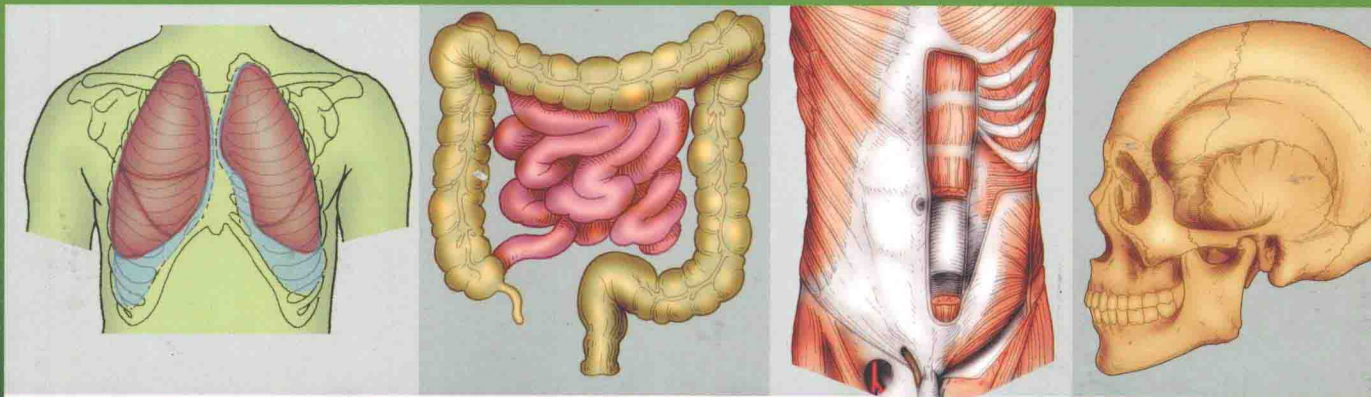


医学教育改革系列教材



# Systematic Anatomy

*Chief Editor* Weiming Duan



高等教育出版社



# Systematic Anatomy

## Chief Editor

Weiming Duan

## Contributors

Lirong Chang

Weiming Duan

Yan Gao

Hui Li

Wei Ling

Jinping Liu

Li Liu

Yingjin Luo

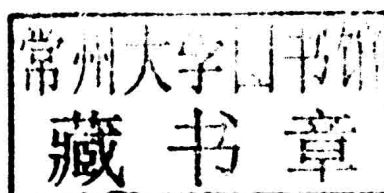
Ying Wang

Yan Wu

Chun Yang

Guitao Zhang

Nan Zhang



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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

Anatomy is an important foundation course for medical students to further study other medical courses. With an increasing number of foreign students who come to China to receive medical education, there is a need to have a series of textbooks in English. In order to strengthen the construction of textbooks, to adapt to the development of international student education, and to meet the needs of English teaching and bilingual teaching in the school, we received the task to write the textbook of the systematic anatomy. The textbook of the systematic anatomy is one of three textbooks regarding human anatomy, including the systematic anatomy, neuroanatomy and regional anatomy. This edition of the textbook has been designed for foreign medical students in China, and 7 or 8-year Chinese medical students who receive bilingual teaching.

We have written the textbook in accordance with five writing principles on English textbook preparation issued by Capital Medical University (CMU) in November 2009. The five writing principles are: ① Scientific principles: the accuracy of definitions, concepts, terminology and symbols, language, and the data; reliable sources of teaching materials; ② Basic principles: basic theory, basic concepts and basic skills; ③ Simple principle: word concise and simple sentences; ④ Practical principles: priority to meet the needs of teaching, easy to understand, to meet the needs of students' learning, reflecting course features; ⑤ Systematic principle: following the step-by-step learning law, focusing on the intrinsic link between subject knowledge, to ensure systematic set of teaching materials.

In this edition, we have mainly referred to the 5th edition of "clinically Oriented Anatomy" edited by Keith L. Moore and the 40th edition of "Gray's Anatomy" edited by Susan Standring. This textbook features comprehensive coverage of anatomy and contains 20 chapters including general introduction of anatomy, the osteology, the arthrology, the myology, the alimentary system, the respiratory system, the urinary system, the male reproductive system, the female reproductive system, the peritoneum, the cardiovascular system, the lymphatic system, the sensory organs, the vestibulocochlear organ, general description of the nervous system, the central nervous system, the peripheral nervous system, the nervous pathways, and the meninges and blood vessels of brain and spinal cord and cerebrospinal fluid. The definitions, concepts, and terminology and symbols are refined, accurate and focused. The structure of professional knowledge is complete and clear. We have paid attention to the link between the textbooks of systematic anatomy and neuroanatomy and regional anatomy, and to the clinical application of the main structures and the



parts of the human body.

