

*First Edition*

*An English Textbook for Medical Students, Law Students, and Forensic Medical Experts*

# Forensic Medicine 法医学

*Edited by*

Ling Li

Yiping Hou

主 编

(李 玲)

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*Associate Editors*

Ziqin Zhao

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PEOPLE'S MEDICAL PUBLISHING HOUSE

Collaborative Innovation Center of Judicial Civilization

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法 医 学

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# FORWARD

Since the beginning of political, cultural, social, and economic reform in 1977, China has undergone profound changes in all its areas of endeavor. With the globalization of trade, China has attracted more and more foreign developers and scholars. There has been a growing demand for internationalization of China's legal system. There is also a growing need for English written textbooks of forensic medicine, not only for the medical students and criminal law students, but also for the forensic scientists who need to meet the international standard when they practice their professions.

Although there are many English books on forensic medicine currently available on the market, none of them is written by Chinese forensic scholars in conjunction with American forensic scholars. This new book is the first English forensic textbook that has been written by both Chinese and American forensic scholars with a goal of filling a gap by providing a well written and easy to read English textbook with comprehensive and contemporary aspects of forensic medicine for Chinese medical students, criminal law students, and forensic experts.

The editors and contributors to this book are well known forensic experts with a vast background of experience in a wide range of professional disciplines in the field of forensic medicine. The editor-in-chief of the book, Ling Li, M. D. , is a Chinese-American forensic pathologist, who has learned and practiced forensic medicine both in China and in the United States for almost 30 years. Dr. Li is certified by the American Board of Pathology in Anatomic Pathology and Forensic Pathology. She has investigated more than three thousand medico-legal cases, dealing with families in crisis while at the same time dealing with the police and the court system. She also has broad collaborations in teaching and research with several institutes and many scientists not only in the United States but also in China and Canada. She has a professorship with the University of Maryland School of Medicine in the departments of pathology and pediatrics, as well as a professorship with the China University of Political Science



and Law, Fudan University Medical School, Wuhan University, and Tongji Medical College. The co-editor-in-chief, Professor Yiping Hou is the editor-in-chief of a Chinese textbook of *Forensic Medicine*. Professor Ziqin Zhao is the editor-in-chief of a Chinese textbook of *Forensic Pathology* and Dr. David R. Fowler, the Chief Medical Examiner for the State of Maryland, is co-editor of the *Special Forensic Neuropathology*.

It is a great pleasure to be asked to introduce this English forensic textbook because it provides invaluable knowledge and expertise in almost every aspect of forensic medicine.

**Guangzhao Huang, M. D.**  
**Professor and Forensic Pathologist**

# PREFACE

Forensic medicine, as a branch of medicine, is a multidisciplinary subject and covers a wide spectrum of professional interests and deals with aspects of medicine which interact with the law. Forensic medicine serves not only the criminal justice system, but also the public health and public safety. The medicolegal or forensic investigations provide scientific and physical evidence to convict the guilty and protect the innocent. Forensic investigations also aid civil litigation, such as in medical malpractice, personal injury, and life insurance claims. The services of forensic medicine are critical for many aspects of public health practice and medical research, including disease surveillance and injury prevention, as well as evaluation of the quality of health. Forensic death investigations are emerging to be important in responding to bio-terrorism. Forensic autopsy provides an invaluable source of human tissues for medical research.

I understand that there are many differences between the practice of forensic medicine in China and in the United States. Therefore, this comprehensive textbook is truly a joint endeavor between Chinese and American forensic scholars. This collaborative effort will provide Chinese medical students, criminal law students, and forensic scientists with the comprehensive and contemporary aspects of forensic medicine.

“The search for the truth is the essence of forensic medicine.” I hope this book serves two purposes: to enhance our general knowledge of forensic medicine and to promote the understanding that to practice forensic medicine is to search for the truth and bring justice to the people.

Lastly, I wish to indicate my debt of gratitude to the greatest teachers of forensic medicine, my mentors (Professor Guangzhao Huang and the late Dr. John E. Smialek) for their significant contributions in medicolegal investigation, teaching and research. I am also deeply indebted to all the contributing authors, including my lifetime best friend (my husband Xiang Zhang), with whom I have had the privilege of working on this special book. All the authors have worked together tirelessly with great enthusiasm in completing and editing



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**Ling Li, M. D.**

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# PART I INTRODUCTION TO FORENSIC MEDICINE

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## Chapter 1 CONCEPT OF FORENSIC MEDICINE

Ling Li

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Forensic medicine, also known as legal medicine, is a branch of medicine that applies the principles and knowledge of medical sciences and technologies to the problems in a court of law. Although there are considerable variations in the social and legal systems, as well as the diversity of ethics and religions among the nations in the world, the common goal of a forensic medical investigation is to satisfy the needs of justice, public health, and public safety.

