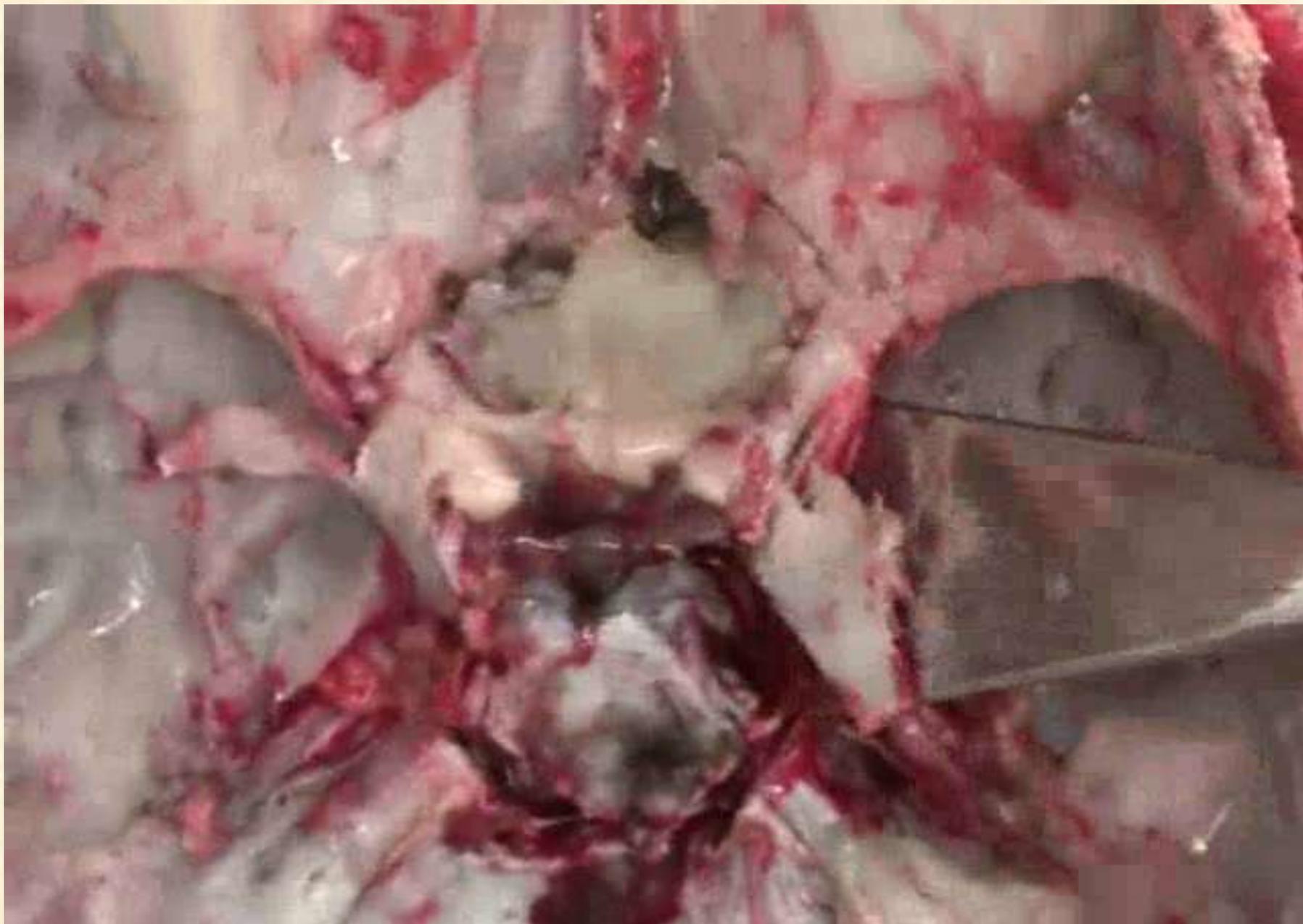
$$\text{TIR (\%)} = \frac{\sum h_i \times w_i \times d_i}{\sum h_0 \times w_0 \times d_0 \times I_{sh}} \times n^{-1}, I_{sh} = 0,6 - 0,8$$