The editorial board members of this edition are all from the Department of Anatomy at CMU. They are associate professors Yan Wu and Yan Gao, and Drs. Chun Yang, Li Liu, Lirong Chang, Yijin Luo, Hui Li, Ying Wang, Qin Hu, Nan Zhang, Wei Ling, Guitao Zhang. They are all experienced teachers in human anatomy. They routinely have very heavy teaching tasks in the school. In combination of their rich teaching experience and reference of classical textbooks of human anatomy in English, they worked extremely hard to fulfill the task of writing this textbook within a very limited time frame.

I would like to sincerely thank the colleagues who were invited as chapter authors to assist with the development of this edition through their dedication and hard work, without which this edition would not have been possible. I also wish to acknowledge Dr. Fuhua Xian, the Vice President of CMU, for her patience, and constant support and encouragement, Dr. Chun Yang, secretary of this edition for her coordination, organization and administrative work, Dr. Yizhi Song for his design of cover images, Dr. Yun Wu from the Department of Educational Affairs for her administrative work, guidance, patience and support. I also wish to extend my sincere gratitude and appreciation to Professor Qunyuan Xu at CMU for his invaluable advice and great support.

I hope that you enjoy using this edition of systematic anatomy, and that this textbook becomes a useful partner in your medical education experience. I also hope that readers and reviewers will find many of their comments and suggestions incorporated into this edition and will continue to provide their valuable input for future improvements.

*Weiming Duan*

*May, 2014*

# Contributors

## **Lirong Chang 常丽荣**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 5

## **Weiming Duan 段维明**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 1, 15, 18 and Chapter 17 section 3, 4 and 5

## **Yan Gao 高艳**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 17 section 1 and 2

## **Hui Li 李慧**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 4

## **Wei Ling 凌薇**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 2 and 3

## **Jinping Liu 刘津平**

School of Basic Medical Sciences  
Tsinghua University, Beijing, China  
Chapter 6

## **Li Liu 刘丽**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 7 – 10

## **Yingjin Luo 罗英瑾**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 11 section 2 and 3

## **Ying Wang 王颖**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 11 section 1

## **Yan Wu 武艳**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 16

## **Chun Yang 杨春**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 2, 3, 12-14, 19 and 20

## **Guitao Zhang 张贵焘**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 4

## **Nan Zhang 张楠**

School of Basic Medical Sciences  
Capital Medical University, Beijing, China  
Chapter 11



# CONTENTS

<b>Chapter 1</b>	<b>General Introduction</b>	1
1.1	Task and Classification of Human Anatomy	1
1.2	Basic Terms of Human Anatomy	2

## PART 1 LOCOMOTOR SYSTEM

<b>Chapter 2</b>	<b>Osteology</b>	7
2.1	Introduction	7
2.2	Axial Skeleton	10
2.3	Appendicular Skeleton	21
<b>Chapter 3</b>	<b>Arthrology</b>	29
3.1	Introduction	29
3.2	Direct Joints	29
3.3	Indirect Joints	30
3.4	Joints of Axial Skeleton	32
<b>Chapter 4</b>	<b>Myology</b>	42
4.1	Introduction	43
4.2	Muscles of Head	45
4.3	Muscles of Neck	47
4.4	Muscles of Trunk	48
4.5	Muscles of Upper Limb	53
4.6	Muscles of Lower Limb	58

## PART 2 SPLANCHNOLOGY

<b>Chapter 5</b>	<b>Alimentary System</b>	67
5.1	Oral Cavity	68
5.2	Pharynx	72
5.3	Esophagus	74
5.4	Stomach	75
5.5	Small Intestine	76
5.6	Large Intestine	78
5.7	Liver	80
5.8	Pancreas	83
<b>Chapter 6</b>	<b>Respiratory System</b>	84
6.1	Introduction	84
6.2	Respiratory Tracts	86
6.3	Lungs	96
6.4	Pleurae	101
6.5	Mediastinum	103

