

The Topographic Map of Human Acupoints  
(Acupointotopy of human body)

人体腧穴拓扑映射

Kun Wang 王昆

Dongyun Wang 王东云



## Table of Contents

|   |    |
|---|----|
| Table of Contents .....   | A  |
| Declaration of originality .....  | D  |
| Safety Instructions.....  | E  |
| Preface (translated from the Chinese version) .....   | F  |
| Chapter 1 - Basic Knowledge of Acupuncture .....  | 1  |
| 1.1 Yin-Yang (阴阳).....  | 1  |
| 1.2 Five Elements (五行) .....  | 3  |
| 1.3 Zang-Fu (脏腑).....   | 5  |
| 1.3.1 Zang-Fu (脏腑, viscera).....  | 5  |
| 1.3.2 Five-Zang (五脏, the five solid inner organs) .....   | 5  |
| 1.3.3 Six-Fu (六腑, the six hollow inner organs).....   | 8  |
| 1.4 Meridian Channels and Collaterals (经络) .....  | 10 |
| 1.4.1 The Meridian Channels and Collaterals (经络) .....  | 10 |
| 1.4.2 Acupoints (腧穴) .....  | 13 |
| 1.4.3 The Distribution of Acupoints.....  | 14 |
| 1.4.4 Three Principal Energies in the Traditional Tibetan Medicine – Loong, Tripa, and Baakan ..... | 23 |
| 1.4 Reference and Recommended Books in This Chapter .....   | 28 |
| Chapter 2 - Basic Knowledge of Biology.....   | 30 |
| 2.1 The Skeletal System.....  | 30 |
| 2.2 The Digestive System.....   | 36 |
| 2.3 The Cardiovascular System.....  | 39 |
| 2.4 The Nervous System .....  | 45 |
| 2.5 The Embryogenesis.....  | 50 |
| 2.5.1 The Embryogenesis.....  | 50 |
| 2.5.2 The Development of Limbs.....   | 52 |
| 2.6 Reference and Recommended Books in This Chapter .....   | 55 |
| Chapter 3 - Classification of Acupoints and the New Model.....                                      | 58 |
| 3.1 The Definition of Axes of Acupoints (穴位轴).....  | 58 |

|   |     |
|---|-----|
| 3.2 The Classification of Acupoints.....  | 60  |
| 3.2.1 Acupoints in the Facial and Head Region .....   | 60  |
| 3.2.2 Acupoints on the Distal Limbs with Functions Related to the Head .....  | 63  |
| 3.2.3 Acupoints on the (Anterior, Posterior and Side of) Trunk.....   | 66  |
| 3.2.4 Limb Long-distance Acupoints with Functions Related to Viscera.....   | 74  |
| 3.3 The Acupoint Distribution Model.....  | 90  |
| 3.3.1 The Acupoint Distribution Model.....  | 90  |
| 3.3.2 The Prediction of Unknown Acupoints.....  | 102 |
| 3.3.3 Explaining the Traditional Principles on Combination (Selection) of Acupoints .....   | 111 |
| 3.3.4 The Construction of Acupoint Distribution Pattern during the Early Development<br>(hypothesized based on the early embryogenesis without experimental data) ..... | 118 |
| 3.4 Principles on Combination of Acupoints .....  | 129 |
| 3.4.1 Main Principle - Combination of Host and Guest Acupoints (主辅配穴) .....   | 129 |
| 3.4.2 Principles in Detail .....  | 130 |
| 3.5 The Acupoint Distribution Model is applicable for the TTM, TMM and TZM acupuncture ..   | 138 |
| 3.5.1 The TTM acupoints .....   | 138 |
| 3.5.2 The TMM acupoints.....  | 145 |
| 3.5.3 The TZM acupoints .....   | 156 |
| 3.5 Discussion --- Acupoint Distribution Model .....  | 159 |
| 3.5.1 Advantages of the Model .....   | 159 |
| 3.5.2 Disadvantages of the Model.....   | 159 |
| 3.6 Reference and Recommended Books in This Chapter .....   | 161 |
| Chapter 4 - Distribution Pattern of Animal Acupoints .....  | 164 |
| 4.1 Distribution Pattern of Equine Acupoints .....  | 167 |
| 4.2 Distribution Pattern of Pig Acupoints.....  | 170 |
| 4.3 Distribution Pattern of Chicken Acupoints.....  | 173 |
| 4.4 Reference and Recommended Books in This Chapter .....   | 174 |
| 5 Appendix.....   | 175 |
| 5.1 Appendix 1 --- Some Dieses not Discussed in the Main Body of the Book .....   | 175 |
| 5.1.1 Shenzhibing (Mental Disorders, 神志病) .....   | 175 |
| 5.1.2 Yingbing (癰病).....  | 176 |
| 5.2 Appendix 2 --- Regions of the Head.....   | 177 |

|  |     |
|--|-----|
| 5.3 Appendix 3 --- Acupoints Related with the Head Region on the Distal Regions of the Posterior Upper Limb and the Lateral Anterior Lower Limb..... | 178 |
| 5.4 Appendix 4 --- The Corresponding Relationship of Viscera and Diseases in the Acupoint Classification.....  | 179 |
| 5.5 Appendix 5 --- Fitting of the Acupoint Distribution Pattern.....   | 180 |
| 5.6 Appendix 6 --- Discussion about Some Suspected Viewpoint .....   | 185 |
| 5.6.1 Acupoint LI3 (Hegu, 合谷) .....  | 185 |
| 5.6.2 Long- distance Acupoints on the Upper Arm and Thigh .....  | 185 |
| 5.6.3 Acupoints Corresponding to the Spleen and Pancreas .....   | 186 |
| 5.7 Appendix 7 --- Conic Helix Function .....  | 187 |
| 5.8 Appendix 8 --- the Connecting Model of the Trunk Acupoints and Long-distance Limb Acupoints with the Viscera (or the Head Region) .....          | 189 |
| 5.8.1 Trunk Acupoint - LCAs - Viscera Connecting Model .....   | 189 |
| 5.8.2 Limb Long-distance Acupoint - LCAs - Viscera Connecting Model .....  | 190 |
| 5.8.3 Limb Long-distance Acupoint - LCAs - Viscera Connecting Model (variant) .....  | 197 |
| 6 Index .....  | 200 |

## Declaration of originality

We hereby confirm that this manuscript, *The Topographic Map of Human Acupoints* (or *Acupointotopy of Human Body*; in Chinese, 《人体腧穴拓扑映射》), is our (authors, Kun Wang 王昆 and Dongyun Wang 王东云) original work. All the cited figures and references have been annotated in the manuscript. Some of the figures are not shown due to the copyright. The manuscript is not allowed for any commercial use. Please annotate it when citing this manuscript.

Cherry Hinton Rd, Cambridge CB1 7BX 英国 剑桥

Email: biowangk@126.com or biowangk@gmail.com

Kun Wang 王昆

Oct 31, 2021

Cambridge UK

## Safety Instructions

This manuscript, in which the human acupoint distribution pattern has been fully discussed, has not been reviewed by professionals. Therefore, the manuscript is **ABSOLUTELY NOT** for medical diagnosis or instructing clinical acupuncture treatment.

Cherry Hinton Rd, Cambridge CB1 7BX 英国 剑桥

Email: biowangk@126.com or biowangk@gmail.com

Kun Wang 王昆

Oct 31, 2021

Cambridge UK

## Preface (translated from the Chinese version)

In this book, we classified human acupoints according to their clinical functions and proposed a new model, the topographic map of acupoints (acupointotopy), to simulate the distribution pattern of acupoints based on this new classification. The new model shows that the distribution of acupoints on the body trunk, upper and lower limbs match the pattern that all the inner organs are aligned along the rostrocaudal axis of vertebrates in biology. Our model shows potential connections between acupoints in the traditional Chinese medicine (TCM) and the modern biology on some level though we cannot explain the biological structure and functional mechanisms of acupoints directly so far. Meanwhile, we predict the positions and the functions of some new (unknown) acupoints based on this new model.

This book consists of four chapters. Before introducing the contents of each chapter, we need to point out that we use two different nomenclatures, the TCM and the modern anatomy in this book. In Chapter 1, we mainly use the nomenclature of the TCM; in all the other chapters, we mainly use the nomenclature of the modern anatomy. To avoid misunderstanding, we specify the nomenclature at the beginning of each chapter.

Below are the main contents of each chapter:

In Chapter 1 and 2, we briefly introduce the basic principles of the TCM, including essential knowledge of the TCM acupuncture, and basic knowledge of biology, including human anatomy, comparative vertebrate anatomy, developmental biology, and neuroscience. These two chapters pave the way for the readers to further understand the discussions and analyses in the following chapters by providing some basic knowledge of the TCM acupuncture and biology. In another word, these two chapters are the basis for the readers to learn the main viewpoints of this book. Readers are suggested reading the books recommended at the end of each chapter if they are willing to learn more about acupuncture and biology. Readers who have backgrounds in acupuncture or biology can briefly read Chapter 1 or 2 and focus on the following chapters.

In Chapter 3, the most essential section of this book, we summarized the distribution pattern of acupoints on the trunk and limbs by analyzing the functions of each acupoint in detail. Meanwhile, we compared this acupoint distribution pattern with the pattern that the body of vertebrates is constructed along the somites introduced in Chapter 2 and discussed the potential connection between these two patterns. Based on the distribution pattern, we proposed a new acupoint distribution model, analyzed and deepened the model further, and discussed its advantages and disadvantages. Furthermore, we predicted some new human acupoints and proposed new principles of combination of acupoints for clinical application based on this model.

At last, we generalized our core viewpoint and ideas to other vertebrates based on traditional Chinese veterinary acupuncture and demonstrated that the acupoint distribution model is universal among vertebrates in Chapter 4.

I was awarded my PhD from the University of Tuebingen during the covid-19 pandemics in 2020. Because of the pandemic, I did not manage to start my postdoctoral research at the Queensland University or Weizmann Institute of Science. This book was written in the gap year between my PhD study and postdoc research.

I sincerely thank chief physician Dongyun Wang (王东云) for writing this book using his clinical experience and knowledge with me! I am grateful to my friends Yi Qin (秦毅), Yongrong Qiu (邱永荣), Yue Zhang (张粤), and Ruoyu Huang (黄若昱) for their suggestions and help!

I referred to numerous books and references in writing this book. But due to the limitation of my horizon and the short time in writing the books, some mistakes and concaves may remain in this edition. Thank readers for their suggestions and correction!

Kun Wang (王昆)

28th, October 2020; Tübingen (2020 年 10 月 28 日星期三 图宾根)

## Chapter 1 - Basic Knowledge of Acupuncture

Acupuncture is one of the most important components of the traditional Chinese (TCM, 中医), Tibetan (TTM, 藏医), Mongolian (TMM, 蒙医), and Zhuang (TZM, 壮医) medicine. It has been widely used in clinic with a long history. Clinically, the traditional medicines above use numerous identical acupoints, but the mechanisms of acupuncture are explained with different theories or hypotheses by them. Traditional acupuncture theories (or hypotheses) are quite diverse, among which the references and the mechanism explanations for acupuncture are most abundant from the TCM. The TCM acupuncture influences profoundly the traditional Japanese and Korean medicine while the TTM, based on its own characteristics, adopts many theories from the traditional Indian medicine and influences and promotes the development of the TMM immensely. In this book, therefore, we mainly talk about acupuncture based on the TCM and briefly introduce basic knowledge of the TTM acupuncture in the last part of this chapter.

In this chapter, we use two nomenclatures, the TCM definition and the modern anatomical definition, to address the human inner organs. Names of inner organs, according to the TCM definition, are applied character borders in the text (For instance, kidney referring to the anatomical structure; **kidney** referring to a definition of the TCM).

### 1.1 Yin-Yang (阴阳)

Everything in the world, including all non-living objects, living organisms and even natural phenomena, is composed of Qi (Chinese, 气; English, air) according to the TCM. Qi is extremely tiny and constantly moving material particles. Not only is Qi the basic components of human body, but also the motion of the Qi promotes the metabolism of the human body and maintains the life process of a human.

Yin-Yang (阴阳), a philosophical concept of dualism, refers to the opposite (or contrary) and complementary internal forces of one object (living or non-living) for everything in nature. The duality of Yin (阴) and Yang (阳) is regarded as the basic law of all the changes (or motions) in the universe and serves as the fundamental force of motion (or changes).

Yin and Yang originally refers to the adret (brighter side) and the ubac (darker side) of a mountain. In the Yin-Yang dualism, however, they refer to the two opposite or contrary sides of one object by the ancient Chinese after a long-time observation and abstract summary of natural phenomena. Here are some examples to explicitize the concept, such as darkness and brightness, nights and days, water and fire, females and males, descending and ascending, the earth and the sky,

coldness and warmness, stagnation and motion. Here we take water and fire as one example. A flame (fire) is hot, light, ascending, and zealous, belonging to the regime of Yang (阳). On the contrary, water is cold, heavy, descending and restrained, with the property of Yin (阴). In the TCM, Yang promotes the metabolism of the body and maintains the life process functionally while Yin can nourish and moisturize the physical body.

The classification of Yin and Yang is relative rather than absolute. First, Yin and Yang can transform into the other under certain conditions. For instance, the sunrise and the sunset are regarded as Yang (ascending, warmer and brighter) and Yin (descending, colder and darker), respectively. At the solar noon, the sun makes an upper meridian transit from ascending to descending (Yang is transforming into Yin). Second, Yin and Yang are infinitely dividable into smaller Yin and Yang with other classification criteria. For example, a day is regarded as Yang (warm and bright), a night as Yin (cold and dark). Meanwhile, the morning of a day is the Yang (becoming warmer, brighter; sunrising) in the Yang (a day) while the afternoon is the Yin (becoming colder, darker; unsetting) in the same Yang (a day). In this way, a day can be divided repeatedly and infinitely.

