



What is forensic medicine?

**The main task of forensic medicine in Slovakia
and worldwide.**

The concept of forensic medicine.

Health Care Surveillance Authority (HCSA).

Medical aspects of death.

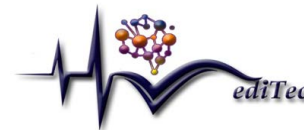


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Training for students

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UPJŠ, Faculty of Medicine, Košice, Slovakia





***„Forensic medicine is a key to the past,
explanation of the presence,
and indicator of the future.“***





"forensic" means "placed on *Forum Romanum*" (Roma, Italy)



Forum Romanum was a **marketplace in Roma** from ancient times, 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.



Stages of development of Forensic Medicine

1. stage – related to the development of basic medical knowledge and rights:

- existence of medical education
- knowledge of the effects of poisons and medicines
- knowledge of injuries
- establishment of laws and regulations defining the rights and responsibilities of a physician
- establishment of laws and regulations on injuries and death
- establishment of laws and regulations on compensation for damage to health and life

2. stage – related to the need for professional medical testimonies in cases of:

murder, poisoning, drowning, hanging, rape, injuries, criminal abortion, medical malpractice

3. stage – the period of gradual professionalisation:

- medico-legal investigation, including autopsies
- expert opinions/expert testimonies
- establishment of Departments of Forensic Medicine
- course on forensic medicine established in medical schools
- publication and research



History of Forensic Medicine

- **9th century BC** → worldwide foundation of the FM
- **5th century BC, Heliopolis** → first medico-legal autopsy
- **2nd century BC, Egypt, Ebers papyrus** → mention about effects of certain poisons and drugs, medical examination for legal purposes
- **Egypt** → knowledge about natural mummification and embalming
- **3rd century BC, China** → mention about effects of remedies
- **1 800 BC, Babylon – Code of Hammurabi** → the oldest collection of laws that established the fundamental rights and responsibilities of doctors, including medical errors
- **1st century BC, dynasty Qin** → bamboo records with instructions for examination of the wounds
- **600 BC, India – Manu Smriti (Laws of Manu)** → ancient legal text, including practices of law and government, like procedure of legal tribunals, rules of judicature, and civil and criminal law



History of Forensic Medicine

- **Hippocrates (460-377 BC)** → investigation of the cause of abortions, viability of newborns, and mechanical damages of skull
- **Ancient Rome, 448 BC – Twelve tables** → regulations of legal actions with necessity of medical examinations in violent cases



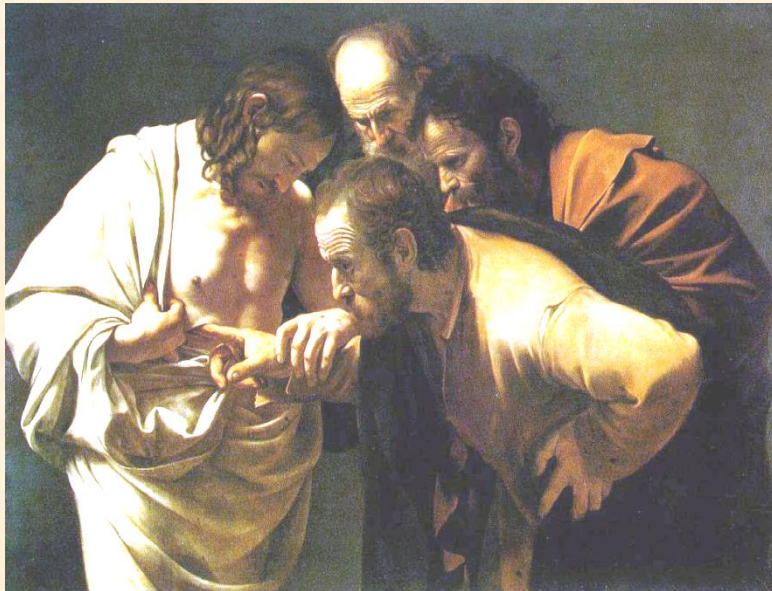
- **6th century AD – *Corpus Juris Civilis* (Body of Civil Law, Code of Justinian)** → replacement of Twelve tables, dealing with some medico-legal aspects like poisoning, determination of the age, testimonies of midwives when determining the date of birth, psychological disorders, mental condition of the perpetrator, distinction between death due to injury and death due to its complications