## Results – reported case No. 3

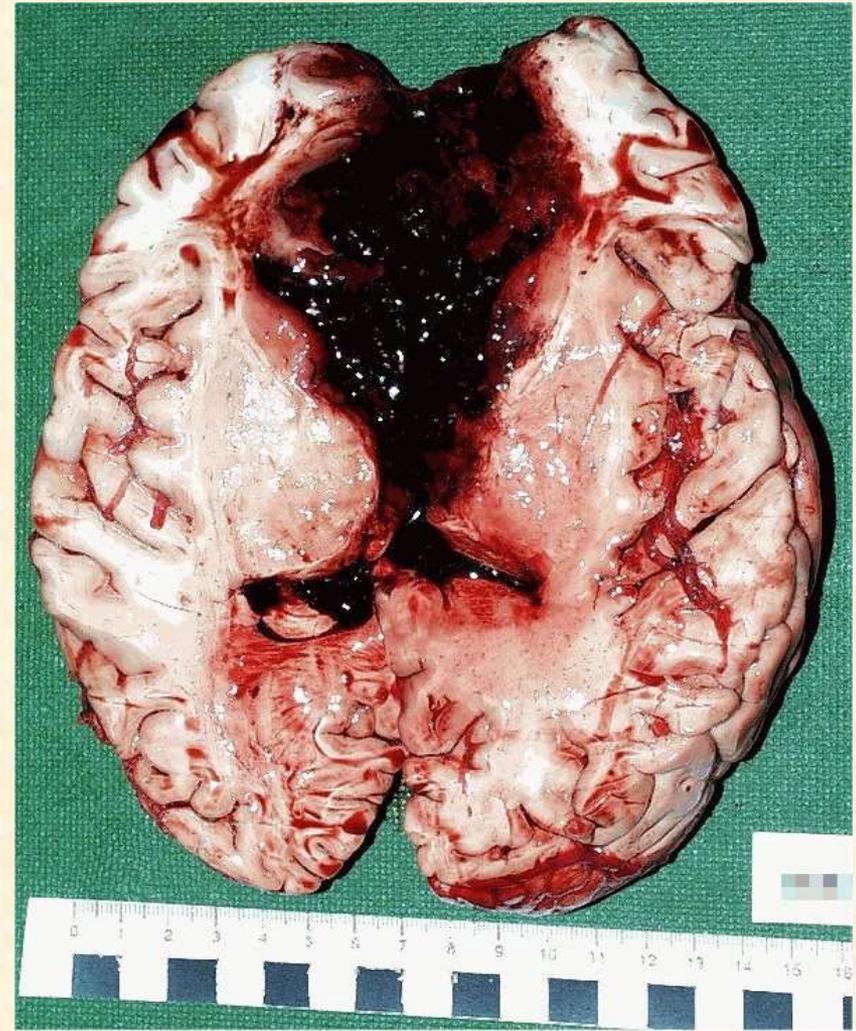


13-year-old boy: posttraumatic purulent sinusitis, meningitis

## Reported case No. 3 – purulent sinusitis



## More cases – discussed on forensic forums



Penetrating shot wound by slaughter pistol – comparison of *ante mortem* CT and autopsy findings



# More cases – discussed on forensic forums – FORENS-RUS

← → + ↩ → ↻ 🏠 🔍 100% 🌐 <http://forens.ru/index.php?shc>

**FR**  
ФОРУМ

**Правила**

Здравствуйте, Вы — [Dr\\_Vob](#) ( [Выход](#) )