The essential relationship of Yin and Yang can be summarized as contradiction, inter-consumption, interdependence, and inter-transformation (**Figure 1.1.1**). The Yin-Yang doctrine plays a vital role in the TCM. It explains the human structure, functions, and pathological processes, and instructs the clinical practice of the TCM practitioners. The balance between Yin and Yang is the standard or criterion of health while diseases are the imbalance status of Yin and Yang according to the TCM. Observing and comprehending the imbalance status of Yin and Yang in the body, such as deficiency or excess (虚实) of Yin and Yang, is the key to diagnose and treat disease. Herbs and acupuncture are often used clinically to reestablish the balance of Yin and Yang.



**Figure 1.1.1 contradiction, inter-consumption, interdependence, and inter-transformation of Yin-Yang**

## 1.2 Five Elements (五行)

Everything in nature is believed to consist of Five Elements (五行, or Five Phases) which refer to the Metal (金), the Water (水), the Wood (木), the Fire (火), and the Earth (土). Essentially, these Five Elements are different from those in the western philosophy. These Five Elements represent five different properties or features rather than five materials. The Wood (in fact, it is better to be translated as “the tree”), expands outwards freely, disliking repression from the external world and representing new life in the spring; The Fire is extremely hot and ascending, representing the climax of a process or an event; The Earth bears and nourishes everything in nature, like a mother; The Metal represents the rustling and dying of plants and insects in the Autumn; The Water is cold and descending, representing living organisms (animals and seeds) hiding themselves in the freezing winter.

The ancient Chinese related many natural objects, phenomena, and processes with the Five Elements using a comparative thinking paradigm (“取象类比”) (**Table 1.2.1**). For instance, the east, the direction where the sun rises, belongs to the Wood; The South, in which direction the sunshine (light and temperature) is the strongest, reaching the climax, is connected to the Fire element; The West, desolate and connected with the sunset, belongs to the regime of the Metal; The North, extremely cold, is connected with the Water; The center, the basis to localize the other four directions, belongs to the Earth.

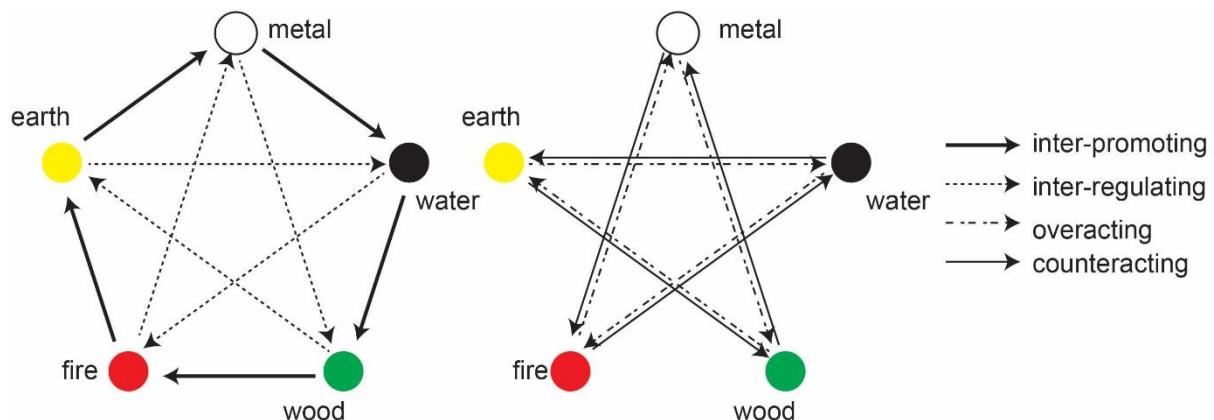
**Table 1.2.1** Five Elements and some example correlations

| Five Elements (五行) | Five Directions (五方) | Five Colors (五色) | Five Tastes (五味) | Growth and Perishment (生长消亡) | Five Qi (五气) | Five Seasons (五季) | Five Zang (五脏) | Five Emotions (五志) | Five Sensory organs (五官) |
|--------------------|----------------------|------------------|------------------|------------------------------|--------------|-------------------|----------------|--------------------|--------------------------|
| Wood               | east                 | green            | sour             | arise                        | wind         | spring            | liver          | angry              | eyes                     |
| Fire               | south                | red              | bitter           | grow                         | hot          | summer            | heart          | happy              | tongue                   |
| Earth              | center               | yellow           | sweet            | transform                    | damp         | long summer       | spleen         | worry              | mouth                    |
| Metal              | west                 | white            | spicy            | collect                      | dry          | autumn            | lung           | grief              | nose                     |
| Water              | north                | black            | salty            | store                        | cold         | winter            | kidney         | fear               | ears                     |

The relationship or the connection of the Five Elements can be briefly summarized as inter-promoting (相生), inter-regulating (相克), overacting (相乘), and counteracting (相侮) (**Figure 1.2.1**). Each of the Five Elements helps to generate or promote one other specific Element. The order of the mutual nourishing or promoting is the Wood → the Fire → the Earth → the Metal → the Water → the Wood; similarly, the order of mutual controlling (inter-regulating) is the Wood → the Earth → the Water → the Fire → the Metal → the Wood. The mutual controlling develops into overacting when the suppression of one controlling Element (克者) over the controlled Element (被克者) excesses the normal range, impairing the balance among the Five Elements. On the contrary, if one controlled Element is extremely excessive or one controlling element is quite deficient, the controlled Element (被克者) suppresses the controlling Element (克者) reversely, leading to the status of counteracting.

The doctrine of the Five Elements (五行学说), which is strongly related with the visceral manifestation theory (脏象学说) of the TCM, has been mainly used to explain the functions and interaction of inner organs and instruct the clinical practices. For instance, the Water promotes the Wood according to the doctrine of Five Elements. Therefore, nourishing the Yin of the Liver (肝, the Wood) by strengthening the Yin of Kidney (肾, the Water) can be used clinically when the Yin of the Liver is deficient, or the Yang of the Liver is quite excessive.

**The Chapter Circular Flow (环流篇)** from the book *Heguanzi* (鹖冠子, or *Master Pheasant Cap*) states: “the handle of the Big Dipper points to the east, the south, the west or the north, then it indicates the seasons of the Spring, Summer, Autumn or the Winter in the world, respectively”.



**Figure 1.2.1 inter-promoting, inter-regulating, overacting, and counteracting of the Five Elements**

## 1.3 Zang-Fu (脏腑)

### 1.3.1 Zang-Fu (脏腑, viscera)

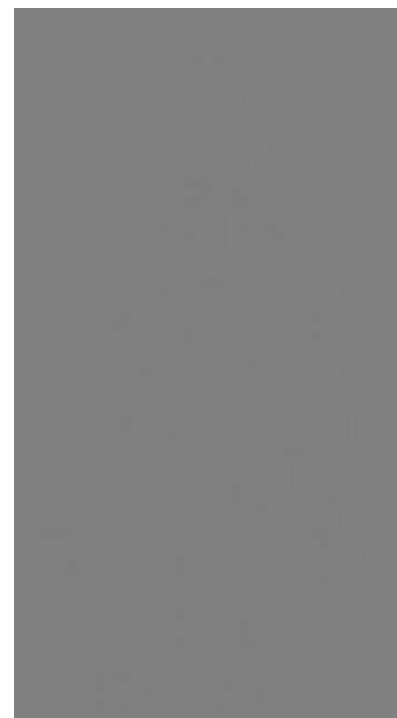
Zang-Fu (脏腑, viscera, inner organs) is the general name of all the inner organs, including the Five-Zang (五脏, five solid inner organs; the **Pericardium** (心包) is also regarded as a Zang according to the TCM acupuncture. In total also named as Six-Zang), the Six-Fu (六腑, six hollow inner organs) and the Qiheng's-Fu (奇恒之腑, extraordinary inner organs). The Five-Zang consists of the **Liver** (肝), the **Heart** (心), the **Spleen** (脾), the **Lung** (肺), and the **Kidney** (肾) while the Six-Fu includes the **Gallbladder** (胆), the **Small Intestine** (小肠), the **Stomach** (胃), the **Large Intestine** (大肠), the **Urinary Bladder** (膀胱), and the **Triple Warmer** (三焦); The Qiheng's-Fu refers to the **Brain** (脑), the **Bone Marrow** (髓), the **Bones** (骨), the **Vessels** (脉), the **Gallbladder** (胆), and the **Uterus** (女子胞) (**Figure 1.3.1**).

The Five-Zang, Yin inner organs, produce and store Jing-Qi (精气, essential energy). They store the essential energy but never discharge. "Therefore, the Five-Zang are full of essential energy but do not contain any material food ("故满而不能实")." The Six-Fu, Yang inner organs, temporally stores, transmits and digests food and water. "Therefore, the Six-Fu contains material food, but they are never full ("故实而不能满也")." The Five-Zang, the Six-Fu, the Qiheng's-Fu, and the Five Sensory Organs (五官) are connected and interact with each other functionally via the meridian channels and collaterals to maintain the physiological processes of the human body though the functions and properties of the Zang and Fu are quite different from each other (**Table 1.2.1**). We should note here that the Zang and Fu are different from the anatomical visceral structures of modern anatomy.

### 1.3.2 Five-Zang (五脏, the five solid inner organs)

#### 1.3.2.1 The **Liver** (肝)

The **Liver** lies below the diaphragm and in the right hypochondriac region. It is paired with the **Gallbladder** via meridian channels and collaterals.



**Figure 1.3.1 Mingtang Chart**  
(《明堂图》) from *The Great Compendium of Acupuncture and Moxibustion* (《针灸大成》)

The Liver “stores blood (“藏血”）”: The Liver stores blood, regulates the volume of blood in circulation, and prevents bleeding. The Liver dredges the routes of the flow of Qi (“主疏泄”): The Liver regulates the movement of Qi in the whole body to ensure smooth flow of Qi from the Zang and Fu in the body. 1) the smooth flow of Qi regulated by the Liver makes one person in a good mood, neither intense excited nor depressed; 2) the Liver promotes the digestive functions of the Spleen and the Stomach via assisting the moment of Qi from these two. Meanwhile, the Liver promotes the secretion and discharge of the bile; 3) the Liver facilitates circulation of blood and the metabolism and distribution of the body fluid (津液). The Liver “governs the tendons, and the external manifestation of the Liver is on the nails (“主筋，其华在爪”）”: The tendons and nails are nourished by the Liver. “The eyes are the extremal sense organ of the Liver” (“肝开窍于目”). The essential energy of the Liver runs upward into the eyes and nourishes them to maintain the visual functions of the eyes.

### 1.3.2.2 The Heart (心)

The Heart is in the chest, between the two lobes of the lung. It is paired with the Small Intestine via meridian channels and collaterals.

“The Heart controls the Xue (血, blood) in the vessels, and the status of the Heart is reflected in the face” (“心主血脉，其华在面”). The Heart pumps the circulation of the blood. The blood flow is smooth, powerful, and strong enough to nourish the whole body when the Qi of the Heart (心气) is sufficient. The status of the Xue (血, blood) and Qi (气, air) in the face, deficient or sufficient, depends highly on the Qi of the Heart. “Shen (神, spirit) is stored in the Heart” (“心藏神”). All mental functions, including consciousness, emotion, and thoughts, are related with the Heart. “The tongue is the extremal sense organ of the Heart” (“心开窍于舌”). Its color, texture and functions are closely related to the Heart; the tongue is ruddy and lustrous in appearance, keen in taste and fluent and flexible in speaking functionally with sufficient Qi of the Heart (心气).

### 1.3.2.3 The Spleen (脾)

The Spleen is in the abdomen, below the diaphragm, on the left side of the Stomach. It is paired with the Stomach via meridian channels and collaterals.

The Spleen “governs the transportation and transformation” (“主运化”): The Spleen transports and transforms the essential nutrients and water, 1) the Spleen digests food, absorbs and transports nutrients, and regulates the metabolism of the water and body fluid. The Spleen

“commands the blood” (“主统血”): The **Spleen** maintains blood circulation inside the vessels and prevents blood from flowing out. The **Spleen** “governs the muscles and the four limbs” (“主肌肉, 四肢”): The essential nutrients transformed by the **Spleen** nourish the muscles and strengthen the limbs. “The mouth is the extremal sense organ of the **Spleen** and external manifestation of the **Spleen** is the lip” (“脾开窍于口, 其华在唇”). The sufficient Qi of the **Spleen** leads to a good appetite and the color of the lip reflects the status of the Qi of the **Spleen**.

#### 1.3.2.4 The **Lung** (肺)

The **Lung** is in the chest, connected to the throat and the nose. It is paired with the **Large Intestine** via meridian channels and collaterals.

The **Lung** “governs the Qi, responsible for the respiration” (“主气, 司呼吸”): The **Lung** is the place where gas exchange happens; Meanwhile, the fresh air from nature and the essential energy transformed by the **Stomach** and the **Spleen** combine and transform into Zong-Qi (宗气). The Zong-Qi, stored in the chest, is transported to the whole body by the **Heart** and the **Lung** to maintain the functions of all the tissue and organs. The **Lung** “dominates dispersion and governs the skin” (“主宣发, 外合皮毛”): The Defence-Qi (卫气) and body fluid (津液) are dispersed to the entire body by the **Lung** to nourish the muscles, skin, and hair. The **Lung** “dominates descending movement and regulates the water passage” (“主肃降, 通调水道”): The location of the **Lung** is the highest among the Zang-Fu and the Qi of the **Lung** tends to descend. The descending movement of the **Lung**-Qi promotes the metabolism and the fluid flow in the body. “The nose is the extremal sense organ of the **Lung**” (“肺开窍于鼻”). The air flow through the nostril cavity is smooth and the nose is sensitive in smelling when the functions of the **Lung** are normal.