### 1.1 Major Tasks of Forensic Medicine

1. To provide scientific and physical evidence in civil and criminal investigation.
  2. To produce useful information in the administration of public health and public safety.
  3. To advance medicine by using medical principles derived from the study of disease and injury on the human body.
- **Serve the criminal justice system:** The medicolegal or forensic investigations carry broad

societal importance for criminal justice by providing physical evidence to convict the guilty and protect the innocent, whether they are accused of murder, child abuse, or other crimes. Forensic investigations also aid civil litigation, such as in medical malpractice, personal injury, and life insurance claims. Forensic investigation is designed to systematically evaluate the mechanism and time of injury and death, and to establish the cause and manner of injury and illness in deaths that are of legal interest. This is accomplished by the use of accepted scientific methods and procedures to integrate medical findings with available investigative facts.

- **Serve the public health and public safety:** Forensic death investigations are critical for many aspects of public health practice and research, including surveillance, epidemiology, and prevention programs. This occurs most often in injury prevention and control but also in prevention of suicide, violence, or substance abuse. Forensic death investigations are emerging to be critically important in evaluating the quality of health care and in responding to bio-terrorism.
- **Serve medicine:** Forensic medicine studies the untoward or adverse effects of disease and injury on the human body, which will provide hospitals and their clinical doctors with valuable information for evaluations of their diagnosis and treatment, as well as for further improvement of their health care system. Forensic autopsy provides an invaluable source of human tissues for medical research. Forensic pathologists are part of decision makers for organ transplants in the United States.

## 1.2 Branches of Forensic Medicine

Forensic medicine is a multidisciplinary subject, drawing primarily from medicine, chemistry, and biology, but also from physics, psychology, computer science, geology, and social science. Forensic medicine covers a wide spectrum of professional interests and, in fact, deals with any aspect of medicine which interacts with the law. There are many branches in the practice of Forensic Medicine, including forensic pathology, clinical forensic medicine, forensic toxicology, forensic serology, forensic psychiatry, and forensic anthropology.

### 1.2.1 Forensic Pathology

Forensic pathology deals with the study of the cause and manner of death by examination of a dead body during the medicolegal investigation of criminal law and civil law cases in some jurisdictions.

**Table I . 1. 1 The Categories of medicolegal cases**

- 
- (a) Violent deaths, i. e. ,unnatural deaths(homicides, suicides, unintentional injuries)
  - (b) Sudden and unexpected deaths
  - (c) Deaths with suspicion, i. e. ,those that may be due to violence
  - (d) Deaths in police custody, in prison, and correctional institutions
  - (e) Deaths without physician attendance
  - (f) Deaths related to therapeutic misadventure (medical malpractice)
- 

**Table I . 1. 2 The objectives of medicolegal investigation**

- 
- (a) To determine the cause of death
  - (b) To determine the manner of death
  - (c) To determine the primary, secondary and contributory factors in the cause of death when trauma and disease are present simultaneously
  - (d) To estimate the time of death and injury
  - (e) To interpret how the injury occurred and the nature of weapon used (if any)
  - (f) To identify the deceased if unknown
  - (g) To collect evidence from the bodies that can be used in criminal law cases
  - (h) To provide expert testimony from forensic pathologists in criminal and civil law cases if the case goes to trial
- 

## 1. 2. 2 Clinical Forensic Medicine

Clinical forensic medicine refers to a branch of forensic medicine that involves an evaluation and interpretation of injuries and illness in living individuals. Clinical forensic medicine is principally concerned with the provision of forensic medical services to the living patients and medical advice particularly in the investigation of crimes. In broad terms, a forensic pathologist generally does not deal with living individuals, and a forensic physician generally does not deal with the deceased. However, there are doctors, worldwide, who are involved in both the clinical and the pathological aspects of forensic medicine. There are many areas where both clinical and pathological aspects of forensic medicine overlap. In the United Kingdom and Australia, clinical forensic medicine is practiced by a group of doctors who are not forensic pathologists. Most of these are general practitioners, although there are now more and more members with other postgraduate qualifications. In continental Europe and China, where doctors in institutes of legal medicine are the clinical forensic practitioners, they are often also forensic pathologists. In the United States, there is no specific group of doctors providing clinical forensic medical service. Instead, forensic nurses provide direct services to individual clients who are in some way involved in the criminal justice system. Forensic nurses deal with patients who have allegedly committed or who have been convicted of a criminal offence, or are victims of an alleged crime.



