

医学教育改革系列教材



# Pathology

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# Pathology

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# Foreword

Global developments in medicine and health shape trends in medical education. And in China education reform has become an important focus as the country strives to meet the basic requirements for developing a medical education system that meets international standards. Significant medical developments abroad are now being incorporated into the education of both domestic and international medical students in China, which includes students from the districts of China's Hong Kong, Macao and Taiwan that are taught through mandarin Chinese as well as students from a variety of other regions that are taught through the English language. This latter group creates higher demands for both schools and teachers.

Unfortunately there is no consensus as to how to improve the level and quality of education for these students or even as to which English language materials should be used. Some teachers prefer to directly use original English language materials, while others make use of Chinese medical textbooks with the help of English language medical notes. The lack of consensus has emerged from the lack of English language medical textbooks based on the characteristics of modern medical education in China.

In fact, most Chinese teachers involved in medical education have already attained an adequate level of English language usage. However, English language medical textbooks that reflect the culture of the teachers would in fact make it easier for these teachers to complete the task at hand and would improve the level and quality of medical education for international students. In addition, these texts could be used to improve the English language level of the medical students taught in Chinese. This is the purpose behind the compilation and publishing of this set of English language medical education textbooks.

The editors in chief are mainly experts in medicine from Capital Medical University (CCMU). The editorial board members are mainly teachers of a variety of subjects

from CCMU. In addition, teachers with rich teaching experience in other medical schools are also called upon to help create this set of textbooks. And finally some excellent scholars are invited to participate as final arbiters for some of the materials.

The total package of English medical education textbooks includes 63 books. Each textbook conforms to five standards according to their grounding in science; adherence to a system; basic theory, concepts and skills elucidated; simplicity and practicality. This has enabled the creation of a series of English language textbooks that adheres to the characteristics and customs of Chinese medical education. The complete set of textbooks conforms to an overall design and uniform style in regards to covers, colors, and graphics. Each chapter contains learning objectives, core concepts, an introduction, a body, a summary, questions and references that together serve as a scaffold for both teachers and students.

The complete set of English language medical education textbooks is designed for teaching overseas undergraduate clinical medicine students (six years), and can also serve as reference textbooks for bilingual teaching and learning for 5-year, 7-year and 8-year programs in clinical medicine.

We would like to thank the chief arbiters, chief editors and general editors for their arduous labor in the writing of each chapter. We would also like to acknowledge all the contributors. Finally, we would like to acknowledge Higher Education Press. They have all provided valuable support during the many weekends and evening hours of work that were necessary for completing this endeavor.

*President of Capital Medical University  
Director of English Textbook Compiling Commission*

*Zhaofeng Lu*

*August 1st, 2011*

# Preface

This textbook is one of the set of English language medical education textbook series. It applies to international students in clinical medicine and any students who are interested in this subject.

Pathology is one of the important medical subjects. It is a discipline that bridges clinical practice and basic science. Various research methods are employed to study the etiology, pathogenesis and pathological features of disease so that to illustrate the nature of the disease and develop prevention and treatment to a certain disease. In this text book, the content is roughly divided into 2 parts. Part 1 is general or basic pathology, which focuses on the fundamental cellular and tissue responses to pathologic stimuli. Part 2 is diseases of organ system, which deals with the specific disease of individual organ or system. Each chapter contains learning objectives, key concepts, text, summary and review questions. Two hundreds of well-chosen color pictures will help the students to master the pathological features of each lesion or disease.

This text book has been accomplished together with the teachers from headquarter of Capital Medical University and the clinical doctors from 5 affiliated hospitals of Capital Medical University. I express my special thanks to the coauthors, without their cooperation, this book could never be finished successfully.

Lastly, we sincerely welcome comments and suggestions from the faculty, students and other readers, and these will help us make improvement in the future edition.

*Liang Li*  
*April, 2015*



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# Introduction to Pathology

Pathology is a kind of basic medical discipline, and it involves the investigation of the causes (etiology) of the disease, underlying mechanisms of development (pathogenesis), pathological changes (structural and functional alterations) and clinical manifestations and prognosis. The aim of pathology is to understand the nature of the diseases, to render diagnosis and to guide therapy in clinical settings.

## *Content of Pathology*

In principle, pathology is divided into two parts, general pathology and systemic pathology. There are 14 chapters in this textbook. Chapter 1 to chapter 5 deal with general pathology, also called basic pathology, which focuses on the general lesions induced by injury stimuli. These are the fundamental cellular and tissue responses in every specific disease including cellular adaptation and injury, tissue repair, local hemodynamic derangement, inflammation and neoplasm. Systemic pathology deals with specific diseases of individual organ or system which is covered in chapter 6 to chapter 14. These two parts are closely connected. For example, the inflammatory diseases, such as hepatitis, pneumonia, appendicitis, cholecystitis, have the same basic pathological features (common principles in the disease development). However, the causes, mechanisms, pathological changes, clinical manifestations, prognoses and the therapies are varied as the different structures and functions of each organ, this is so called special rules of specific disease.