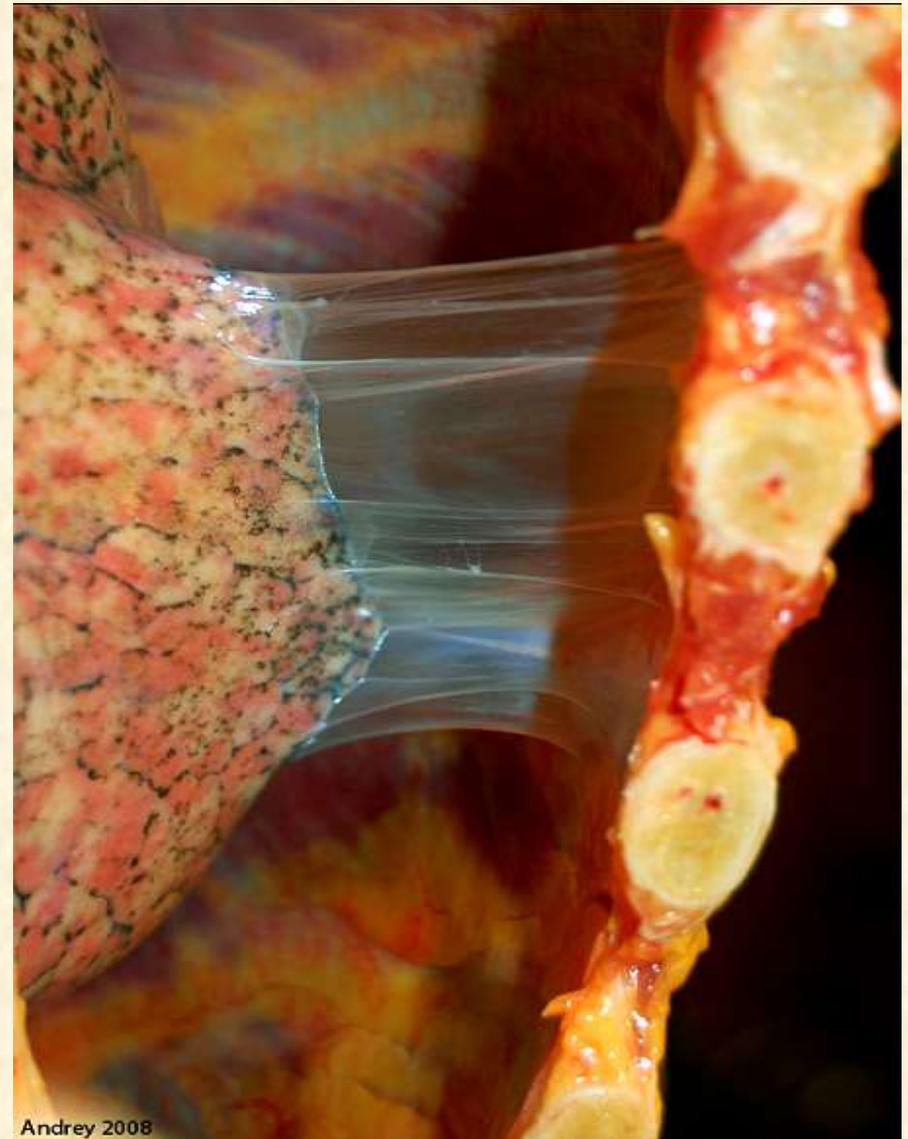
» FR > Made in forens.ru > Литературно-творческий салон > Конкурс "МАКРОФОТОГРАФИЯ"

» **Итоги конкурса "Макрофотография", голосуем**

Голосуем за понравившиеся фотографии

**Выберите 3-5 наиболее понравившихся Вам фотографий из списка**

Татуировка	[ 1 ]	● [0,99%
Рыба-1	[ 0 ]	● [0,00%
Рыба-2	[ 0 ]	● [0,00%
Рептилия-1	[ 2 ]	● [1,98%
Рептилия-2	[ 1 ]	● [0,99%
Цветы	[ 3 ]	● [2,97%
"Эх, пивка-бы..."	[ 0 ]	● [0,00%
Паук	[ 2 ]	● [1,98%
Бифуркация воротной вены в печени	[ 7 ]	● [6,93%
Метастазы рака простаты в печень	[ 0 ]	● [0,00%
Спайка в легком	[ 18 ]	● [17,82%
"Ожоговый пузырь"	[ 5 ]	● [4,95%
Радужка	[ 4 ]	● [3,96%
Интракраниальная аневризма	[ 12 ]	● [11,88%
Цветок	[ 0 ]	● [0,00%
Волосы, растущие непосредственно на своде черепа	[ 2 ]	● [1,98%
Гиалиноз париетальной плевры	[ 1 ]	● [0,99%
Атеросклеротическая бляшка а. basilaris	[ 0 ]	● [0,00%
Ушиб головного мозга	[ 2 ]	● [1,98%
Сосуды в области старых переломов ребер	[ 8 ]	● [7,92%