**Table I . 1. 3 Major tasks of clinical forensic medicine**

- 
- (a) To conduct medical examination and assessments of victims and assailants of violence, physical abuse, and sexual assault
  - (b) To provide expert opinion as to the degree of injuries and illness resulted from trauma for possible liability in criminal proceedings and civil compensation
  - (c) To perform medical examinations and assessments of motorists who may have been driving under the influence of alcohol and/or drugs
  - (d) To conduct assessments of work ability for the purpose of workers' compensation
  - (e) To assess the mental health of victims and assailants for legal and court purposes
  - (f) To evaluate the adequacy of care and service of detained persons
- 

**1. 2. 3 Forensic Toxicology**

Forensic toxicology is an interdisciplinary field applying the methods of analytical chemistry, pharmacology, and toxicology to the analysis and interpretation of drugs and chemicals in biological samples for legal purposes. A forensic toxicologist must work closely with forensic pathologists, considering the context of an investigation. In particular, they must consider any recorded clinical signs and symptoms, any pathological changes caused by poisonings, and any evidence collected at a crime scene that may narrow the search, such as pill bottles, powders, trace residue, and chemicals. Provided with this information and samples with which to work, the forensic toxicologist must determine which toxic substances are present, in what concentrations, and the probable effect of those chemicals on the person. The forensic toxicologist is involved not only in the analysis of body fluids and tissue for drugs and poisons, but also in the interpretation of the resulting information in a judicial context.

**1. 2. 4 Forensic Serology**

Forensic serology, also known as Science of Forensic Material Evidence or Forensic Physical Evidence, is the application of biology to law enforcement. The forensic biology deals with the study of serological and DNA analyses of bodily (physiological) fluids for the purpose of identification and individualization. The type of material typically examined includes, but is not limited to blood, semen, saliva, and dental pulp from victims and assailants collected at crime scenes and from articles of physical evidence. These types of physiological fluids are frequently generated during the commission of violent crimes such as homicides, rapes, assaults, and hit and run motor vehicle fatalities. The ultimate goal is to identify what type of material is present and then, through the use of DNA analysis, link that material to a specific person. Paternity tests usually are also performed by forensic serologists.

### 1. 2. 5 Forensic Psychiatry

Forensic psychiatry involves both psychology and psychiatry science in relation to the law and legal system. It studies, evaluates, and identifies mentally-related illnesses and human behavior to obtain legal evidence. Forensic psychiatrists are frequently required to do behavioral and psychological evaluations of criminals, victims of crime, and individuals involved in major disasters. Forensic psychiatrists consult and testify regarding competency, sentencing recommendations, treatment recommendations, and assessment of future risk of criminals. They may write reports on criminal responsibility, criminal profiles, and exaggerated or faked symptoms of criminals and non-criminals. Forensic psychiatry experts may also testify on criminal evaluations, malingering, feigned symptoms, forensic assessment, personality disorders, settled insanity, mental status, mental capacity, wrongful commitment, and inadequate informed consent.

### 1. 2. 6 Forensic Anthropology

Forensic anthropology is the application of the science of physical anthropology and human osteology (the study of the human skeleton) in criminal cases where the victim's remains are decomposed, burned, mutilated, or otherwise unrecognizable. Forensic anthropologists can assist in the recovery of remains, assess age, race, sex, stature, ancestry, and analyze trauma and disease of human remains of crime and natural disasters. Forensic anthropologists frequently work in conjunction with forensic pathologists, forensic odontologists, and homicide investigators to identify a decedent. They also assist in discovering evidence of trauma and determining the postmortem interval.

## Chapter 2 THE PATIENTS, DOCTORS AND LAW

Ling Li

---

Doctors are trained to attend to patients in need and to exercise their profession to the best of their knowledge and ability for the safety and welfare of all individuals entrusted in their care. The relationship between a doctor and a patient is based on mutual trust and on a simple contract in terms of which the doctor undertakes to examine and treat the patient according to generally accepted standards of medical care and procedures, while the patient is obligated to remunerate the doctor for any reasonable expenses incurred. In all countries, medical practice is controlled to some extent by governmental laws and regulations. Doctors must be well aware of their legal obligations and ethical responsibilities during their medical practice. Legal obligations are laws and regulations imposed by the State on behalf of the people, while ethics is a self-imposed code of conduct accepted by voluntary agreement within the medical profession.

### *Being a doctor, you must fulfill an important role in the medico-legal field and in the court of law*

Like forensic medicine, other medical disciplines have a bearing on the law and therefore, have potential value in the court of law. Although clinical doctors are primarily concerned with and responsible for their patients' well-being, they must be conscious of legal responsibilities and medicolegal obligations during their practice. Generally speaking clinical doctors tend to be reluctant collaborators who lack enthusiasm in the application of their expertise to legal problems, regardless of the fact that they have a legal responsibility and can be called to testify at any time.

Doctors play an important role in the medicolegal field by giving expert assistance and evidence in the investigation of criminal and civil law cases. Doctors must clearly understand the legal aspects concerning matters such as termination of pregnancy and criminal abortion, euthanasia/assisted suicide, artificial insemination, and birth control. Doctors also have moral duties to the law and legal proceedings.

The doctors become involved in the court of law in a number of ways:

1. Being an "ordinary witness" or "witness as to fact" sometimes called an "eyewit-