History of Forensic Medicine



- 44 BC – assassination of Julius Caesar
- body was examined by **Antistius**, according to his report, only one of Caesar's 23 stab wounds was fatal



- **St. Thomas** examining the wound on the side of Christ
 - candidate for the patron of medical examiners



History of Forensic Medicine

- **11th – 12th century** → no development of forensic medicine, times of trials by ordeal (fire, water)
- **12th – 14th century** → inquisition, torture
- **Europe** → first autopsy after abolition of prohibition of autopsies by Church
- **1302, Bologna** → first medico-legal autopsy (intoxication by arsenicum)
- **1600, Ján Jessenius, Prague** → first public autopsy (hanging) in Department of Anatomy ChU
- **Ambrosius Paré (1510-1590)** → first European author presenting the FM
- **1624, Daniel de Luna, Prague** – *Questiones legales*
- **1621, Paolo Zacchias, Rome** – *Questiones medicolegales*



Model of the autopsy room



Instruments used for the autopsy



Forensic Medicine (*legal medicine, forensic pathology*)

- branch of medicine used for legal purposes and concerned with determining cause of death, examination of injuries due to crime and negligence, and examination of tissue samples relevant to crimes

Forensic medicine is dealing with living and dead person, 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:

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

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

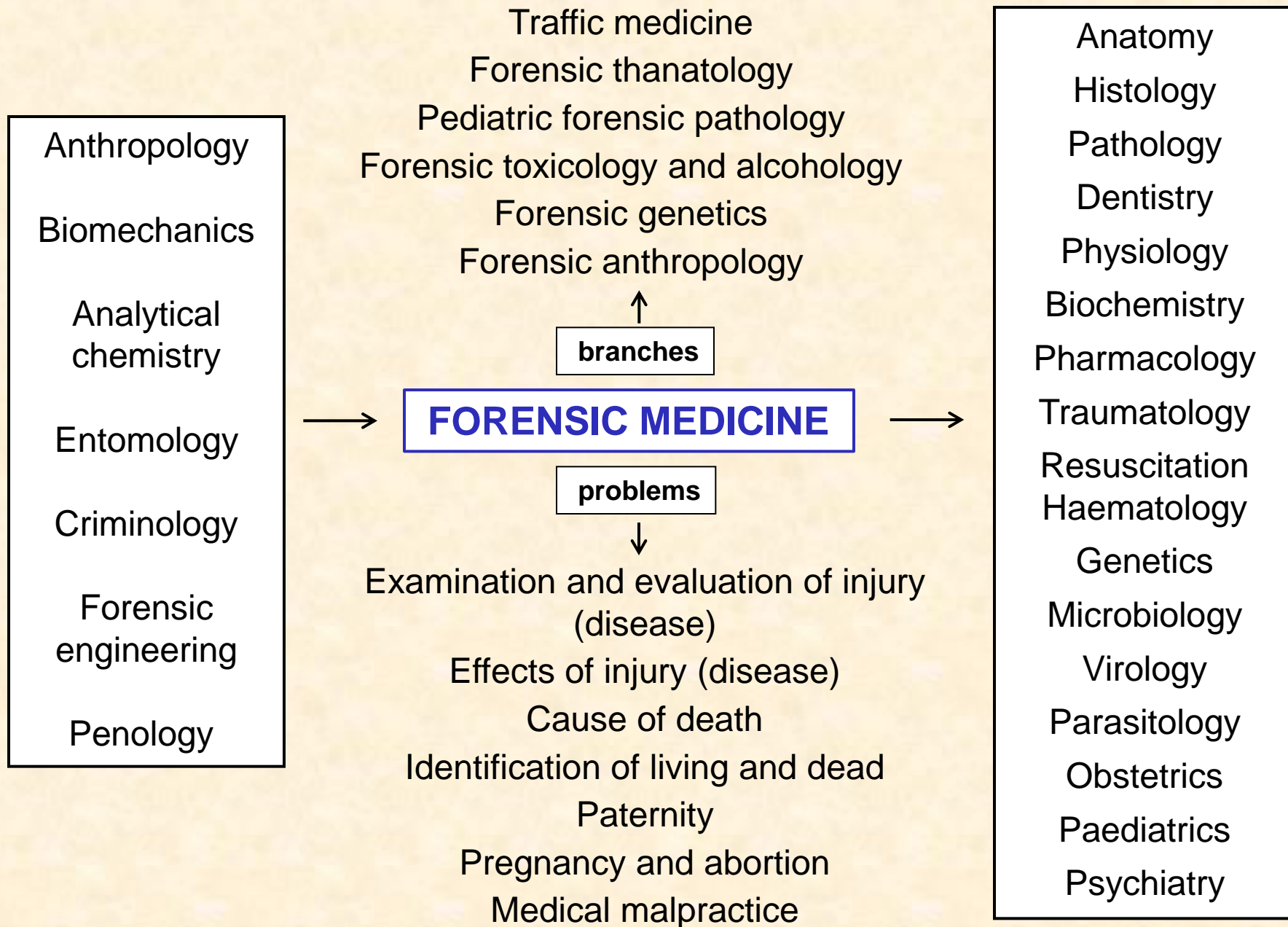
anthropology, biomechanics, analytical chemistry, entomology (science about insects), criminology, etc.