Andrey 2008

## Dental evidence



## **The bullet as the trace evidence**



## Fingerprints evidence



## **Latent fingerprints on the dead body**



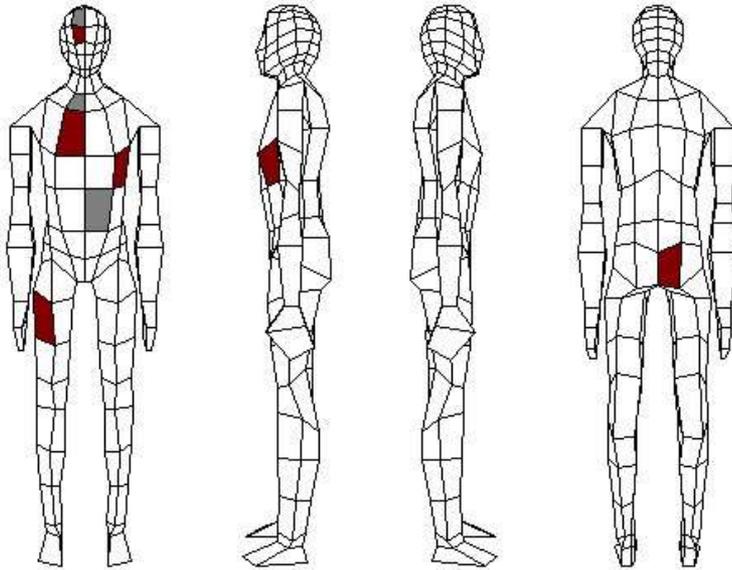
## The silicon cast of the wounding object



## Material for DNA analysis



# More cases – traffic accident of a driver – FORTIS



Meno:  
Muž, 80 kg, 170 cm,

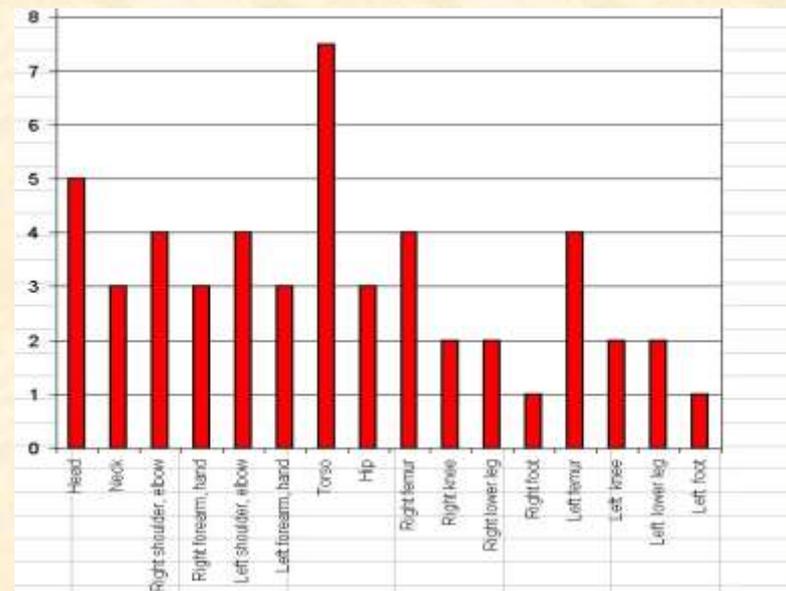
FORTIS

	Celkom	ZPZ	Ko1	Ko2
Trup	14	6	8	0
Paŕva	2	2	0	0
Pravé stehno	3	3	0	0
Pravé lýtko	0	0	0	0
Pravé chodidlo	0	0	0	0
Ľavé stehno	0	0	0	0
Ľavé lýtko	0	0	0	0
Ľavé chodidlo	0	0	0	0
Ľavé nadlaktie	0	0	0	0
Ľavé predlaktie	0	0	0	0
Pravé nadlaktie	0	0	0	0
Pravé predlaktie	0	0	0	0
Krk	0	0	0	0
Hlava	4	1	3	0
Ľavé koleno	0	0	0	0
Pravé koleno	0	0	0	0