Among the medical education, pathology is a bridging discipline of clinical practice and basic science. On the one hand, it is based on the basic sciences, such as anatomy, histology, physiology, biochemistry, cellular biology, molecular biology, microbiology, immunology. On the other hand, it is also the basis of clinical studies. Pathology is a practical subject, and the course study includes theory, practice, clinical pathological conference (CPC) and training of autopsy. Pathological features

of each lesion or disease, including changes in gross and microscopic appearance (morphology) of cells and tissues, are mainly focused on. However, the learners must pay more attention to link the morphologic changes with clinical manifestations, called clinicopathological relation.

### *Development of Pathology*

Pathology is a very old subject. The history of pathology can be traced back to antiquity when people began examining bodies. The examination of bodies led to the dissection of bodies in order to discover the causes of death. Till 1761, organ pathology was put forward on the basis of 700 autopsies done by an Italian doctor Morgani (1682—1771), which laid the foundation of medicine and pathology development. Pathology began to develop as a subject during the 19th century through teachers and physicians that studied pathology. They referred to it as “pathological anatomy” or “morbid anatomy”. However, pathology as a field of medicine was not recognized until the late 19th and early 20th centuries. During the 19th century, with the invention and use of the microscope, the German pathologist Rudolf Virchow (1821—1902) gave the biggest contribution to the field by introducing the procedure of analyzing tissues and cells through a microscope to pathologists, and cytopathology was raised. This greatly affected the discipline because it was another way to analyze objects, and it led to more advanced technological development. By the late 1920s to early 1930s, pathology was deemed as a medical specialty. During the following years, the decision to split pathology into sub-specialties arose. Today, anatomical, clinical, molecular, forensic, and oral pathology, dermatopathology, hematopathology, and neuropathology exist as medical specialties. With the development and application of modern scientific technology, many new subdivisions in modern pathology are formed, including ultrastructural pathology, immunopathology, molecular pathology, genetic pathology, quantitative pathology and so on.

### *Approaches to Pathology*

Pathology can be further divided into human pathology and experimental pathology according to study subject. Human pathology is based on a longitudinal approach to a patient's illness by examination samples from living bodies or after his death. Autopsy, biopsy and cytology are the commonly used methods.

#### (1) Autopsy

An autopsy, also known as a post-mortem examination, is a highly specialized surgical procedure that consists of a thorough examination of a corpse to determine the cause and manner of death and to evaluate any disease or injury that may be present. Autopsies are performed for either legal or medical purposes used in cases of unknown or uncertain death, or for research purposes. Autopsy is also useful for gathering accurate statistics about disease incidence, for accuracy of clinical diagnosis and treatment response, and for research into the causes and mechanisms of diseases.

#### (2) Biopsy

A biopsy is a medical test performed by examining samples of cells or tissues obtained from a living body. The tissue is generally examined under a microscope by a pathologist, and can also be analyzed chemically. When an entire lump or suspicious area is removed, the procedure is called an excisional biopsy. When only a sample of tissue is removed with preservation of the histological architecture of the tissue's cells, the procedure is called an incisional biopsy or core biopsy. When a sample of tissue or fluid is removed with a needle in such a way that cells are removed without preserving the histological architecture of the tissue cells, the procedure is called a needle aspiration biopsy. Biopsies are most commonly performed to distinguish cancerous and inflammatory conditions. It is the most commonly approach clinically.

#### (3) Cytology

Cytology refers to the study of cells. Cytologic samples are more easily obtained than that of biopsy. Cell smears may be collected from epithelium shed of the body fluid or secretions such as sputum, urine and abdominal fluid, or scraped from a body surface, or collected by needle aspirating. Since the cells are dissociated from their surrounding tissue, or the normal tissue structure lost, some special diagnostic criterion which is different from that of histopathological examination should be used.

Experimental pathology is the scientific study of disease processes on experimental system, such as the animal models of a certain disease and in vitro study, e. g. , cell and tissue culture. Usually this discipline is to investigate the mechanisms of the disease and effect of drugs on the body. Although there are some advantages in experimental study, it is extremely difficult to mimic the physiological milieu which prevails in the intact human body.

(Liang Li 李良)



# PART *1*

## GENERAL PATHOLOGY