<b>Chapter 7</b>	<b>Urinary System</b>	105
7.1	Kidneys	106
7.2	Ureters	109
7.3	Urinary Bladder	109
7.4	Urethra	110
<b>Chapter 8</b>	<b>Male Reproductive System</b>	112
8.1	Internal Reproductive Organs	112
8.2	External Reproductive Organs	115
<b>Chapter 9</b>	<b>Female Reproductive System</b>	118
9.1	Internal Reproductive Organs	119
9.2	External Reproductive Organs	121
<b>Chapter 10</b>	<b>Peritoneum</b>	124
10.1	Introduction	124
10.2	Relationship between Abdominopelvic Viscera and Peritoneum	125
10.3	Peritoneal Reflections	125
10.4	Folds, Peritoneal Recesses and Pouches	128
10.5	Subdivision of Peritoneal Cavity	129

## PART 3 VASCULAR SYSTEM

<b>Chapter 11</b>	<b>Cardiovascular System</b>	133
11.1	Introduction	134
11.2	Heart	135
11.3	Arteries	145
11.4	Veins	164
<b>Chapter 12</b>	<b>Lymphatic System</b>	176
12.1	Main Collecting Lymph Channels	177
12.2	Lymphatic Drainage of Head and Neck	180
12.3	Lymphatic Drainage of Upper Limbs	181
12.4	Lymphatic Drainage of Thorax	182
12.5	Lymphatic Drainage of Abdomen and Pelvis	183
12.6	Lymphatic Drainage of Lower Limbs	183

## PART 4 SENSORY ORGANS

<b>Chapter 13</b>	<b>Visual Organs</b>	187
13.1	Eyeballs	188
13.2	Accessory Organs	191
13.3	Blood Vessels and Nerves of Eyes	194
<b>Chapter 14</b>	<b>Vestibulocochlear Organs</b>	196
14.1	External Ears	197
14.2	Middle Ears	198
14.3	Internal Ears	200

## PART 5 NERVOUS SYSTEM

<b>Chapter 15</b>	<b>General Description of Nervous System</b>	207
15.1	Main Divisions	207
15.2	Components of Nervous System	209
15.3	Active Ways of Nervous System	214
15.4	Terms Used in Nervous System	214
<b>Chapter 16</b>	<b>Peripheral Nervous System</b>	216
16.1	Spinal Nerves	217
16.2	Cranial Nerves	231
16.3	Autonomic Nervous System	240
<b>Chapter 17</b>	<b>Central Nervous System</b>	248
17.1	Spinal Cord	249
17.2	Brain Stem	256
17.3	Cerebellum	269
17.4	Diencephalon	275
17.5	Telencephalon	281
<b>Chapter 18</b>	<b>Pathways of Nervous System</b>	295
18.1	Sensory Pathway	295
18.2	Motor Pathway	303
<b>Chapter 19</b>	<b>Coverings and Blood Supplies</b>	308
19.1	Meninges and Spaces	308
19.2	Cerebral Spinal Fluid	311
19.3	Barriers in Nervous System	312
19.4	Arterial Supplies of Brain and Spinal Cord	313
19.5	Venous Drainage	317
<b>Chapter 20</b>	<b>Endocrine System</b>	319
20.1	Pituitary Gland	319
20.2	Thyroid Gland	320
20.3	Parathyroid Gland	321
20.4	Suprarenal Gland	322
20.5	Pineal Body	322
20.6	Pancreatic Islets	322
20.7	Thymus	322
20.8	Genital Gonad	323
<b>References</b>		324





# General Introduction

# Chapter

# 1

## 1.1 Task and Classification of Human Anatomy

### 1.1.1 Task

### 1.1.2 Classification

## 1.2 Basic Terms of Human Anatomy

### 1.2.1 Anatomical Positions

### 1.2.2 Terms of Directions

### 1.2.3 Axes and Planes of Human Body

## ■ Study objectives

### 1 Essential points

1.1 Anatomical position.

1.2 Terms of direction.

1.3 Axes and planes of human body.

### 2 Understanding points

2.1 Task and classification of human anatomy.

## ■ Key words

anatomical position, anatomical terms, terms of direction

## 1.1 Task and Classification of Human Anatomy

### 1.1.1 Task

Human anatomy is the science on the morphology and structure of normal human body. The mission of human anatomy is to understand the structure (also related function and clinical significance) of each organ of system in human body and positional relations to adjacent parts. Good knowledge of human anatomy lays a solid foundation in learning other courses of basic medicine and clinical medicine.