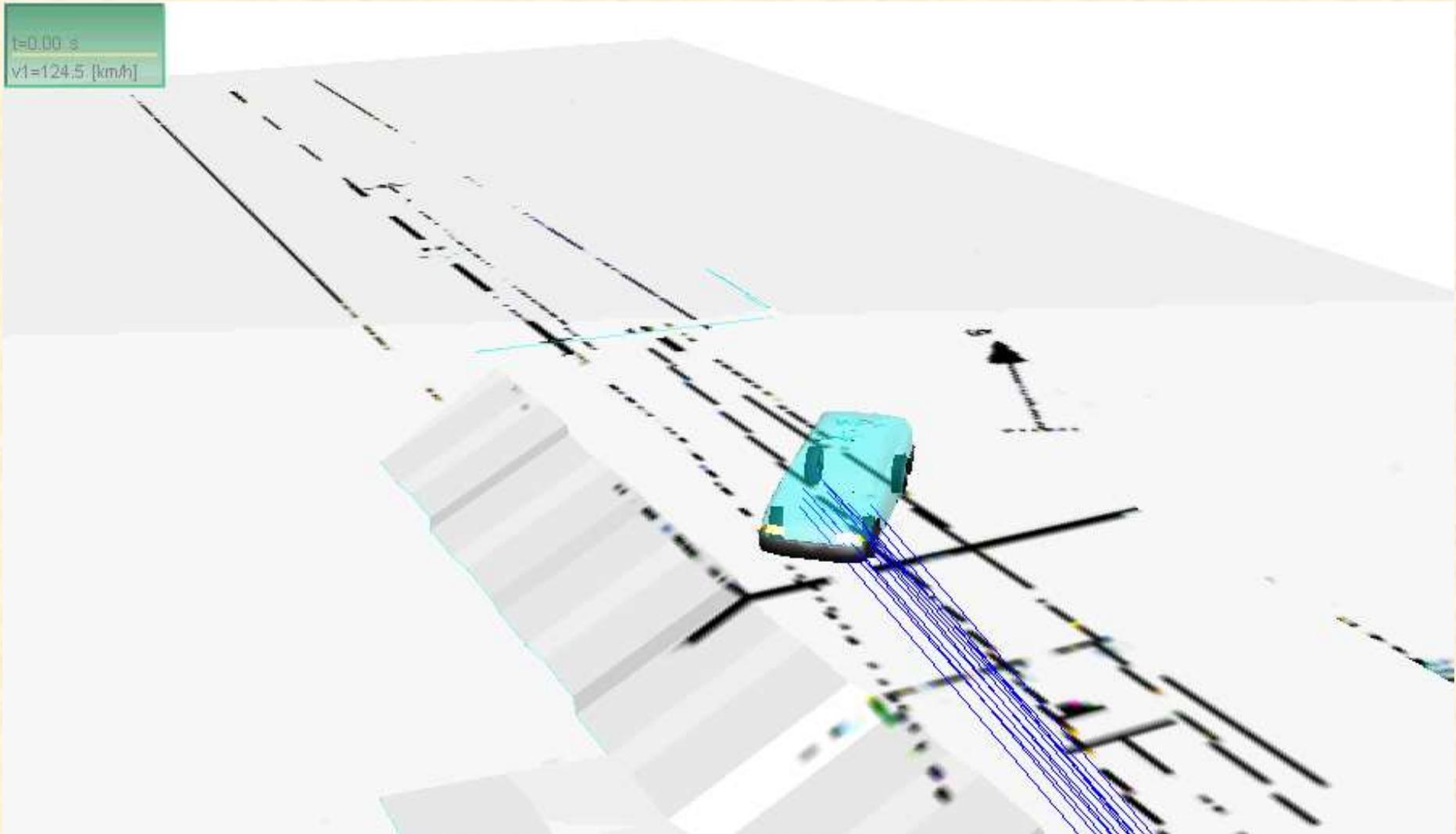
Celkom: FORTIS ZPZ 12  
 Celkom: FORTIS Ko1 11  
 Celkom: FORTIS Ko2 0

It is available to calculate the extent and severity of injuries by FORTIS systém in order to standardized evaluation of injury parameters as well as their complications

Local areas of injuries are divided to 16 body regions.



## More cases – traffic accident of a driver



Simulation of traffic accident by PC-CRASH v. 9 –  
throwing out of the non-restrained driver



- The demonstrated cases indicate, that the **complex application** of methods of visual fixation (forensic imaging) and visual dynamics in practice and teaching **leads to more precise making of autopsy diagnosis and to more effective medico-legal teaching.**
- This leads also to the **efficient collaboration** with law enforcement institutions (police, prosecutor, courts).
- The role of methods of visual dynamics is nowadays **increased**, that is why complete video footage at external and internal examination as well as using of most visual investigative methods in forensic medicine **is inevitable for the methodological and contentual integrity** of forensic documentation.
- The perspectives for the further development of visual investigative methods in practice and teaching **depend on a strict legislative settlement** of forensic imaging and particularly forensic visual dynamics on background of Slovak Law of personal info security.



Thanks for your attention!