#### 1.3.2.5 The **Kidney** (肾)

The **Kidney** is in the abdomen, on each side of the vertebral column. It is paired with the **Gallbladder** via meridian channels and collaterals.

The **Kidney** “stores the Jing (essential energy, 精) and governs development and reproduction” (“肾藏精, 主发育和生殖”): The **Kidney** stores the innate Jing (innate essential energy, 先天之精) from parents and the postnatal Jing (postnatal essential energy, 后天之精) transformed by the **Spleen** and **Stomach**. The capability of human reproduction, growth and development depends on the amount of the **Kidney**-Jing. The **Kidney** “governs water” (“主水”): The **Kidney** disperses the water and regulates the metabolism of the water through “distillation”. The **Kidney**

“governs the reception of Qi” (“主纳气”): The **Kidney** maintains the depth of the fresh air inhalation of the **Lung**; The **Lung** inhales normally and evenly only when **Kidney-Qi (肾气)** is sufficient. The **Kidney** “governs the **Bones**, produces **Bone Marrows**, and enriches the **Brain** and its external manifestation is the hair” (“主骨, 生髓, 充脑, 其华在发”): The **Kidney** stores Jing, which can be transformed into **Bone marrows**; The **Bone narrows** nourish **Bones**. The spinal cord is connected to the **Brain** which results from the convergence of **Bone Narrows**. The hair is the external manifestation of the **Kidney** and the growth, loss, and the texture of the hair, lustrous or withered, reflect the amount of the Kidney-Jing. “The ears, the external genitalia and the anus are the extremal sense organs of the **Kidney**” (“肾肺开窍于耳及二阴”). Ears, affiliated to the **Kidney**, are nourished by the **Kidney**. The formation and excretion of urine depend on the distillation and controlling function of the **Kidney**. Similarly, the defecation is also related to the promotion and controlling function of the **Kidney**.

### 1.3.3 Six-Fu (六腑, the six hollow inner organs)

#### 1.3.3.1 The **Gallbladder** (胆)

The **Gallbladder** lies in the right hypochondriac region, attached to the **Liver**. It is paired with the **Liver** via meridian channels and collaterals. The **Gallbladder** stores and excretes bile into the intestine to promote digestion. The **Gallbladder** “governs determination” (“主决断”): The **Gallbladder** helps a person to judge and make decisions. The **Gallbladder** belongs to the Six-Fu, but it does not receive or transmit food, water, or the faces, which is remarkably different from other Fu organs. Therefore, the **Gallbladder** is also regarded as one of the Qiheng's-Fu.

#### 1.3.3.2 The **Small Intestine** (小肠)

The **Small Intestine** lies in the abdominal cavity, between the pylorus of the stomach and the **Large Intestine**. It is paired with the **Heart** via meridian channels and collaterals. The **Small Intestine** receives the chyme transmitted from the stomach, further digests the chyme, absorbs the nutrients and transmits the waste into the **Large Intestine**. Meanwhile, the **Small Intestine** excretes the useless water into the **Urinary Bladder**.

#### 1.3.3.3 The **Stomach** (胃)

The **Stomach** lies in the upper abdominal cavity, connected to the esophagus and the **Small Intestine**. It is paired with the **Spleen** via meridian channels and collaterals. It receives food transmitted from the esophagus, digests the food and transmits the chyme to the **Small Intestine**.

The **Stomach** and the **Spleen** digest food and absorb the nutrients to nourish the entire body collaboratively. Therefore, they are called “the postnatal basis of the body” (“后天之本”).

#### 1.3.3.4 The **Large Intestine** (大肠)

The **Large Intestine** lies in the abdominal cavity, connected to the **Small Intestine** and the anus. It is paired with the **Lung** via meridian channels and collaterals. It receives the chyme from the **Small Intestine**, absorbs the remaining water in the chyme and converts food remnants to feces.

#### 1.3.3.5 The **Urinary Bladder** (膀胱)

The **Urinary Bladder** is in the lower abdominal cavity, below the **Kidney** and in front of the **Large Intestine**. It is paired with the **Kidney** via meridian channels and collaterals. The **Urinary Bladder** stores the urine temporarily with the assist of the **Kidney-Qi**. With the activation and the controlling function of the Qi from the **Kidney** and the **Urinary Bladder**, the urine is excreted regularly.

#### 1.3.3.6 The **Triple Warmer** (三焦)

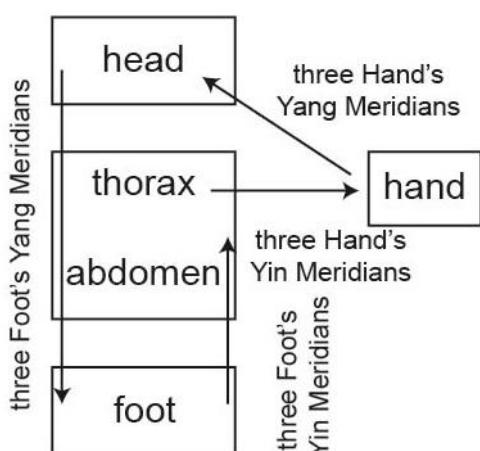
The **Triple Warmer** lies in the body but outside of the viscera. It is paired with the **Pericardium** via meridian channels and collaterals. The **Triple Warmer** is the route of the Yuan-Qi (元气) and water. It consists of the **Upper Warmer** (上焦), the **Middle Warmer** (中焦) and the **Bottom Warmer** (下焦). The **Upper Warmer** is responsible for dispersion, which means that it disperses the nutrients from the food and water to the entire body with the dispersive functions of the **Lung** and the **Heart**. The **Middle Warmer** digests food and water: The **Spleen** and the **Stomach** digest food, absorb the nutrients and transform the nutrients into nourishing blood (营血). The **Bottom Warmer** separates the useless and useful materials and excretes the defecation and useless water. Clinically, the diaphragm and the umbilicus are often used as the boundaries of the three regions of the **Triple Warmer**.

## 1.4 Meridian Channels and Collaterals (经络)

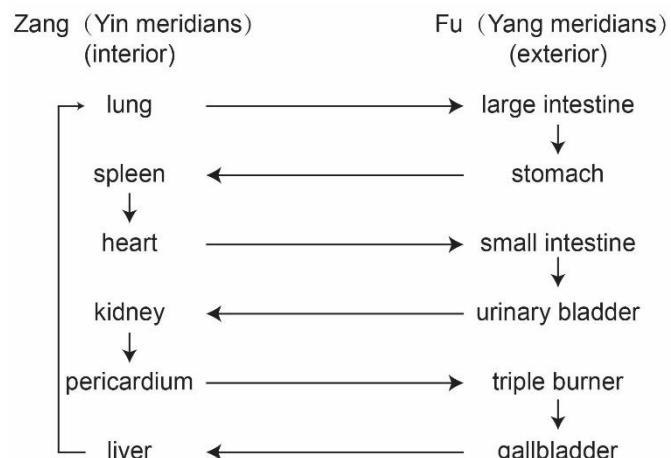
### 1.4.1 The Meridian Channels and Collaterals (经络)

Meridians channels and collaterals (经络), which are distributed all over the body and connected with all the inner organs, are paths for the circulation of the Qi. The meridian system consists of the meridian channels (经脉), collaterals (络脉), and structures affiliated to these two. Meridian channels (经脉) are the main branches, including the 12 Principal Meridians (十二正经), 12 Divergent Meridians (十二经别), and 8 Extraordinary Meridians (奇经八脉); Collaterals (络脉) are small associated vessels, consisting of the 15 Collaterals (十五络脉), Superficial Collaterals (浮络), and Tertiary Collaterals (孙络). The associated structures of the 12 Principal Meridians are the 12 Tendinomuscular Meridians (十二经筋) and the 12 Cutaneous Regions (十二皮部).

The 12 Principal Meridians, the essential components of the meridian system, are divided into Yang and Yin groups, and each of these two groups paired with the hand (upper limb) and the foot (lower limb), respectively. In total, the 12 Principal Meridians include three Hand's Yin Meridians (手三阴经), three Hand's Yang Meridians (手三阳经), three Foot's Yin meridians (足三阴经), and three Foot's Yang Meridians (足三阳经).



**Figure 1.4.1** the flow directions of the three Hand's and Foot's Yang (and Yin) Meridians



**Figure 1.4.2** the flow direction and order of the 12 Principal Meridians (all the visceral names are based on the TCM)

Five-Zang and the **Pericardium** are Yin inner organs. The **Lung**, the **Pericardium**, and the **Heart**, located above the thoracic diaphragm, are paired with the three Hand's Yin Meridians (手三阴经); the rest Yin inner organs, including the **Liver**, the **Spleen**, and the **Kidney**, below the thoracic diaphragm, are paired with three Foot's Yin Meridians(足三阴经). On the contrary, Six-Fu is Yang inner organs. The **Small Intestine**, the **Large Intestine**, and the **Triple Warmer**, connected with the

three Hand's Yin Meridians (手三阴经) respectively, are paired with the three Hand's Yang Meridians (手三阳经); the **Stomach**, the **Gallbladder** and the **Urinary Bladder**, connected with three Foot's Yin Meridians (足三阴经) respectively, are paired with the three Foot's Yang Meridians (足三阳经). Among the Yin group, the Major Yin (太阴, Taiyin), Minor Yin (少阴, Shaoyin), and Absolute Yin (厥阴, Jueyin) meridians, are connected to the Yang Supreme (阳明, Yangming), Major Yang (太阳, Taiyang) and Minor Yang (少阳, Shaoyang) meridians of the Yang group, respectively.

The three Hand's Yin Meridians start from the chest, enter the upper limb, extend along the anterior upper limb and end at the distal end of the hand (fingertips). In contrast, the three Hand's Yang Meridians start from the distal end of the hand (fingertips), extend along the posterior upper limb, cross through neck and end on the head (face). The three Foot's Yang Meridians start from the head (face), cross the neck and trunk, extend along the lower limb (anterior, lateral, and posterior), and end at the distal end of the foot (toes). On the contrary, the three Foot's Yin Meridians start from the foot, extend along the medial lower limb, end in the abdomen (or the chest) (**Figure 1.4.1**).

**Table 1.3.1 the twelve Principal Meridians**

| Yin Meridians (阴经)                |   | Yang Meridians (阳经)   |                                    |
|-----------------------------------|---|---|------------------------------------|
| Three Hand's Yin Meridians (手三阴经) | Taiyin Lung Channel of Hand or Hand's Major Yin Lung Meridian (手太阴肺经)                                     | Yangming Large Intestine Channel of Hand or Hand's Yang Supreme Large Intestine Meridian (手阳明大肠经) | Three Hand's Yang Meridians (手三阳经) |
|                                   | Shaoyin Heart Channel of Hand or Hand's Minor Yin Heart Meridian (手少阴心经)                                  | Taiyang Small Intestine Channel of Hand or Hand's Major Yang Small Intestine Meridian (手太阳小肠经)    |                                    |
|                                   | Jueyin Pericardium Channel of Hand or Hand's Absolute Yin Heart Protector (Pericardium) Meridian (手厥阴心包经) | Shaoyang Sanjiao Channel of Hand or Hand's Minor Yang Triple Warmer Meridian (手少阳三焦经)             |                                    |
| Three Foot's Yin Meridians (足三阴经) | Taiyin Spleen Channel of Foot or Foot's Major Yin Spleen Meridian (足太阴脾经)                                 | Yangming Stomach Channel of Foot or Foot's Yang Supreme Stomach Meridian (足阳明胃经)                  | Three Foot's Yang Meridians (足三阳经) |
|                                   | Shaoyin Kidney Channel of Foot or Foot's Minor Yin Kidney Meridian (足少阴肾经)                                | Taiyang Bladder Channel of Foot or Foot's Major Yang Urinary Bladder Meridian (足太阳膀胱经)            |                                    |
|                                   | Jueyin Liver Channel of Foot or Foot's Absolute Yin Liver Meridian (足厥阴肝经)                                | Shaoyang Gallbladder Channel of Foot or Foot's Minor Yang Gallbladder Meridian (足少阳胆经)            |                                    |

Here are the flow direction and order of the 12 Principal Meridian, Hand's Major Yin Lung Meridian → Hand's Yang Supreme Large Intestine Meridian → Foot's Yang Supreme Stomach Meridian → Foot's Major Yin Spleen Meridian → Hand's Minor Yin Heart Meridian → Hand's Major Yang Small Intestine Meridian → Foot's Major Yang Urinary Bladder Meridian → Foot's Minor Yin Kidney Meridian → Hand's Absolute Yin Heart Protector (**Pericardium**) Meridian → Hand's Minor Yang Triple Warmer Meridian → Foot's Minor Yang Gallbladder Meridian → Foot's Absolute Yin Liver Meridian → Hand's Major Yin Lung Meridian, and these meridian channels are connected in a circle (**Figure 1.4.2**). One should notice that in the early TCM documents, “***the Cauterization Canon of the Eleven Foot and Arm Channels*** (《足臂十一脉灸经》)” and “***Cauterization Canon of the Eleven Yin and Yang Channels*** (《阴阳十一脉灸经》)”, the 12 Principal Meridians were not complete, lacking the Hand's Absolute Yin Heart Protector (**Pericardium**) Meridian.

