

## **Forensic Pathology**

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**ABSTRACT:** *The word forensic is derived from the Latin word forensis, meaning "of or before the forum". In modern use, the term "forensics" in the place of "forensic science" can be considered correct as the term "forensic" is effectively a synonym for "legal" or "related to courts". Forensic pathology is sub-speciality of pathology that focuses on determining the cause death by examining the corpse.*

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### **I. INTRODUCTION**

The word forensic is derived from the Latin word forensis, meaning "of or before the forum". In modern use, the term "forensics" in the place of "forensic science" can be considered correct as the term "forensic" is effectively a synonym for "legal" or "related to courts". Forensic pathology is sub-speciality of pathology that focuses on determining the cause death by examining the corpse. The autopsy is performed by coroner or medical examiner, usually during the investigations of civil law and criminal law cases in some jurisdiction. Subspecialty board certification is available in forensic pathology after completion of a minimum of three-years in pathology residency and an additional fellowship year in an accredited forensic pathology training program.

### **II. BRANCHES IN FORENSIC PATHOLOGY:**

Two distinct branches in forensic pathology:

- Anatomical pathology
- Clinical pathology

### **III. ANATOMICAL PATHOLOGY:**

It is a medical specialty which deals with the morphologic evaluation of tissues removed from living or dead individuals by use of gross, microscopic, chemical, immunologic and molecular examination. Anatomical pathology has three distinct areas: autopsy pathology, surgical pathology, and cytopathology. A forensic pathologist will be concerned almost exclusively with performing autopsies. It deals with structural alterations of the human body.

### **IV. CLINICAL PATHOLOGY:**

A forensic pathologist working in this particular field will be responsible for quantitative and qualitative analysis and interpretation of patient specimens, including tissue, blood, urine, and other body fluids by laboratory means. The main subcategories of clinical pathology are chemistry, hematology, microbiology, blood banking, toxicology, and immunology. In short: it deals with laboratory examination of samples removed from the body.

A forensic pathologist ultimately determines the cause of death for people who have died unexpectedly, suddenly, or by violent means. In some parts of the world it is a basic requirement for any individual who has died unexpectedly to have an autopsy performed on them in order to prove definitely the cause of death and rule out the chance of foul play.

Human remains are treated as a separate and unique type of forensic evidence. As such, the forensic pathologist is charged to examine the human remains (post-mortem examination) and consider death scene findings. There are various instances that can occur during field work; during the examination the forensic pathologist might recover critical clues as to the manner and means of death, ranging from highly evident, like bullet wounds, to less conclusive like a wound pattern that can be matched to a weapon.

### **The Basic Terminology for Describing Traumas In Forensic Pathology**

Laceration is a tearing injury due to friction or impact with a blunt object. Incised wound is a cutting injury due to slicing action of a bladelike object. Puncture is a penetrating injury due to pointed object without a blade. Abrasion is a friction injury removing superficial layers of skin. Contusion is a bruise due to rupture or penetration of small-caliber blood vessel walls. Gunshot wounds represent a special form of trauma, very much encountered with particular interest to forensic pathologist, as it represents a clear sign of manslaughter. By analyzing gunshot wounds, one can determine many parameters like the type of firearm used, firing distance, whether the trauma is an entry or exit wound, and the track of the projectile through the body. Wounds may be

**Classified by distance as follows:**

Contact wound: Muzzle of gun was applied to skin at time of shooting.

Close range (6 – 8 inches): The entrance wound is surrounded by fouling, due to gun powder particles which get stuck to the skin or cloths of the victim from the proximity.

Intermediate range (6 – 8 inches to 1.5 – 3.5 feet): Hot fragments of burning gunpowder follow the bullet to the victim and produce stippling by causing pinpoint burns around the entrance wound.

Distant (greater than 1.5 – 3.5 feet): There aren't clear signs like in the previous distance classifications from above, like gunpowder and such, however by examining the entrance and exit wounds, a forensic pathologists can accurately determine the firing range using common means from his practice.