Subjects of forensic medicine:

traffic medicine, pediatric forensic pathology, forensic toxicology and alcoholology, forensic genetics, forensic anthropology, etc.



Relationships between Forensic Medicine and other sciences





- **1919** → the first **Department of Forensic Medicine of Comenius University in Bratislava** was established
- **1948** → **Department of Forensic Medicine of P. J. Šafárik 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 Concept of Forensic Medicine**
- **01.01.2005** → **Health Care Surveillance Authority** was established, with its **Medico-Legal and Pathological-Anatomical Departments**
- **2006** → **The New Concept of Forensic Medicine**

VESTNÍK



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

Výnos Ministerstva pôdohospodárstva Slovenskej republiky a Ministerstva zdravotníctva Slovenskej republiky z 26. júla 2006 č. 13760/2006-SL, ktorým sa mení a dopĺňa výnos Ministerstva pôdohospodárstva Slovenskej republiky a Ministerstva zdravotníctva Slovenskej republiky z 9. júna 2003 č. 1799/2003-100, ktorým sa vydáva hlava Potravinového kódexu Slovenskej republiky upravujúca materiály a predmety určené na styk s potravinami v znení neskorších predpisov

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
 - in cases of identification and exhumation
- 2. The presence of a forensic doctor at the scene of crime, external examination of the dead body.**

3. **Forensic toxicology** and drug analysis (living and dead persons)
4. **Forensic serohematology and genetics**
(examination of blood and other biological material, 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 skeletonized human remains by anthropological methods)

7. The role in mass disasters (natural)



8. Investigation of living persons:

- examination of wounds, 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. **Pregraduate and postgraduate education** and scientific research

- **Faculty of Medicine: Departments of Forensic Medicine**
Košice, Bratislava, Martin
→ education and research activities
 - **Health Care Surveillance Authority: Medico-Legal and Pathological-Anatomical Departments**
→ autopsies, toxicological analysis
- Forensic experts** (individuals/organizations/departments)
- external examination of the dead bodies and investigation of the scene of crime, autopsy
 - expert opinions



- established **by the Act No. 581/2004** Coll. on Healthcare Insurance Companies and Surveillance over Health Care
- **established in 1st January 2005**
- the Authority is not entered in the commercial register and its registered office is in Bratislava
- reports on activities of the Authority are submitted to the Government of the SR
- HCSA introduces a new element into health care that is independent, and its aim is the satisfaction of the 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 to doctors and healthcare providers**
- **holds the registry of persons who refused autopsy**



Headquarter – Žellova 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



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

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

Organizational set up

of the **Medico-legal and Pathological-Anatomical Departments:**

- necropsy section
- forensic histopathology (microscopic diagnostics)
- forensic toxicology and alcoholology
- forensic serohematology and genetics
- examination of living persons
- section of photodocumentation (macrophotography, microphotography, video and x-ray documentation)
- computer database archive and library



Forencis Medicine at UPJŠ



UPJŠ Faculty of Medicine, Košice



Medico-Legal and Pathological-Anatomical
Department of HCSA, Košice



Autopsy room, HCSA

...present



- forensic medicine helps to objectively **assess the causal link** by identifying, classifying and advocating those medical facts which are essential for the legal clarification of fault
- forensic medicine provides **reconstruction of the violent act** based on detailed and objective analysis
- **notification duty** in case of violent death
- **forensic expert activities:**
 - examination of the dead body and subsequent autopsy ordered by the police
 - examination of living persons – victim / perpetrator
 - participation on the reconstruction of the crime, expert witness testimonies
 - identification of persons
 - assessment of the influence of addictive and toxic substances on an individual
 - assessment of the medical conditions of the person in cases of compensation for pain and deteriorated social and work capacity



Autopsy

- is a **full post-mortem external and internal examination of the dead body** with the objective to estimate the cause, manner and mechanism of death
- it is a highly specialized procedure, which should be performed only by the experienced **forensic doctor or pathologist**



*"To the living we owe respect,
but to the dead we owe only the truth."*

Francois Marie Arouet Voltaire (1694-1778)



The value of autopsy:

- determination of the cause of death
- identification, anthropological examination
- determination of the time of death
- vitality and mechanism of injuries
- exclusion/confirmation, that the death was caused by another person
- death during diagnostic or therapeutic procedure
- diagnostic inaccuracies
- complications of the disease, treatment (iatrogenic damage)
- inherited disease, congenital disorders, metabolic disorders
- diseases in donors for organ transplantation
- collection of data for medical statistics
- expert activities in the assessment of potential complaints about an incorrect treatment
- autopsy as a part of an expert activity → crime investigation
- life insurance payout

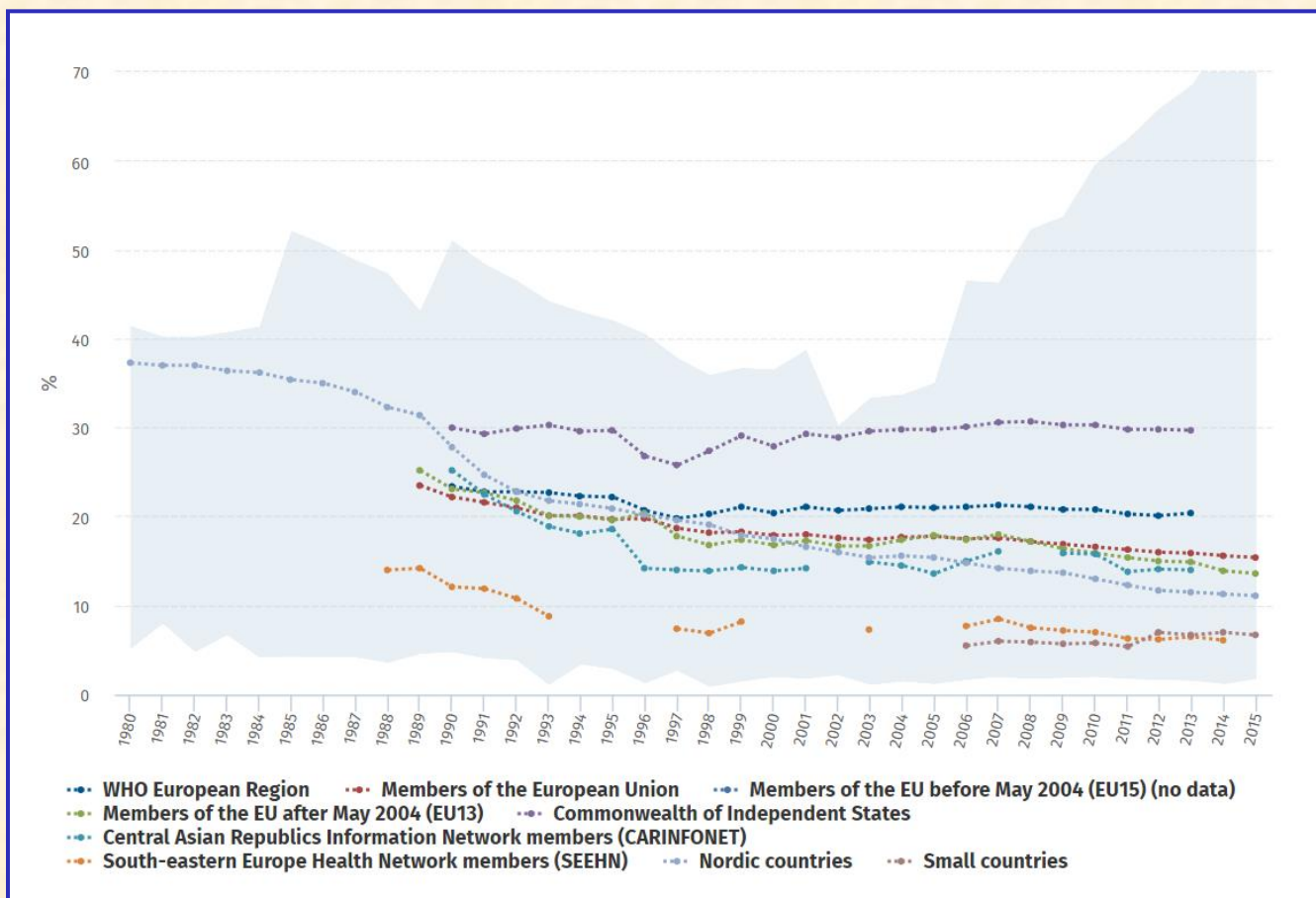


Autopsy rate

Autopsy rate → worldwide decrease

e.g.: Members of EU: **25,5% (1984) → 13,6% (2015)**

Nordic countries: **37,3% (1980) → 11,1% (2015)**



WHO
Autopsy rate (%)
for all deaths
(1970-2015)



Most common reasons for not ordering an autopsy:

- inexperience medical examiner, who can not properly assess whether the autopsy is needed or not
- pressure from the clinicians not to order the autopsy for the fear of unrecognized or wrong diagnoses
- pressure from the family members not to order the autopsy
- autopsy refusal by family members – accepted in some countries
- religious beliefs
- confirmation of diagnosis during life (new visualization and laboratory methods)



Autopsy rate – Košice region

- number of deceased persons in Slovakia: approx. **50 000-53 500**
- number of inhabitants in **Košice region**: approx. **775 500**
- number of inhabitants in Košice: **233 700**
- number of **deceased persons** in **Košice region**:
approx. 7300-7500/year
- **number of autopsies** performed at the **Medico-Legal and Pathological-Anatomical Department of HCSA in Košice** per year: **aprox. 1200 (15-18 % of the total number of the deceased)**



Regionalization of autopsies in Slovakia



- death in hospital if there is a need to **verify the underlying illness or treatment**
- death related to the surgery and during surgery – *mors in tabula*
- suspicion for **contagious illness**
- suspicion for **radioactive contamination** of deceased
- after procurement of organs for transplantation – **organ donors**
- suspicion of **medical malpractice**
- suspected **poisoning** including professional exposition to such agents
- **occupational disease**, death related to work
- **violent death** including suicide
- death **abroad**
- death in **jail/custody**
- all cases of sudden/unexpected death where by external examination or by other means was **not possible do specify the cause of death**



1. Anatomical autopsy:

For academic interest, teaching and research purposes.

2. Pathological (clinical) autopsy:

Performed by a **pathologist**, when 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

Performed by a **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

Performed by **two forensic doctors – experts**, in cases of violent death, where the suspicion of the other person's guilt can not be excluded. Result is an expert opinion.



Rules for autopsy performance

1. The dead body must be identified before autopsy.
2. Collection of identification marks in a case of the unknown body.
3. Where definite crime or suspicion exists, the forensic doctor should visit the scene of the death.
4. The body should be examined with the clothing; the clothes must be carefully retained for police laboratory examination.
5. The body should be photographed at the scene of death, and then in autopsy room, first with the cloths on and then after their removal.
6. Access must be given to the police forensic experts before and during the autopsy for the collection of trace evidence.
7. In a medico-legal autopsy the external examination often means more than internal examination.
8. The external appearance must be recorded by photos, video, sketches and description, the nomenclature of injuries must be accurate.
9. The biological material (blood, urine, tissue and organ samples) must be taken for histo-, toxico-, serohematological, and other investigations.
10. The internal examination must be complete, never only partial.



Death (*from a biological point of view*) is defined as a permanent ending of all vital processes, cellular activity, and metabolism.

Death (*from a medical point of view*) is defined as an irreversible cardiac and respiratory arrest, associated with a permanent ending of all brain functions (brain death).

Dying is relatively complicated process caused by a severe damage of vitally important organ or body system leading to the reduction and cessation of main vital functions.

Stages of dying:

- 1st stage – agony
- 2nd stage – clinical death
- 3rd stage – somatic death
- 4th stage – cellular death

- **thanatology** is a science of dying and death
/Thanatos – god of dead sleep in the ancient Greek mythology/
- the main branch of this science is a **forensic thanatology**



Pronouncement of death

- in most states the pronouncement of death is a task of the physician, the registered nurse or the coroner

Two categories of legal death:

- **cardiopulmonary death** – determined by irreversible cessation of heartbeat and breathing
- **brain death** – determined by irreversible cessation of functions of the brain

General signs of death:

- absence of spontaneous movement
- absent pupillary reflex (no reaction to light)
- the absence of all reflexes (corneal, oculocephalic, cough, gag, oculovestibular)
- cessation of breathing (auscultation, no clouding on a bright surface (mirror) held in front of the nose and mouth)
- cessation of blood circulation (absence of carotid pulsation and heart sounds for one to three minutes)
- flat electroencephalogram (EEG)
- postmortem changes (early or late)



Clinical evaluation of brain death

- the patient is in a **deep coma**
- **exclusion of reversible cause of unconsciousness** (shock, hypothermia, drugs affecting neurological and neuromuscular functions)
 - the patient must for at least 6-12 hours without such medication
- performance of a **complete neurological examination**:
 - examination of the patient-absence of spontaneous movement, absence of response to noxious stimuli administered through a cranial nerve path way
 - absent pupillary reflex to direct and consensual light; pupils need not be equal or dilated
 - absent corneal, oculocephalic, cough, gag, oculovestibular reflexes
 - absent respiratory efforts, the patient is on mechanical ventilation
 - the apnoea test

Confirmatory tests: EEG, CT angiography, cerebral angiography, brainstem auditory evoked potential (BEAP)

I. Natural (non-violent) death – such manner of death, where the cause of death is known as a definitive disease or the cause is unknown yet, but the violent factors are excluded.

These are three subtypes of the natural death:

- 1. Expected death** – caused by clinically estimated and properly treated severe disease or its complications.
- 2. Sudden death** – rapid natural death, in which the cause is unknown (cannot be discovered without the autopsy).

Sudden death cases are:

- case of instantaneous death
- case of non-instantaneous death
- case of founding dead individual

3. Unexpected death – death where a known disease was successfully treated or the patient is in recovery, but this disease unexpectedly causes death.

II. Violent death – such manner of death, where the cause of death is evident violence or complication after a committed violent act.

In general the violent death may be caused by:

- blunt force injury
- sharp force injury
- firearms and explosive injuries
- mechanical asphyxia
- thermal injuries
- electrical injuries
- barotrauma
- intoxication
- medical malpractice

II. Violent death

There are three subtypes of the violent death from a legal point of view:

1. Suicide
2. Homicide
3. Accident



POSTMORTEM CHANGES

Postmortem changes refers to various processes that occur in the body shortly after death, first on a cellular level, later they become visible.

Two types of postmortem changes

- early postmortem changes
- late postmortem changes



Thank you for attention!