The 8 Extraordinary Meridians are the Conception Vessel (任脉), the Governing Vessel (督脉), the Penetrating Vessel (冲脉), the Girdle Vessel (带脉), the Yin Heel Vessel (阴跷脉), the Yang Heel Vessel (阳跷脉), the Yin linking vessel (阴维脉), and the Yang linking vessel (阳维脉). Among these 8 Extraordinary Meridians, only the Conception Vessel and the Governing Vessel have their own acupoints while all the other Extraordinary Meridians share acupoints with the 12 Principal Meridians. Moreover, the Extraordinary Meridians are neither coupled with inner organs nor paired with each other. They link the Principal Meridians and adjust the circulation of the Xue (blood, 血) and the Qi (air, 气).

The Major Yin Meridian, the Absolute Yin Meridian and the Minor Yin Meridian are distributed from the lateral (radial) to the medial (ulnar) side of the anterior upper limb (anterior to posterior side of the medial lower limb; **note**: the location 8 cun above the prominence of the medial malleolus is regarded as a landmark; the Major Yin Meridian is anterior while the Absolute Yin Meridian lies in the middle above the landmark; however, the Absolute Yin Meridian lies anteriorly while the Major Yin Meridian is in the middle below the landmark.). In the same order, the Yang Supreme Meridian, the Minor Yang Meridian, and the Major Yang Meridian are aligned on the posterior upper limb (anterior to posterior side of the lateral lower limb). The Conception Vessel (in the anterior median line), Foot's Minor Yin Kidney Meridian, Foot's Yang Supreme Stomach Meridian, and Foot's Major Yin Spleen Meridian are aligned on the anterior trunk mediolaterally. The Foot's Minor Yang Gallbladder Meridian lies in the hypochondrial region on the side of the trunk. The Foot's Absolute Yin Liver Meridian crosses the hypochondrial region and bypasses the external genital area. The Governing Vessel is across the posterior midline of the trunk. The Foot's Major Yang Urinary Bladder Meridian is lateral to the Governing Vessel on the posterior trunk. In the facial and head

region, the Hand's and Foot's Yang Supreme Meridian and Minor Yang Meridian lie in the Frontal Head (facial region and the forehead) and Temporal Head region, respectively. The Governing Vessel crosses through the midline of the head while the Foot's Major Yang Meridian is on both sides of the midline of the head (above the eyebrow) (**Figure 1.4.3**).

#### 1.4.2 Acupoints (腧穴)

Acupoints, thought to be located on the surface of human body, are regions where the Qi from the inner organs and meridians perfuses to the body surface according to the TCM. They are the sites where the acupuncture treatment was applied. Stimulating acupoints using needling or other methods (moxibustion) can adjust the circulation of the Qi and restore the balance of Yin and Yang in the body.

Human acupoints are classified into three categories, Meridian Acupoints (十四经腧穴), Extra Points (经外奇穴) and Ashi Points (阿是穴). The Meridian Acupoints are located on the 12 Principal Meridians and the Conception Vessel and Governing Vessel, with 361 different acupoint names. Extra Points (经外奇穴) have fixed locations and names though they are not on the 12 Principal Meridians or the Conception Vessel and Governing Vessel. In fact, some of the Meridian Acupoints belonged to the category of Extra Points originally and they were classified into the Meridian Acupoints later. However, Ashi Points do not have names or fixed sites. In general, their positions are localized based on the pain sites.

The main principle of acupuncture treatment is that “stimulating acupoints treats the diseases occurring in the regions which are connected to the acupoints by the meridians or collaterals (“经脉所通, 主治所及””). In general, all acupoints have local effects to disorders near the acupoints. For example, acupoints on the head are effective to disorders of the Five Sensory Organs (the eyes, ears, mouth, nose, and tongue, 五官疾病), headache and vertigo based on the locations of acupoints. However, some of the acupoints have long-distance effects (长程疗效; we address acupoints with long-distance effects as long-distance acupoints, 长程穴) and they are used to treat diseases occurring in regions away from the acupoints. Most limb acupoints distal away from the elbow joint (or the knee joint) have long-distance effects (**Table 1.3.2**). For instance, ST36 (Zusanli, 足三里) is not only effective to lower limb diseases, but also to Shenzhibing (mental disorders, 神志病; **Appendix 1**) and disorders of the stomach, intestine, urinary system, and reproductive system.

Meanwhile, stimulating acupoints often has bidirectional effects conditionally. For instance, needling the acupoints PC6 (Neiguan, 内关) can increase or decrease the heart rate to recover to the

normal heart rate range according to the physiological status of the patients (bradycardia or tachycardia).

**Table 1.3.2** selection of long-distance acupoints (长程穴) or acupoints in vicinity

| location of disorders   | long-distance acupoint                     | acupoint in vicinity |  |
|-------------------------|--|----------------------|--|
|                         |  | vicinal acupoint     | local acupoint                           |
| face and forehead       | LI4 (Hegu, 合谷), ST44 (Neiting, 内庭)         | GV20 (Baihui, 百会)    | GB14 (Yangbai, 阳白)                       |
| temporal head           | TE5 (Waiguan, 外关), GB41 (Zulinqi, 足临泣)     | GB20 (Fengchi, 风池)   | HN5 (Tayang, 太阳), GB8 (Shuaigu, 率谷)      |
| back of the neck (nape) | SI3 (Houxi, 后溪), BL60 (Kunlun, 昆仑)         | GV14 (Dazhui, 大椎)    | BL10 (Tianzhu, 天柱)                       |
| ears                    | TE3 (Zhongzhu, 中渚), GB43 (Xiaxi, 侠溪)       | GB20 (Fengchi, 风池)   | GB2 (Tinghui, 听会), TE17 (Yifeng, 翳风)     |
| throat                  | LU10 (Yuji, 鱼际), KI6 (Zhaohai, 照海)         | BL10 (Tianzhu, 天柱)   | CV23 (Lianquan, 廉泉), SI17 (Tianrong, 天容) |
| chest                   | PC6 (Neiguan, 内关), ST40 (Fenglong, 丰隆)     | LU1 (Zhongfu, 中府)    | CV17 (Danzhong, 膽中)                      |
| hypochondrium           | TE6 (Zhigou, 支沟), GB34 (Yanglingquan, 阳陵泉) | LR13 (Zhangmen, 章门)  | LR14 (Qimen, 期门)                         |
| upper abdomen           | PC6 (Neiguan, 内关), ST36 (Zusanli, 足三里)     | ST21 (Liangmen, 梁门)  | CV12 (Zhongwan, 中脘)                      |
| lower abdomen           | LR8 (Ququan, 曲泉), SP6 (Sanyinjiao, 三阴交)    | ST25 (Tianshu, 天枢)   | CV4 (Guanyuan, 关元)                       |

#### 1.4.3 The Distribution of Acupoints

Acupoints on the three Hand's Yin Meridians are effective for Shenzhibing (**Appendix 1**) and diseases in the chest area, including pharyngitis and disorders of the heart, the lung, and the stomach while acupoints on the three Hand's Yang Meridians are commonly effective for eye diseases, throat disorders and fever. Meanwhile, the Hand's Yang Supreme, the Hand's Major Yang and the Hand's Minor Yang Meridians are effective for: ① diseases on the Frontal Head (face and forehead; e.g., the Five Sensory Organs); ② disorders in the Temporal Head and the hypochondrial region; ③ mental disorders and diseases of the Hind Head and the scapular area, respectively (**Figure 1.4.3**).

Acupoints on the three Foot's Yin Meridians are commonly effective for Qianyinbing (diseases of external genitalia, 前阴病) and gynecological diseases. Meanwhile, the Foot's Major Yin, the Foot's Minor Yin and the Foot's Absolute Yin Meridians are effective for: ① digestive problems of

the stomach and intestine; ② diseases of the liver and gallbladder; ③ disorders of the kidney, lung, and throat, respectively. However, acupoints on the three Foot's Yang Meridians are commonly effective for Shenzhibing (mental disorders, **Appendix 1**) and fever. Furthermore, the Foot's Yang Supreme, the Foot's Major Yang and the Foot's Minor Yang Meridians are effective for: ① diseases on the Frontal Head (face and forehead; e.g., the Five Sensory Organs) and digestive problems of the stomach and intestine; ② diseases of the Temporal Head and the hypochondrial region; ③ disorders of the Hind Head, inner organs (viscera) and the back, respectively (**Figure 1.4.3**).

Most of the acupoints on the head (including facial region) and the trunk mainly show local effects. From the top to the bottom, the acupoints are mainly effective to the disease of the head (Five Sensory Organs), disorders of the heart, the lung, the stomach, the liver, the gallbladder, the spleen, the pancreas, the intestine, the urinary system, and the reproductive system (**Figure 1.4.3**).

Acupoints on the Conception Vessel and Governing Vessel are effective for Shenzhibing (mental disorders, **Appendix 1**), diseases of inner organs (viscera) and gynecological diseases. Among these acupoints, some of them on the Conception Vessel can “restore Yang, relieve desecration (rescuing patient from collapse, “回阳固脱”)” and strengthen the body while acupoints on the Governing Vessel are effective for fever, stroke, and coma (**Figure 1.4.3**).

**Table 1.3.3** distribution pattern of acupoints  
the Three Hand's Yin Meridians

|                              | feature of the meridian                             | common for two meridians | common for three meridians   |
|------------------------------|---|--------------------------|------------------------------|
| Hand's Major Yin Meridian    | throat disorders and diseases of the chest and lung |                          | diseases in the chest region |
| Hand's Absolute Yin Meridian | diseases of the chest, the heart, and the stomach   | mental disorders         |                              |
| Hand's Minor Yin Meridian    | diseases of the chest and the heart                 |                          |                              |

the Three Hand's Yang Meridians

|                     | feature of the meridian   | common for two meridians | common for three meridians              |
|---------------------|---|--------------------------|---|
| Hand's Yang Supreme | disorders of the Frontal Head, the nose, the mouth, and teeth         |                          | diseases of the eyes, throat, and fever |
| Hand's Minor Yang   | disorders of the Temporal Head and the hypochondrium                  | disorders of the ears    |   |
| Hand's Major Yang   | disorders of the Hind Head, the scapular region, and mental disorders |                          |   |

the three Foot's Yin Meridians

|                              | feature of the meridian                             | common for three meridians  |
|------------------------------|---|---|
| Foot's Major Yin Meridian    | digestive problems of the stomach and the intestine | Qianyinbing (diseases of external genitals, 前阴病) and gynecological diseases |
| Foot's Absolute Yin Meridian | diseases of the liver and gallbladder               |   |
| Foot's Minor Yin Meridian    | disorders of the kidney, the lung, and the throat   |   |

the three Foot's Yang Meridians

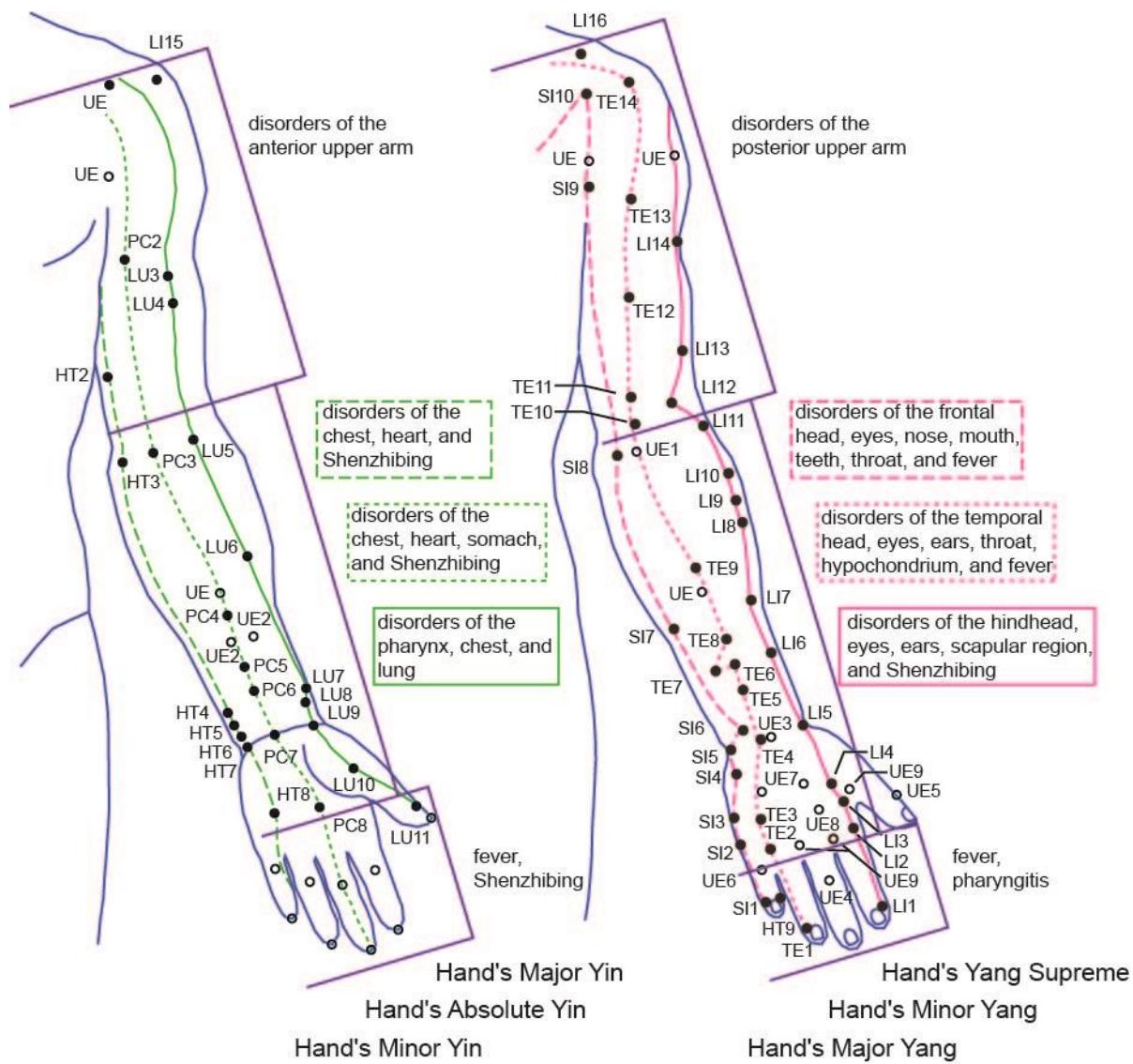
|                              | feature of the meridian  | common for two meridians | common for three meridians |
|------------------------------|--|--------------------------|----------------------------|
| Foot's Yang Supreme Meridian | diseases of the Frontal Head, the mouth, teeth, the throat, the stomach, and the intestine | hearing disorders        | mental disorders and fever |
| Foot's Minor Yang Meridian   | diseases of the Temporal Head, ears and the hypochondrium                                  |                          |                            |
| Foot's Major Yang Meridian   | diseases of the Hind Head, the back and viscera  |                          |                            |

the functional distribution pattern of acupoints on the head and trunk

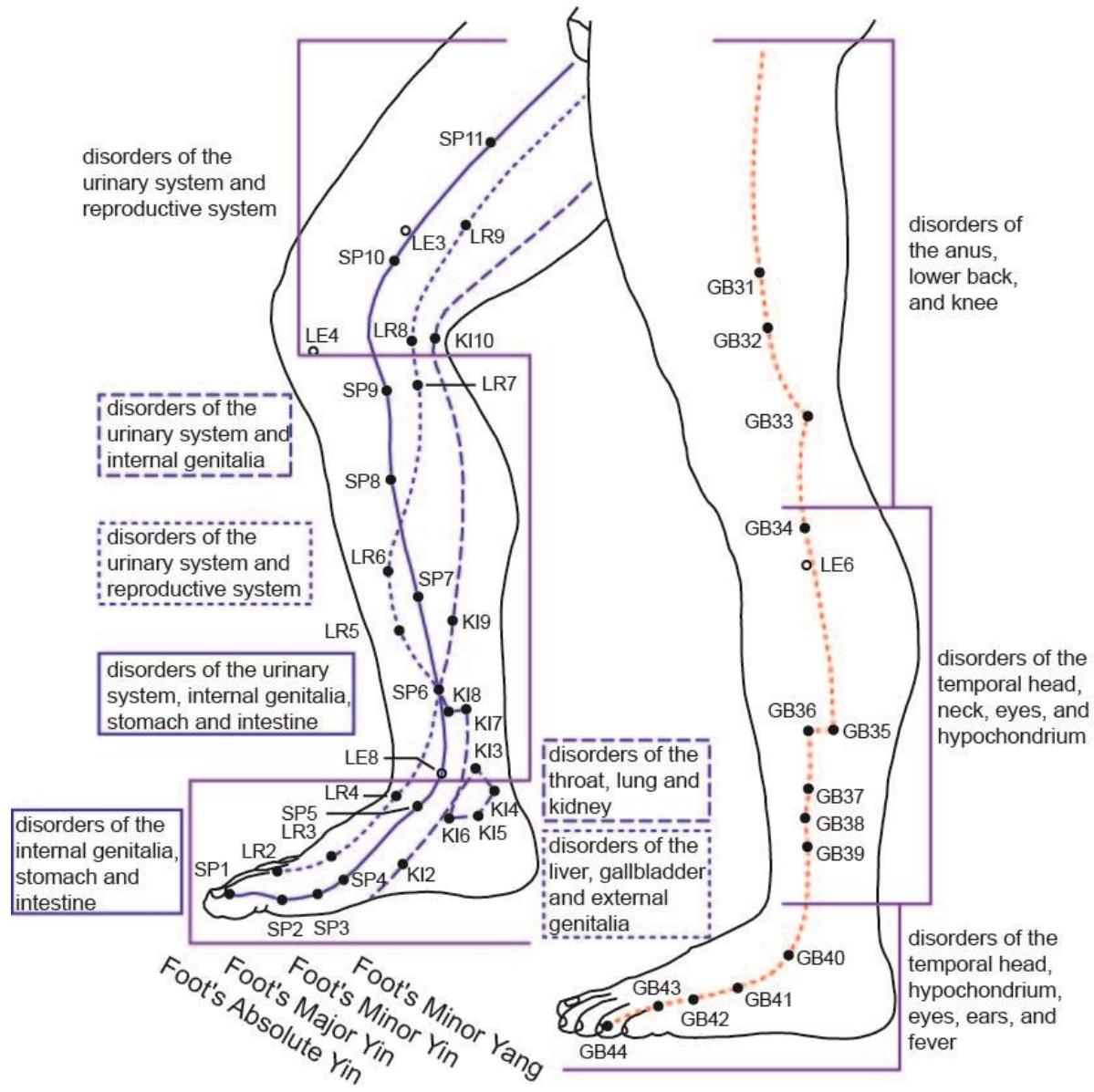
| regions                                      | functions   |
|--|---|
| head (including facial region) and neck      | diseases of the brain, eyes, ears, the nose, the mouth, teeth, the throat, and the neck |
| thorax, upper back (T1 - T7)                 | diseases of the lung and the heart  |
| upper abdomen and lower back (T8 - L1)       | diseases of the stomach, the liver, the gallbladder, the spleen, and the pancreas       |
| lower abdomen and lumbosacral area (L2 - S4) | diseases of the kidney, the urinary bladder, the intestine, and the reproductive system |

the Conception Vessel and Governing Vessel

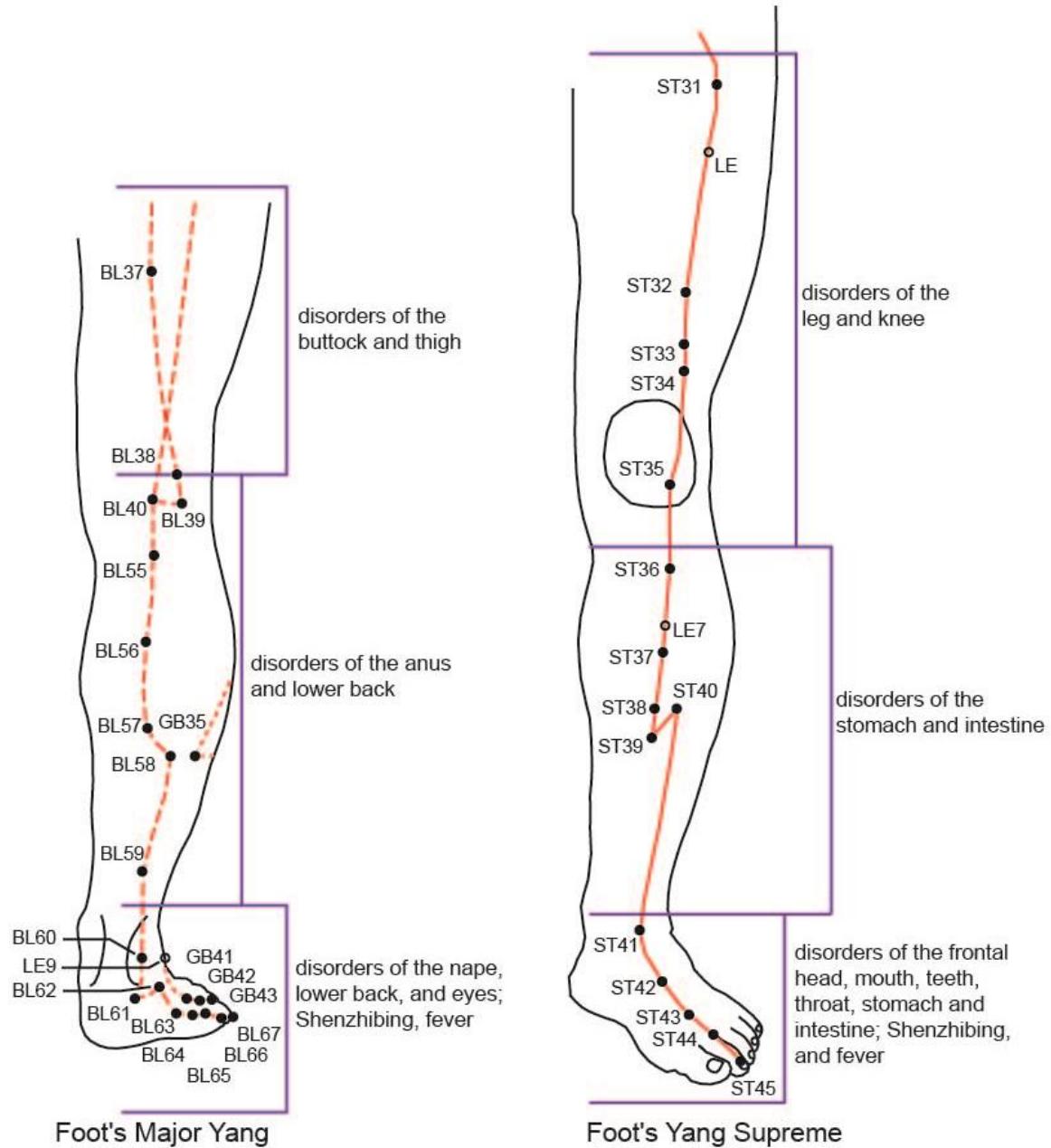
|                   | feature of the Vessel  | common for two Vessels  |
|-------------------|--|---|
| Conception Vessel | "restore Yang, relieve desorption (rescuing patient from collapse, “回阳固脱”) and strengthen the body | mental disorders, disorders of viscera and gynecological diseases |
| Governing Vessel  | stroke, coma, fever, and diseases in the facial and head regions                                   |   |



**Figure 1.4.3.1 the distribution pattern of acupoints – upper limb acupoints**



**Figure 1.4.3.2 the distribution pattern of acupoints – lower limb acupoints**



**Figure 1.4.3.3 the distribution pattern of acupoints – lower limb acupoints**

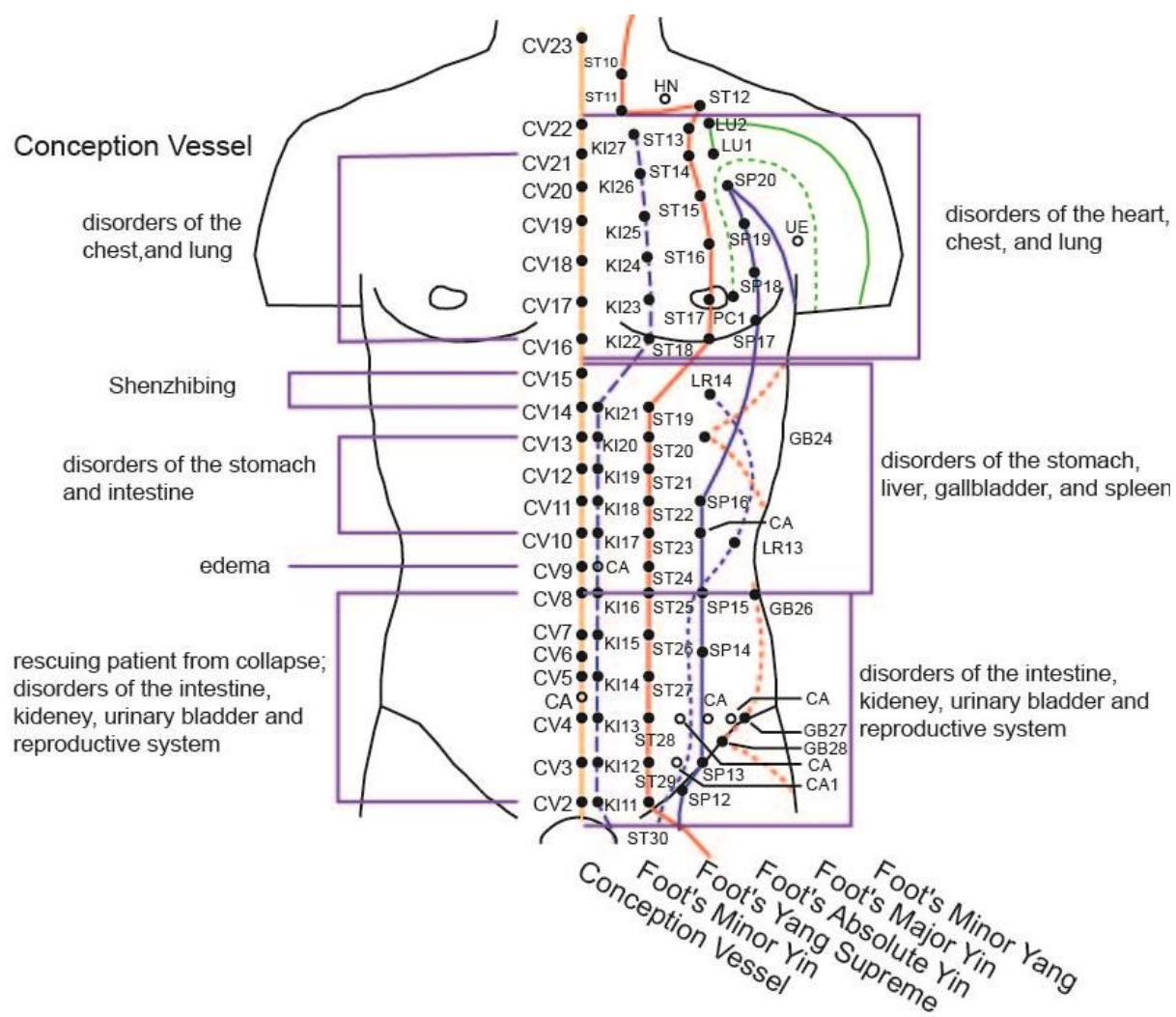


Figure 1.4.3.4 the distribution pattern of acupoints – acupoints on the anterior trunk

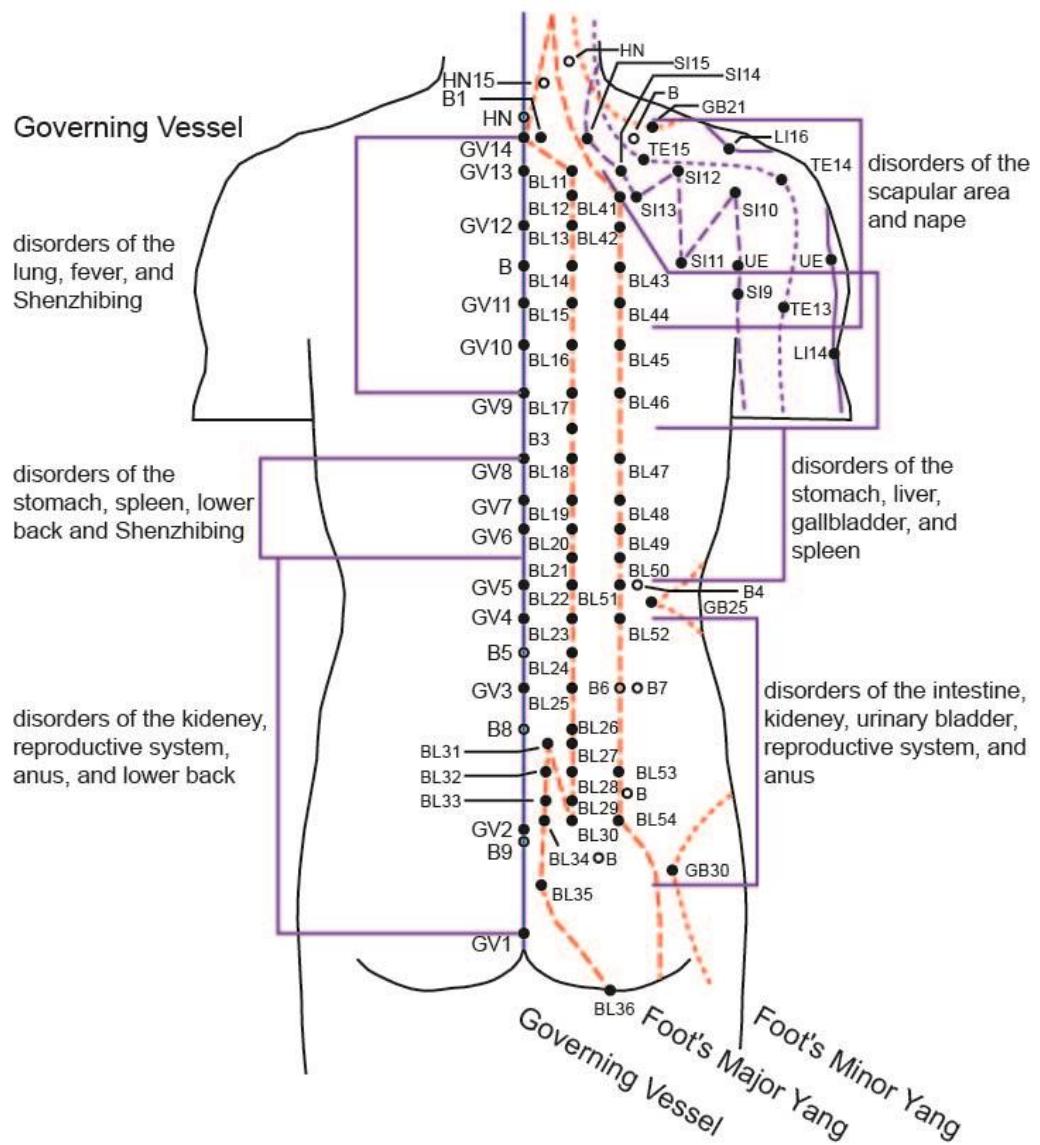
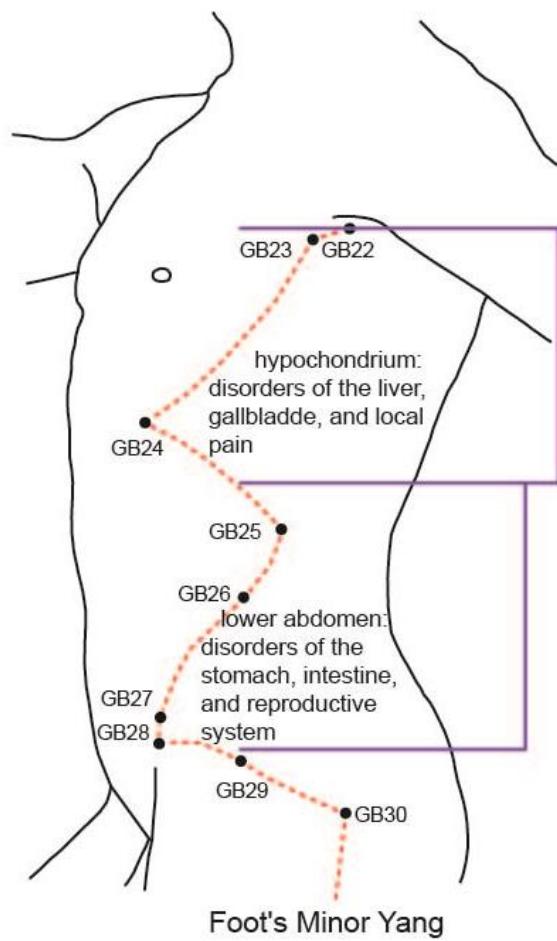


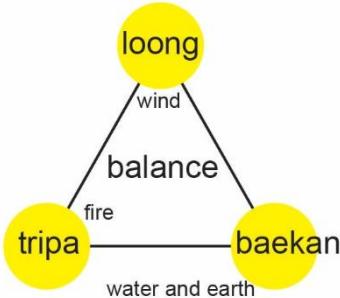
Figure 1.4.3.5 the distribution pattern of acupoints – acupoints on the posterior trunk



**Figure 1.4.3.6 the distribution pattern of acupoints – acupoints on the side of the trunk**

#### 1.4.4 Three Principal Energies in the Traditional Tibetan Medicine – Loong, Tripa, and Baekan

The theory of Three Principal Energies (三因学说) is fundamental for the Traditional Tibetan Medicine (TTM). The Three Principal Energies are the manifestation of the Five Great Elements (五元), which refer to the Wind (风), the Fire (火), the Water (水), the Earth (土), and the Space (空). The three Principal Energies are Loong (隆), Tripa (赤巴), and Baekan (培根), representing the Wind (or air), the Fire, and the sticky liquid (or the Water and the Earth). The TTM Loong, like the Qi (气) in the TCM, is the driving force of the body and is closely related with biological processes. Tripa, with the properties of the Fire, is responsible for the functions and activities of human viscera. Baekan, based on the property of the Water and the Earth, is highly related with liquids, materials in the human body and their functions (**Figure 1.3.5**). Each of the Three Principal Energies can be further classified into five different types according to their locations and physiological functions in the body (**Table 1.3.4**). The Loong, Tripa, and Baekan interact, collaborate with each other and maintain the functional balance of human body (**Figure 1.3.5**). All diseases result from the imbalance of the Three Principal Energies.



**Figure 1.3.5 three principal energies of the TTM**

**Table 1.3.4** five types of Loong, Tripa and Baekan

| Three Principal Energies                     | location  | function   |
|--|---|--|
| Loong  |   |  |
| Loong Srog-dzin<br>(life grasping Loong)     | at the top of the head, comparable to the TCM acupoint, GV20 (Baihui, 百会); traveling between the pharynx and the chest      | swallow, breath, secretion of saliva, smith sneeze and eructation  |
| Loong Gyen-rgyu<br>(upward moving Loong)     | in the chest; traveling among the nose, the tip of the tongue, and the uvula  | human voice  |
| Loong Khyab-byed<br>(all-pervading Loong)    | in the heart; traveling through the whole body  | flexion and extension of the limbs; the opening and close of eyes and the mouth; coordinating facial expression and movement |
| Loong Me-mnyam<br>(fire-accompanying Loong)  | in the stomach; traveling through the inner organs  | responsible for digestion  |
| Loong Thur-sel<br>(downward cleansing Loong) | in the anus; flowing through the lower body including the large intestine, urinary bladder, genitalia, and the medial thigh | ejaculation, menstruation, urination, defecation, and childbirth   |

| Three Principal Energies                      | location                     | function   |
|---|------------------------------|--|
| Tripa   |                              |  |
| Tripa mthong-byed<br>(sight Tripa)            | in the eyes                  | vision   |
| Tripa sGrub-byed<br>(accomplishing Tripa)     | in the heart                 | consciousness, motivating our minds to succeed in our life goals and ambitions, and building up our confidence.  |
| Tripa Jyoo-byed<br>(digesting Tripa)          | in the stomach and intestine | digestion and producing heat   |
| Tripa mdangs-sgyur<br>(color changing Tripa)  | in the liver                 | transforming essential nutrients and maintaining the normal coloring of the body, e.g., the red color of the blood and the greenish-yellow color of the bile |
| Tripa mDog-sel<br>(complexion clearing Tripa) | on the skin surface          | lustering the skin   |

| Three Principal Energies                     | location       | function   |
|--|----------------|--|
| Baekan                                       |                |  |
| Baekan tsim-byed<br>(satisfying Baekan)      | in the head    | emotion such as happiness, anger, enjoyment, pleasure, and satisfaction etc.                           |
| Baekan myong-byed<br>(taste receptor Baekan) | in the tongue  | gustatory function; distinguishing tastes  |
| Baekan rten-byed<br>(supporting Baekan)      | in the thorax  | supporting the other four types of Baekan  |
| Baekan myag-byed<br>(mixing Baekan)          | in the stomach | breaking down foodstuffs into a semi-liquid form   |
| Baekan byor-byed<br>(connecting Baekan)      | in the joints  | assisting the connection of joints, nourishing the joints, and facilitating the movement of the joints |

Here we only note that the each of the Three Principal Energies (except for the Tripa mDog-sel and Baekan byor-byed) is overall aligned from the top to the bottom along the vertebral column and their functions are also distributed along the vertebral column in segments (**Table 1.3.4**).

The TTM acupoints are similar to those of the TCM, but they are not identical. We only talk about the acupoints on the back (posterior trunk) here. The TTM acupoints on the back are classified into 23 groups. Each group (except for the last group) consists of three acupoints on the same horizontal level, below one vertebra. One acupoint is in the posterior median line and the other two are 1 cun (寸, one cun is equal to the space between the distal interphalangeal joint and the proximal interphalangeal joint on the middle finger) apart from the midline laterally. The 7th cervical vertebra is regarded as the first vertebra in localizing acupoints for the TTM (**Table 1.3.5**).

The functions of these acupoints correspond to the viscera which are aligned from the top to the bottom along the vertebral column (**Table 1.3.5**). What should be noticed remarkably is that the male internal genital organ (testicles) is located lower than the sacral vertebrae, but the acupoints BV13 and BV14, which are effective to the genital diseases, are on the same level as the lumbar vertebrae (**Table 1.3.5**). This can be explained with the following two possible reasons, 1) the innervation and blood vessels (arteries) of the testicles and the early development origin of testicles are from the lumbar region; 2) stimulating (needling or moxibustion) acupoint BV13 can adjust the functions of the gonads indirectly by activating the adrenal glands.

**Table 1.3.5 TTM acupoints on the back (posterior trunk)**

| TTM acupoints      | TCM acupoints                          | locations  | functions (according to the TTM)  |
|--------------------|--|--|---|
| BV1<br>(隆穴)        | GV14 (Dazhui, 大椎)                      | below the 7th cervical vertebra                        | mania, delirium, somnolence, stiff neck, and illness caused by Loong  |
| BV2<br>(赤巴穴)       | GV13 (Taodao, 陶道)                      | below the 1st thoracic vertebra                        | diseases of gallbladder of “coldness” type and Yingbing ( <b>Appendix 1</b> )   |
| BV3<br>(培根穴)       |  | below the 2nd thoracic vertebra                        | diseases of the lung, the heart, and the head caused by excessive Tripa or Baekan; nasal congestion and dry mouth;                                  |
| BV4, 5<br>(肺母 肺子穴) | GV12 (Shenzhu, 身柱), B4 (Juqueshu, 巨阙俞) | below the 3rd and 4th thoracic vertebrae, respectively | lung diseases, chest pain, fever, coma, hemoptysis, delirium, seasonal febrile diseases, and backache   |
| BV6, 7<br>(命脉穴 心穴) | GV11 (Shendao, 神道), GV10 (Lingtai, 灵台) | below the 5th and 6th thoracic vertebrae, respectively | mania, delirium, syncope, insomnia, and amnesia   |
| BV8, 9<br>(膈穴 肝穴)  | GV9 (Zhiyang, 至阳)                      | below the 7th and 8th thoracic vertebrae, respectively | vomiting and belching, jaundice, tumor of gallbladder, gallstones, gallbladder enlargement, and vomiting bile                                       |
| BV10<br>(胆穴)       | GV8 (Jinsuo, 筋缩)                       | below the 9th thoracic vertebra                        | indigestion, yellowish sclera, tumor of gallbladder, gallstones, gallbladder enlargement, and vomiting bile   |
| BV11<br>(脾穴)       | GV7 (Zhongshu, 中枢)                     | below the 10th thoracic vertebra                       | abdominal bloating, borborygmus, and feeling of heaviness   |
| BV12<br>(胃穴)       | GV6 (Jizhong, 脊中)                      | below the 11th thoracic vertebra                       | hypofunction of stomach, chronic diarrhea, tumor of stomach, stiff back, and eye pain   |
| BV13<br>("三木塞"穴)   |  | below the 12th thoracic vertebra                       | nocturnal emission, involuntary emission, uterine bleeding, uterine fibroid, diseases of the womb and kidney  |
| BV14<br>(肾穴)       | GV5 (Xuanshu, 悬枢)                      | below the 1st lumbar vertebra                          | “coldness” in the kidney, low back pain, spermatorrhea caused by “coldness”, swelling of the external genitalia, erectile dysfunction, and diarrhea |
| BV15               | GV4 (Mingmen, 命)                       | below the 2nd lumbar vertebra                          | “coldness” illness, infertility, and diseases of viscera below the navel  |

|                 |                           |                               |  |
|-----------------|---------------------------|-------------------------------|--|
| (脏腑总穴)          | 门)                        |                               |  |
| BV16<br>(大肠穴)   | B5 (Xiajizhu, 下极俞)        | below the 3rd lumbar vertebra | borborygmus, tumor of the large intestine, constipation, and dysuria   |
| BV17<br>(小肠穴)   | GV3<br>(Yaoyangguan, 腰阳关) | below the 4th lumbar vertebra | tumor of intestine, “coldness” illness of Loong, diarrhea, and dysuria   |
| BV18<br>(膀胱穴)   | B8 (Shiqizhui, 十七椎)       | below the 5th lumbar vertebra | calculus of bladder, frequent urination, and anuresis  |
| BV19<br>(固精穴)   |                           | on the 1st sacral vertebra    | nocturnal emission, premature ejaculation, diarrhea, urethral pain, pain in the private region, and hematochezia |
| BV20<br>(下泄隆门穴) |                           | on the 2nd sacral vertebra    | excessive flatulence, constipation, diarrhea, frequent urination, and hypermenorrhea                             |
| BV21<br>(肛门穴)   |                           | on the 3rd sacral vertebra    | diarrhea and tachypnea   |
| BV22<br>(寒症总穴)  |                           | on the 4th sacral vertebra    | frequent urination and hypermenorrhea  |
| BV23<br>(马眼穴)   |                           | on the 5th sacral vertebra    | diarrhea and delirium  |

#### 1.4 Reference and Recommended Books in This Chapter

- [1] 《中医基础理论》，张安玲、徐胤聪，同济大学出版社，2009年7月，ISBN：9787560836614。
- [2] 《中国针灸学》（第四版），程莘农，人民卫生出版社，2000年10月，ISBN：9787117033138。
- [3] 《针灸学》，梁繁荣、王华，中国中医药出版，2016年8月，ISBN：9787513233934。
- [4] 《实用针灸学》，吴旭、盛灿若，人民军医出版社，2001年1月，ISBN：7801571010。
- [5] 《针灸大成》，明·杨继洲、靳贤、黄龙祥，人民卫生出版社，2017年9月，ISBN：9787117247054。
- [6] 《针灸穴位挂图》（第5版），靳士英，人民卫生出版社，2013年7月，ISBN：9787117172875。
- [7] 《四部医典》，宇妥·元丹贡布，江苏科学技术出版社，2016年3月，ISBN：9787553752686。
- [8] 《蓝琉璃》，毛继祖、卡洛、毛韶玲（译校），上海科技出版社，2012年1月，ISBN：9787547808832。
- [9] 《基础藏医学》，王智森，中国中医药出版社，2011年，ISBN：9787513205474。
- [10] 《壮医针灸学》，黄瑾明、宋宁、黄凯、苏曲之，中国中医药出版社，2017年9月，ISBN：9787513237321。
- [11] 《实用藏医灸法穴位挂图》，马崇乾、星全章，青海民族出版社，2009年4月，ISBN：9787542014092。

#### Notes of Figures and Tables

| Figures or Tables   | source (referring books or websites)   |
|---------------------|--|
| <b>Figure 1.1.1</b> | designed by the author   |
| <b>Figure 1.2.1</b> | designed by the author   |
| <b>Figure 1.3.1</b> | adapted from reference [5]   |
| <b>Figure 1.4.1</b> | designed by the author   |
| <b>Figure 1.4.2</b> | designed by the author   |
| <b>Figure 1.4.3</b> | The human body outline and acupoint localization are adapted from reference [6]; contents according to the reference [2] |
| <b>Figure 1.4.4</b> | designed by the author   |
| <b>Table 1.2.1</b>  | designed by the author   |
| <b>Table 1.3.1</b>  | designed by the author   |

|                    |   |
|--------------------|---|
| <b>Table 1.3.2</b> | adapted from reference [2]                      |
| <b>Table 1.3.3</b> | adapted from reference [2]                      |
| <b>Table 1.3.4</b> | adapted from reference [9]                      |
| <b>Table 1.3.5</b> | adapted from references [7], [8], [9], and [11] |

## Chapter 2 - Basic Knowledge of Biology

In this chapter, we briefly introduce some basic knowledge of biology to familiarize the readers with that the human structure, including the skeletal system, the digestive system, the vascular system, and the neural system, are constructed along the vertical body axis (the axial skeleton) from the top to the bottom. This alignment or distribution pattern is derived from the early embryogenesis and universal in all the vertebrates. In this chapter, all the inner organs (viscera) refer to anatomical structures.

### 2.1 The Skeletal System

The human skeleton has two divisions: the axial skeleton and the appendicular skeleton. The former consists of the skull (**Figure 2.1.1**), the vertebral column, and the rib cage while the latter is made up from the bones of the arms, legs, shoulders, and pelvic girdles.



**Figure 2.1.1 human skull**

The axial skeleton is centered to the vertebral column and is aligned along the vertical body axis. The vertebral column consists of 33 - 34 vertebrae, including 7 cervical vertebrae, 12 thoracic vertebrae, 5 lumbar vertebrae, 5 sacral vertebrae and 4 - 5 small coccygeal vertebrae in the childhood. In adults, the 5 sacral vertebrae fuse into 1 sacrum and the 4 - 5 small coccygeal vertebrae fuse into 1 coccyx (**Figure 2.1.2**). The 12 pairs of ribs articulate the thoracic vertebrae. Among them, the first seven pairs of ribs from above articulate directly with the manubrium and the body of the sternum (**Figure 2.1.3**).



**Figure 2.1.2 human vertebral column**

**Figure 2.1.3 human rib cage**

In comparison, the vertebral column of fish is only preliminarily differentiated, consisting of trunk vertebrae and caudal vertebrae. Furthermore, the fish ribs are distributed along all the trunk vertebrae and caudal vertebrae, but with no sternum. The vertebral column of amphibians consists of 4 regions, cervical vertebrae, trunk vertebrae, sacral vertebrae, and caudal vertebrae. In reptiles, the vertebral column is further differentiated into cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacral vertebrae, and caudal vertebrae. Ribs articulate with the cervical vertebrae, thoracic vertebrae, and lumbar vertebrae on both sides (**Figure 2.1.4**). Reptiles, birds, and mammals all have well-developed sternums. The avian vertebral column is also differentiated into 5 regions with ribs distributed along the entire vertebral column. Moreover, the last thoracic vertebra, all the lumbar vertebrae and sacral vertebrae and a few caudal vertebrae fuse into a synsacrum. The vertebral columns of other mammals resemble the human one. In terms of the developmental biology, the vertebral column and ribs derive from the sclerotome of the mesodermal somite though the morphology and the differentiation level of various classes of the vertebrates are remarkably different. That is the reason why the vertebral column and ribs are aligned along the somites.



**Figure 2.1.4 crocodile trunk bones**

Except for the jawbone, human skull is highly fused together to protect the brain and special sensory organs inside it. The skull consists of the neurocranium and the facial skeleton (also the sutures, but they are not a bone.). The neurocranium includes 1 frontal bone, 2 parietal bones, 1 occipital bone, 2 temporal bones and bones consisting of the base of the skull. The numbers of bones in the skull decreased and many bones fuse together during the evolution. For example, the single occipital bone, the sphenoid bone, and the temporal bone all result from fusion of several bones in the evolution (**Figure 2.1.5** and **Figure 2.1.6**; **Table 2.1.1**).



**Figure 2.1.5 a mammalian skull model**

In terms of embryogenesis, the human skull has two different embryological origins (the sutures do not count here). The parietal bone, the occipital bone and the petrous part of temporal bone derive from the paraxial mesoderm while other bones of the skull are developed from neural crest cells (**Figure 2.1.7**). Correspondingly, the head regions covered by the bones deriving from the paraxial mesoderm are mainly innervated by the cervical nerves while those regions covered by bones developed from neural crest cells are innervated by the cranial nerves. The human brain (except for the cerebral cortex) is mainly covered by the parietal bones and occipital bone. In contrast, the special sensory organs on the head, such as the nose, eyes, ears, and the tongue, are mainly in the regions with bones developed from neural crest cells and they connect to the brain through cranial nerves (**Figure 2.1.8**).



**Figure 2.1.6 a skull model of ancient vertebrate**

On some level, bones of the skull deriving from the paraxial mesoderm, such as the parietal bone, the occipital bone, and the petrous part of temporal bone, can be regarded as a “special vertebra” (we name it as the “special vertebra 1”, also below) and the brain can be seen as a segment of a “special spinal cord” protected by the “special vertebra 1”. The “special spinal cord” projects anteriorly (cranial nerves) and innervates the special sensory organs (the nose, eyes, ears, and the tongue), facial skin, and muscles on the head, which resembles the anterior rami of the spinal cord in the thoracolumbar region. Except for a few innervations in the occipital region by the facial nerves, the “special spinal cord” does not have significant nerve projections to the dorsal side (the “special spinal cord” does not have the posterior rami) of the head. The skin and muscles dorsal to the “special vertebra 1” are innervated by the posterior rami of the 2nd and 3rd cervical nerves.



**Figure 2.1.7 the developmental origin of the human skull** (Blue, deriving from the neural crest cells; Red, from the paraxial mesoderm)



**Figure 2.1.8 the head region partition of ancient vertebrates**

We date back to the more primitive mammals and other lower vertebrates according to the analysis above. The bones of the skull deriving from the neural crest cells are anterior and ventral to the paraxial mesoderm-derived skull bones, with the special sensory organs (the nose, eyes, ears, and the tongue). Therefore, the bones in this region can be regarded as the “special vertebra 0”. We find that 1) the “special vertebra 0” is anterior (rostral) to the “special vertebra 1”. They are adjacent to each other in the temporal region of the head; 2) the “special vertebra 0” derives from the neural crest cells regarding the origin; 3) the region of the “special vertebra 0” is innervated exclusively by nerves (cranial nerves) from the “special vertebra 1”.

To summarize up, the axial skeleton (the “special vertebra 0”, the “special vertebra 1”, and the vertebral column) is overall aligned along the body vertical axis from the top to the bottom (rostro-caudal axis; this pattern is more obvious in lower vertebrates due to the specialized head region of the highly evolved primates). This distribution pattern results from the early embryogenesis and is universal in all the vertebrates.

**Table 2.1.1** the skull bones of ancient vertebrates

|               | cartilaginous bone    |   | membranous bone     |  |   |
|---------------|-----------------------|---|---------------------|--|---|
|               | area                  | bones   | area                | bone   |   |
| neurocranium  | occipital area        | 1 basioccipital bone<br>2 exoccipital bone<br>3 supraoccipital bone | postparietal region | 19 postparietal bone   | palatine bone group<br>29 parasphenoid<br>30 vomer<br>31 pterygoid bone<br>32 palatine bone |
|               | auditory area         | 4 prootic bone<br>5 opisthotic bone<br>6 epiotic bone               | buccal region       | 20 squamosal bone  |   |
|               | base of the cranium   | 7 basisphenoid<br>8 presphenoid bone                                | parietal region     | 21 parietal bone<br>22 frontal bone  |   |
|               | orbitosphenoid region | 9 alisphenoid<br>10 orbitosphenoid                                  | orbital area        | 24 postorbital bone<br>25 postfrontal bone<br>26 supraorbital bone<br>27 prefrontal bone<br>28 lacrimal bone           |   |
|               | ethmoid region        | 11 ethmoid bone   | nasal region        | 23 nasal bone  |   |
| viscerocranum | mandibular arch       | maxilla<br>12 quadrate bone   | maxilla group       | 33 quadratojugal bone<br>34 zygomatic bone<br>35 maxilla<br>36 premaxilla  |   |
|               |                       | jawbone<br>13 meckel's cartilage<br>14 articular bone               | jawbone group       | 37 dentary bone,<br>38 angular bone<br>39 surangular bone,<br>40 sphenial bone<br>41 antarticulare<br>42 coronary bone |   |
|               | hyoid arch            | 15 hyomandibular bone<br>16 ceratohyal bone<br>17 basihyal bone     |                     |  |   |
|               | branchial arch        | 18 branchial skeleton   |                     |  |   |

## 2.2 The Digestive System

The human digestive system consists of the oral cavity, the pharynx, the esophagus, the stomach, the liver, the gallbladder, the pancreas, the small intestine (the duodenum, the jejunum, and the ileum) and the large intestine (the cecum, the appendix, the colon, and the rectum). Overall, the digestive system is distributed along the body vertical axis from the top to the bottom, with various shapes and functions of different parts (**Figure 2.2.1**). Furthermore, the upper part (stomach) of the digestive system mainly stores and digests food, kills bacteria, and absorbs water and minerals; the lower part (small intestine and large intestine) is responsible for digesting food, absorbing nutrition, and storing and defecating the waste.