**V. SCOPE IN FORENSIC PATHOLOGY:**

**The Forensic Pathologist:**

- 1) Is a medical doctor who has completed training in anatomical pathology and who has subsequently sub-specialized in forensic pathology? The requirements for becoming a “fully qualified” forensic pathologist vary from country to country. Some of the different requirements are discussed below.
- 2) Performs autopsies/postmortem examinations to determine the cause of death. The autopsy report contains an opinion about:
  - The pathologic process, injury, or disease that directly results in or initiates a series of events that lead to a person's death (also called mechanism of death), such as a bullet wound to the head, exsanguinations caused by a stab wound, manual or ligature strangulation, myocardial infarction resulting from coronary artery disease, etc.), and
  - The "manner of death", the circumstances surrounding the cause of death, which in most jurisdictions include:
    - Homicide
    - Accidental
    - Natural
    - Suicide
    - Undetermined
- 3) The autopsy also provides an opportunity for other issues raised by the death to be addressed, such as the collection of trace evidence or determining the identity of the deceased.
- 4) Examines and documents wounds and injuries, both at autopsy and occasionally in a clinical setting.
- 5) Collects and examines tissue specimens under the microscope (histology) in order to identify the presence or absence of natural disease and other microscopic findings such as asbestos bodies in the lungs or gunpowder particles around a gunshot wound.
- 6) Collects and interprets toxicological analyses on body tissues and fluids to determine the chemical cause of accidental overdoses or deliberate poisonings.
- 7) Forensic pathologists also work closely with the medico-legal authority for the area concerned with the investigation of sudden and unexpected deaths i.e. the coroner (England and Wales), procurator fiscal (Scotland) or coroner or medical examiner (United States).
- 8) Serves as an expert witness in courts of law testifying in civil or criminal law cases.

In an autopsy, he/she is often assisted by an autopsy/mortuary technician (sometimes called a diener in the USA). Forensic physicians, sometimes referred to as 'forensic medical examiners' or 'police surgeons' (in the UK until recently), are medical doctors trained in the examination of, and provision of medical treatment to, living victims of assault (including sexual assault) and those individuals who find themselves in police custody. Many forensic physicians in the UK practise clinical forensic medicine part-time, whilst they also practise family medicine, or another medical specialty.

**VI. DEATH INVESTIGATION/CORONER:**

**Coroner:**

A coroner is a government official who confirms and certifies the death of an individual within a jurisdiction. A coroner may also conduct or order an investigation into the manner or cause of death, and investigate or confirm the identity of an unknown person who has been found dead within the coroner's jurisdiction. Responsibilities may include overseeing the investigation and certification of deaths related to mass disasters that occur within the coroner's jurisdiction. A coroner's office typically maintains death records of those who have died within the coroner's jurisdiction.

Depending on the jurisdiction, the coroner may adjudge the cause of death personally, or may act as the presiding officer of a special court (a "coroner's jury"). The office of coroner originated in medieval England [1] [2] and has been adopted in many countries whose legal systems have at some time been subject to English or United Kingdom law. The additional roles that a coroner may oversee in judicial investigations may be subject to the attainment of suitable legal and medical qualifications. The qualifications required of a coroner vary significantly between jurisdictions, and are described under the entry for each jurisdiction. In Middle English, the word "coroner" referred to an officer of the crown, derived from the French *couronne* and Latin *corona*, meaning "crown". [3]

## **VII. DEATH INVESTIGATION:**

Deaths where the known cause and those considered unnatural are investigated. In most jurisdictions this is done by a "forensic pathologist", coroner, medical examiner, or hybrid medical examiner-coroner offices. In some jurisdictions, the title of "Medical Examiner" is used by a non-physician, elected official involved in medico legal death investigation. In others, the law requires the medical examiner to be a physician, pathologist, or forensic pathologist.

Similarly, the title "coroner" is applied to both physicians and non-physicians. Historically, coroners were not all physicians (most often serving primarily as the town mortician). However, in some jurisdictions the title of "Coroner" is exclusively used by physicians.

Medico legal Death Investigation is an uncommon term used to describe the investigation into the manner and causes of death. The name implies a combination of medicine and law into a common discipline. However, the field is much more complex than this simple concept may indicate. Death investigation is comprised of a multitude of forensic specialists. These include the investigators, scientific and medical personnel, police, paramedics, clergy and other support staff.

## **VIII. HISTORY:**

In German-speaking Europe, lectures on forensic pathology were regularly held in Freiburg in the mid 18th century and Vienna in 1804. Scientists like Auguste Ambroise Tardieu, Johann Ludwig Casper and Carl Liman made great effort to develop forensic pathology into a science based on empirics.

Forensic pathology was first recognized in the United States by the American Board of Pathology in 1959. [4] In Canada, it was formally recognized in 2003, [5] [6] and a formal training program (a fellowship) is currently being established under the auspices of the Royal College of Physicians and Surgeons of Canada. [7] Education [edit]

## **IX. EDUCATION IN INDIA- FORENSIC PATHOLOGY:**

In India, the speciality is commonly referred to as Forensic Medicine or Legal Medicine. After completion of medical graduation (MBBS), one has to complete three years of study and training including thesis research, which leads to award of degree of MD (Forensic Medicine). One can also alternately pass the board examination conducted by National Board of Examinations, leading to awarding of Diplomat of National Board (DNB).

The majority of the specialists are attached to the Department of Forensic Medicine in various medical colleges. The classification of posts includes Assistant Professor (Lecturer), Associate Professor (Reader) and Professor. The work profile of the specialists includes conducting autopsies and clinical forensic examinations; apart from teaching the medical students. They have to regularly appear in the courts as expert witnesses. A typical department in a government institution conducts 100 to 5000 autopsies a year depending upon the jurisdiction. Apart from this the clinical forensic examinations constitute a major part of the work and number of cases can run up to 10000 a year in an average institution.

The largest association of the specialty is Indian Academy of Forensic Medicine [8] (IAFM), which also publishes its quarterly Journal of Indian Academy of Forensic Medicine [9] regularly. This association has specialist member strength of more than 1000.

**Research Obstacles in Forensic Pathology [10]:**

Research issues in forensic pathology -

- academic practice
- Fellowship training
- Funding availability
- Literature

Academic medicine and research infrastructure:

- pre-award
- contract and granting accounting
- compliance
  - IRB
  - COI
  - ANIMAL CARE
  - BIO HAZARD
- Animal facilities
- Grants management and research training
- Core laboratories

**Academic Forensic Pathology:**

- Full time faculty - 14/125(11%) medical schools
- run state and regional ME offices
- Contract autopsies ME or coroners
- Adjunct relationships - more common and support teaching

**Academic Forensic Pathology:**

- Questionnaire - 14 institutions, 100% response
- 39 total faculty forensic pathology positions
  - 1) 21 tenure track
  - 2) 18 clinical and other tracks
  - 3)25 positions require research/ scholarly output.

**Forensic Pathology:**

Fellowship training available at 6 of 14 academic institutions.

**Forensic Pathology Journals:**

- Journal of forensic sciences
- American Journal of forensic medicine and pathology.

**Other Limitations on Research:**

- Time - priority to publically funded service work
- Isolation from academic centres
- Lack of priority within academic centres.

**Other Limitations on Research:**

- Study subjects- tissue use issues (legal, ethical)
- Confidentiality
- Poorly standardized data acquisition and information technology
- Fragmented jurisdictions restrict population- based epidemiology

**Summary of Problems:**

- Few medical schools with forensic pathologies (No jobs)
- Handful of medical schools prioritize research by forensic pathologies (No support)
- Rare fellowships programs provide research training (No training)
- Scant federal funds available (No resources)
- Anemic forensic pathological nature (No results)

### Forensic Pathology- Research Assets

- Last stronghold of autopsy pathology and tissues
- Window on all unnatural deaths - many offices "data- rich"
- Many jurisdictions populations- based
- Epidemiology treasure trove [10].

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