### 1.1.2 Classification

A cell is the basic structure of human body. A group of structures which are composed of the cells and intercellular substance is called the tissue. The combination of different types of tissues forms an organ, such as the stomach, lungs, etc. The combination of several organs constitutes a system which can complete a certain physiological function, such as the locomotor system, respiratory system, etc. The systemic study on the structure of cells, the development of new individual body, tissues, organs and systems is called the generalized anatomy, including cytology, embryology, histology and human anatomy.

Anatomy, a word, refers to using a knife to expose and separate structures and tissues. This is the most basic method to study the morphology and structure of human body. Anatomy is also divided into systematic anatomy and regional anatomy (topographic anatomy). The organ system of human body can be divided into 10 systems based on their functions: the musculoskeletal system, digestive system, respiratory system, urinary system, reproductive system, cardiovascular system, lymphatic system, sensory organs, nervous system and endocrine system. Generally, human anatomy refers to systematic anatomy. Regional anatomy emphasizes the study of the location, hierarchical structure and local distributions of blood vessels and nerves of an organ, and positional relationship to adjacent structures and other organs. Human body can be divided into 9 main regions: the head (including cranial and facial part), neck (including the neck and nape), back, thorax, abdomen, pelvis, perineum (the latter 5 regions are collectively called trunk), the upper limbs, and the lower limbs. For systematic anatomy and regional anatomy, the macrostructure of human body is mainly studied with the naked eye observation. They are also called macroanatomy, or gross anatomy. For cytology, embryology and histology, the microstructure of the body is studied using a microscope. They are also called microanatomy. Based on the research methods and the purposes, human anatomy can also be divided into several categories. For example, using the X-ray technology to study the morphology of human organs, is called X-ray anatomy. Using section and imaging technology to study the structure of the human body at different levels, is called sectional anatomy. Studying the structure and function of the nervous system, is called neuroanatomy. And also, surgery-related clinical anatomy, and sport-related locomotive anatomy.

## 1.2 Basic Terms of Human Anatomy

The basic terms of anatomy are internationally recognized standard terms. They are used to correctly describe the position relationship, morphology and structure of human organs.

### 1.2.1 Anatomical Positions

**Anatomical positions** are also called **standard positions** (Figure 1-1). It is described as standing position

with eyes looking forward, the upper limbs hanging on each side of the trunk, the palms facing forward, the heels getting together and the big toes facing forward. Whatever body position is, for example, the upright position, supine and prone position, lateral position or inverted position, the anatomical position should always be used as a reference to describe anatomical position.

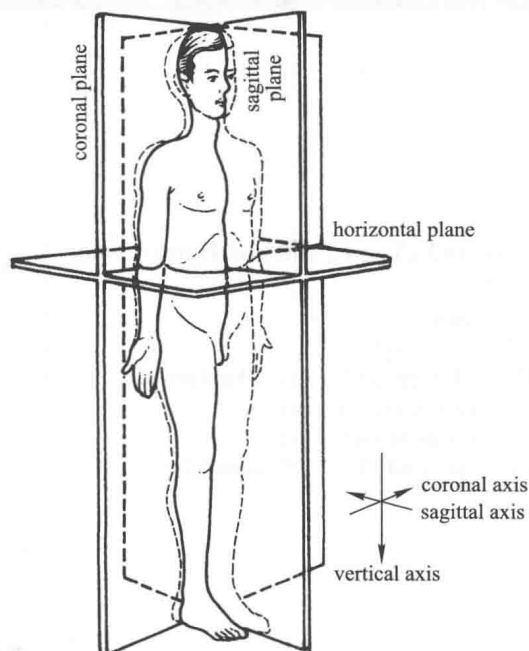


Figure 1-1 Anatomical position and axis & plane

### 1.2.2 Terms of Directions (Figure 1-2)

**Superior and inferior:** Superior is defined as a direction toward the head or cranial part, while inferior is toward the feet or caudal part.

**Anterior and posterior:** Anterior is defined as a direction toward the front of human body or ventral part, while posterior is defined as a direction toward the back or dorsal part.

**Medial and lateral:** Medial refers to a direction toward median plane of human body, while lateral is defined as a direction away from the median plane.

**Internal and external:** They refer to directions for the tubular organs of the human body. Internal means a direction toward the inside, while the external means a direction toward the outside.

**Superficial and deep:** They are used to describe the structure of the human body toward and away from the surface of the body.

The following terms are used to describe directions for the upper and lower limbs: