

Introduction to Forensic Medicine



Presenter: Noor Abu Hantash

Objectives:

- Define forensic medicine
 - Describe the historical evolution of forensic medicine
 - Distinguish between forensic medicine and forensic science
 - Identify and classify the main branches of forensic medicine
 - Recognize key types of forensic investigations
 - Explain the medical-legal role of a forensic physician
 - Analyze a real-life forensic case to understand interdisciplinary roles
-

Definition of Forensic Medicine

- Forensic medicine today is a large medical field that includes many sub areas. However, generally, when one speaks or thinks about it, one associates it immediately with death, autopsies, and related problems. Yet, this is only part of legal medicine, as new approaches and subspecialties are realized because of the advances in medical sciences and sociopolitical changes around the world. Forensic anthropology and clinical forensic medicine are perhaps the best examples of these “new sciences.”
-

-
- “**Forensic**” comes from the Latin word *forensis*, meaning “of or before the **forum**” — referring to the Roman forum where legal matters were discussed(court).
 - “**Medicine**” refers to the science and practice of diagnosing, treating, and preventing disease and injury.
 -  **Together:**
Forensic Medicine literally means “*legal medicine*” — the use of medical expertise in a judicial or investigative setting.
-

*Scientific Definition of Forensic Medicine:

- **Forensic medicine** is the branch of medicine that applies medical knowledge, methods, and principles to the investigation of crimes, particularly in determining the cause, manner, and circumstances of death, as well as the evaluation of injuries in living individuals for legal purposes.
- It integrates disciplines such as pathology, toxicology, and clinical medicine with legal standards to assist in the administration of justice.

Scope Includes: a) Postmortem examination (autopsy)

b) Injury analysis in living persons (assault, abuse)

c) Toxicology

d) Identification of deceased individuals

e) Estimating time of death

Historical perspectives

Era	Civilization / Region	Key Contributions
~2600 BCE	Ancient Egypt	First trauma records; basic understanding of injuries and embalming.
~500 BCE	Ancient India	<i>Sushruta Samhita</i> described wounds, forensic injury patterns, and poisoning.
~300 BCE	Ancient Greece	Hippocratic writings emphasized observation and natural causes of death.
1247 AD	China (Song Dynasty)	<i>Hsi Yuan Lu</i> : First forensic textbook on death investigation and wounds.
13th–16th Century	Medieval Europe	Limited autopsies due to religious restrictions.
16th Century	Italy (Renaissance)	First formal autopsies; anatomy advanced (Vesalius).
17th Century	Germany	Forensic medicine taught in universities (e.g., Leipzig).
18th Century	Europe	Emergence of forensic toxicology and early chemical analysis of poisons.
19th Century	UK & France	Forensic pathology institutionalized; coroners and autopsy systems developed.
20th Century	Global	DNA, toxicology, and imaging integrated into investigations.
21st Century	Global	Digital forensics, virtopsy, and multidisciplinary teams.

Forensic medicine vs forensic science



Aspect	Forensic Medicine	Forensic Science
Focus	Application of medicine to law	Application of any science to law
Practitioners	Medical doctors (e.g., pathologists)	Scientists (chemists, biologists, etc.)
Core Tasks	Determine cause/manner of death, examine victims	Analyze evidence (fingerprints, fibers, DNA)
Setting	Autopsy rooms, hospitals, crime scenes	Labs, crime scenes



*Forensic medicine is a **subset** of forensic science with a medical focus.*

Branches of forensic medicine

Branch	Description	Example
Forensic Pathology	Investigates cause/manner of death through autopsy.	Autopsy in sudden unexplained death.
Clinical Forensic Medicine	Examines living individuals in legal cases.	Rape kit examination; assessing injury in child abuse.
Forensic Toxicology	Analyzes poisons, drugs, and chemicals.	Detecting cyanide in a suspected poisoning case.
Forensic Thanatology	Studies postmortem changes and time since death.	Rigor mortis used to estimate time of death in a homicide.
Medical Ethics	Covers moral principles in medical practice.	Respecting patient confidentiality in legal cases.
Medical Etiquette	Addresses professional conduct among doctors.	Courteous communication between doctors in a forensic report.

Branch	Description	Example
Medical Jurisprudence	Legal duties and responsibilities of physicians.	Handling a medical negligence lawsuit.
Forensic Odontology	Uses dental evidence for identification or injury analysis.	Identifying a disaster victim using dental X-rays.
Forensic Psychiatry	Evaluates mental status in legal contexts.	Determining if a murder suspect is legally insane.
Forensic Anthropology	Identifies skeletal remains and reconstructs identity.	Identifying burned remains using pelvic bones.
Forensic Entomology	Uses insect evidence to estimate time of death.	Using maggots to estimate death occurred 3 days earlier.
Forensic Serology	Studies and classifies bodily fluids at crime scenes.	DNA testing from semen in a sexual assault case.

Forensic Investigations

Type of Investigation

Postmortem Examination (Autopsy)

Injury Assessment in Living Persons

Sexual Assault Examination

Age Estimation

Toxicological Analysis

Time of Death Estimation

Human Identification

Purpose

Determine cause and manner of death (natural, homicide, etc.).

Document and classify injuries from assault, abuse, or accidents.

Collect biological evidence, document trauma, support legal cases.

Assess bone, dental, or sexual maturity for legal age disputes.

Detect presence of alcohol, drugs, poisons in body fluids or tissues.

Use postmortem changes (rigor, livor, decomposition, entomology).

Use DNA, dental records, or skeletal features to identify unknown persons.

Autopsy



It is the primary tool of forensic medicine that frequently used for identification of the dead. *Autopsies may also be conducted to determine the cause of death. *(In a death by gunshot, for example, he can determine with reasonable accuracy the range and angle of fire).

Feature	Forensic Autopsy	Clinical Autopsy
Purpose	Legal investigation	Medical understanding
Conducted by	Forensic pathologist	Clinical pathologist
Requires permission?	No (ordered by legal body)	Yes (from family)
Report use	Court/legal documentation	Hospital/academic record

Autopsies significance

- 1. To document (diagnose, describe, and measure) both external and internal injuries.
 - 2. To detect external and internal abnormalities, malformations, and diseases.
 - 3. To attribute the death to a particular event—the nexus of causality, a paramount issue in legal medicine.
 - 4. To determine other causes that might have contributed to death.
 - 5. To collect samples for histological, toxicological, microbiological, or other ancillary analysis.
 - 6. To determine the time of death, when necessary and possible.
 - 7. To determine whether a newborn had breathed or not.
 - 8. To keep relevant organs, tissues, or samples as evidence.
 - 9. To provide a full written report of the necropsy findings, giving a serious and competent medicolegal interpretation of the findings.
 - 10. To return the body to the family as well presented as possible.
-

a Real-Life Forensic Case – The Zahra Baker Case



-
- In **October 2010**, the disappearance of **10-year-old Zahra Baker**, a cancer survivor with a **prosthetic leg and hearing aids**, triggered alarm in North Carolina. Her **stepmother, Elisa Baker**, reported her missing after setting a **fire in the backyard** and leaving a **fake ransom note**, which was later linked to her through **forensic handwriting analysis**. **Cadaver dogs** alerted to the presence of human remains in the house and family vehicles. Days later, Zahra's **dismembered remains** and **prosthetic leg** were discovered in multiple locations. **Forensic pathologists** determined that the dismemberment occurred **postmortem**, while **forensic anthropologists** analyzed bone tool marks and aided identification. **DNA testing** matched Zahra's toothbrush to the recovered bones, and her **prosthetic leg's serial number** confirmed identity. **Forensic toxicology** ruled out poisoning, while **digital forensic evidence** placed Elisa near disposal sites. Social services had received **multiple prior abuse reports** that were not acted on. Ultimately, Elisa Baker was convicted of **second-degree murder** with aggravating factors including **abuse, concealment, and desecration of remains**. The case highlights the critical role of **interdisciplinary forensic collaboration**—pathology, anthropology, odontology, DNA, and digital analysis—in solving complex criminal investigations and delivering justice
-

References

- 1-Chapter 2 Introduction to Forensic Medicine and Pathology ,João Pinheiro
 - 2-: Encyclopedia of Forensic and Legal Medicine (Second Edition), 2016
 - 3-<https://de.scribd.com/document/869875763/INTRODUCTION-TO-FORENSIC-MEDICINE>
 - 4-<https://www.udemy.com/course/introduction-to-forensic-medicine/>
 - 5-Textbook of Forensic Science . Springer, Singapore. https://doi.org/10.1007/978-981-99-1377-0_20
 - 6-JU medicine 2018
 - 7-ChatGPT
-



Thank you