The digestive systems of the vertebrates from different classes are remarkably similar though the digestive system of the fish is not well differentiated (the intestine has not been differentiated into the small and the large intestines) and some animals like birds have specialized forestomach.

The vertebrate digestive tract, developed from the endoderm and the splanchnic mesoderm, is called primitive gut during the early embryogenesis. The primitive gut consists of the foregut, the midgut, and the hindgut along the body axis rostro-caudally. In later developmental stages, the foregut differentiates into pharynx, the esophagus, the stomach, the liver, the gallbladder, the pancreas, the anterior part of the duodenum, and the primordium of the respiratory system. Meanwhile, the midgut develops into the digestive tract from the middle part of the duodenum to the transverse colon (1/3 from the left). The hindgut differentiates into the intestine from the transverse colon (2/3 from the right) to the anal canal (**Figure 2.2.2**). Though the segmental distribution of the digestive system is not obvious any more in adults due to the intestinal loop, the innervation and the artery vessels of the digestive system keep the segmental pattern, consistent with the early embryogenesis.



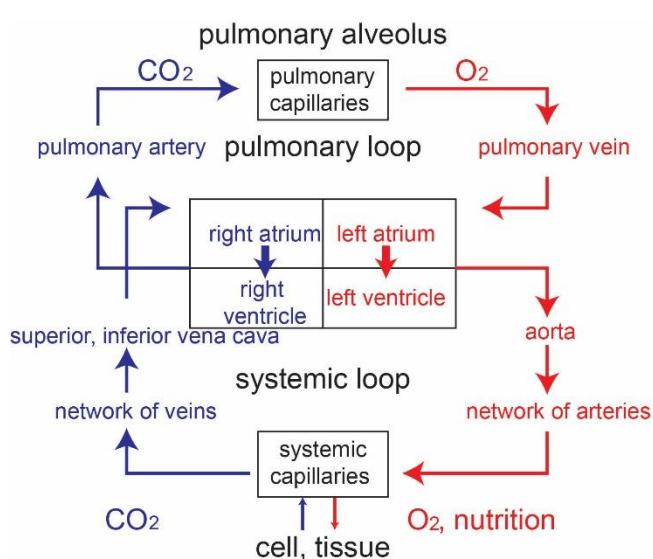
**Figure 2.2.1** the digestive system of the teleosts (A), amphibians (B), reptiles (C), birds (D), and mammals (E).



**Figure 2.2.2 three main arteries of the foregut, the midgut,  
and the hind gut of a human embryo**

## 2.3 The Cardiovascular System

The human cardiovascular system is composed of the heart, arteries, veins, and capillaries. Contracting rhythmically, the heart pumps oxygenated blood into the aorta from the left ventricle, and then the blood circulates through artery branches into capillaries through the entire body. The oxygenated blood turns into oxygen-depleted blood after the interchange of material and gas exchanges and then goes back to the right atrium through veins. Meanwhile, the oxygen-depleted blood flows from the right atrium into the right ventricle. The heart pumps the deoxygenated blood from the right ventricle into the pulmonary artery and the blood goes into the pulmonary capillaries. There, the oxygen level in the blood rises after the gas exchange. At last, the oxygenated blood flows back to the left atrium through pulmonary veins (Figure 2.3.1).



**Figure 2.3.1 systemic and pulmonary loops of adult mammals**



**Figure 2.3.2 the arteries of primitive vertebrates**

In vertebrates of different classes, the heart evolves from a simple structure with one atrium and one ventricle in fish into a complex structure with two atriums and two ventricles, which serves as a highly efficient circulatory system composed of a systemic loop and a pulmonary loop, in birds and mammals. Starting from the amphibians, the heart has differentiated into a structure with two atriums and one ventricle, having a primitive pulmonary circulation. But the oxygenated and deoxygenated blood remains mixed in the ventricle. Consequently, the efficiency of the amphibian cardiovascular system remains low. The reptile's heart also has two atriums and one ventricle. However, the ventricle is incompletely partitioned into two subchambers to separate the oxygenated and deoxygenated blood incompletely by a muscular ridge, which dramatically increases the efficiency of the circulatory system (Figure 2.3.3).

The changes of the pharyngeal arch arteries (PAAs) are the most significant during the evolution of the artery system. Some of the PAAs disappear (the 5th pair of PAAs in tetrapods and the 1st and the 2nd pairs of PAAs in teleost and tetrapods; the 1st pair of PAAs remain in the cartilaginous fish) or turn into arteries of the pulmonary loop (the 6th pair of PAAs in tetrapods) during the evolution. Additionally, the developmental process of the heart and the PAAs recapitulates the course of evolution during the development of the mammalian heart (**Figure 2.3.3**).



**Figure 2.3.3 the evolution of the vertebrate pharyngeal arch arteries and the heart**

The mammalian aorta extends caudally from the left ventricle of the heart and gives rise to branching arteries into organs and tissues in the vicinity. The principle of the arteries branching into the organs in the vicinity is consistent with the developmental pattern of early embryogenesis (**Figure 2.3.2**). For instance, the testicles of most adult mammals (exceptions like elephants and walruses with testicles in the abdomen (**Figure 2.3.7**)) are external, close to the pubis. During the late embryogenesis (in the 7th month post-fertilization in human), the mammalian testicles descend from their original location below the kidney into the scrotum through the canalis inguinalis (**Figure 2.3.6**). The testicular artery, adjacent to the renal artery, is correspondingly located below the initial point of the renal artery. It extends through the canalis inguinalis into the scrotum as one component of the spermatic cord with further branches distributed in the testicles and epididymis (**Figure 2.3.4**). In contrast, the penis and the scrotum derive from precursors located in more caudal regions during early embryogenesis. Therefore, the arteries of these two structures originate in a more caudal region, not adjacent to the testicular artery (**Figure 2.3.5**).

Overall, the distribution of the arteries also shows the segmental patterns on some level. Here we take the intercostal arteries and the arteries of the digestive system in the abdominal cavity as examples.



**Figure 2.3.4 abdominal arteries (testicular artery below the renal artery)**



**Figure 2.3.5 abdominal arteries (pudendal artery)**



**Figure 2.3.7 the elephant testicles lie in the abdomen (caudal to the kidneys)**



**Figure 2.3.6 the testicle descends into the scrotum during the late embryogenesis of human**

The 1st and 2nd intercostal arteries arise from the costocervical trunk, a branch of the subclavian artery. The other intercostal arteries originate from the back of the thoracic aorta, enter the intercostal space, and split into a main trunk and a collateral branch at the costal angle. The intercostal arteries project through the intercostal space, consistent with the segmental pattern of the vertebrae (**Figure 2.3.8**).



**Figure 2.3.8 human intercostal arteries**

During the early embryogenesis, the oxygenated blood supplies of the stomach and the digestive system below the stomach are provided by the celiac trunk, the superior mesenteric artery, and the inferior mesenteric artery from the top to the bottom. The celiac trunk supplies oxygenated blood to the stomach, part of the duodenum, the pancreas, the spleen (immune system), the liver and the gallbladder, which are differentiated from the foregut. The midgut, starting from the duodenum, is supplied by the superior mesenteric artery while the hindgut obtains oxygenated blood via the inferior mesenteric artery (**Figure 2.3.9**). The arteries of the adult digestive system in the abdomen cavity mainly keep the segmental pattern though they look more complex than that in the early developmental stages.



**Figure 2.3.9 the celiac trunk, the superior mesenteric artery, and the inferior mesenteric artery supply oxygenated blood to the foregut, the midgut, and the hindgut**

The formation of the pulmonary vein, involution of portal veins and merging of veins are the remarkable changes of the venous system in vertebrates of different classes during the evolution. Here we only emphasize two points below, skipping details of the three changes above.

First, one pair of posterior cardinal veins, which collect the deoxygenated blood from the viscera and the tail back to the heart in fish, are substituted by one postcaval vein in the tetrapods (**Figure 2.3.10**). Second, the iliac vein joins the brachial vein via the lateral abdominal vein, and they connect with the heart through a common cardinal vein in fish (**Figure 2.3.11**). However, the iliac vein joints the postcaval vein directly but not the brachial vein in tetrapods (**Figure 2.3.10 and 2.3.11**). The primitive lateral abdominal vein possibly indicates that the origin of limbs is tightly related with the thoracic and abdominal trunk, but independent from the inner organs. During the evolution, the blood vessels in the limbs (lower limbs) merge with those of the inner organs, increasing the efficiency of blood circulation.



**Figure 2.3.10 the shark venous system**

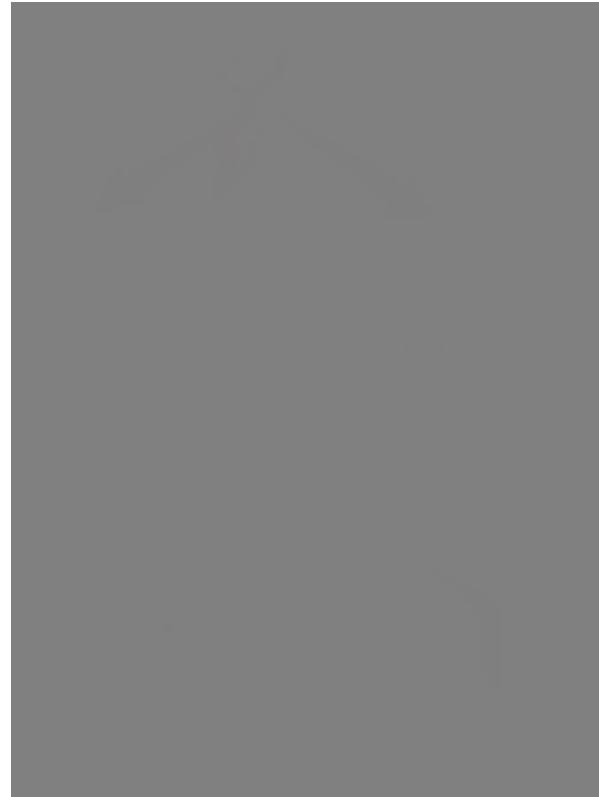
**Figure 2.3.11 the venous system of the Anura**

## 2.4 The Nervous System

The nervous system has two components: the central nervous system (CNS) and the peripheral nervous system (PNS). The CNS consists of the brain and the spinal cord, which lie in the cranial cavity and the spinal canal, respectively. The human PNS is composed of 12 pairs of cranial nerves and 31 pairs of spinal nerves (**Figure 2.4.1**).



**Figure 2.4.1 the human central nervous system**



**Figure 2.4.2 the sensory homunculus of a human brain**

The human brain possesses numerous different functional regions. In each of the corresponding functional areas, such as the visual cortex or the somatosensory cortex, the encoding or representation of the neural information shows topographic maps (**Figure 2.4.2**). Similarly, the spinal cord also possesses different functional compartments. Here we mainly talk about the human PNS.

The 12 pairs of cranial nerves are the olfactory nerve (I), the optic nerve (II), the oculomotor nerve (III), the trochlear nerve (IV), the trigeminal nerve (V), the abducens nerve (VI), the facial nerve (VII), the vestibulocochlear nerve (VIII), the glossopharyngeal nerve (IX), the vague nerve (X), the accessory nerve (XI), and the hypoglossal nerve (XII) aligned rostro-caudally. Except for the vagal nerve projecting into the thoracic and abdominal cavities, all the other cranial nerves mainly innervate the face and the head regions in a segmental pattern. Due to the evolutionary specialization of the mammalian heads (especially for primates), the bones of skull fusing intensively, the

segmental pattern of nerve projection is more significant in lower primitive vertebrates. In the following figures, we can see the special sensory organs in a fish head are aligned in the following order rostro-caudally: the nose (olfaction), the eyes (vision), the ears (hearing), and the tongue (gustation) (**Figure 2.4.3**). The innervation of the human cranial nerves keeps this segmental pattern although the human face is highly specialized during the evolution (**Figure 2.4.4**).



**Figure 2.4.3 shark cranial nerves**



**Figure 2.4.4 human cranial nerves**

The 31 pairs of spinal nerves correspond to the vertebrae and project to the targeting areas from the spinal canal through the corresponding intervertebral foramen. Overall, the segmental pattern of the spinal nerve keeps completely during development. Here the segmental pattern of the spinal sensory cutaneous nerves and the autonomic nervous system (ANS) are taken as examples.



**Figure 2.4.5 the segmental pattern of human spinal sensory cutaneous nerves**

From the 2nd cervical nerve to the 5th sacral nerve, the sensory cutaneous nerves are aligned along the trunk from the top to the bottom. The skin of upper and lower limbs is innervated by anterior rami of cervical nerves (C5 - T1) and the lumbosacral nerve, respectively (**Figure 2.4.5** and **Figure 2.4.6**).



**Figure 2.4.6 human intercostal nerves**

The ANS, also named as the vegetative nervous system, consisting of the sympathetic nervous system (SNS) and the parasympathetic nervous system (PSNS), mainly innervates inner organs, blood vessels, and glands. The SNS arises from the thoracolumbar division of the spinal cord, specifically at thoracic nerve T1 (or C8) to lumbar nerve L3 (or L2). The postganglionic neurons of the SNS project to the targets after the synaptic transmission from the preganglionic neurons (**Figure 2.4.7**).

Neural fibers of the SNS from the thoracic nerves T1 - T5 project to the head, the neck, inner organs in the thoracic cavity and upper limbs. The SNS nerves in the segment of thoracic T5 - T12 innervate the stomach, the liver, the gallbladder, the spleen, the kidney, and the digestive tract anterior to the splenic flexure. The SNS fibers from the lumbar nerves innervate the digestive tract posterior to the splenic flexure, the pelvic viscera, and lower limbs (**Figure 2.4.7**).

The PSNS consists of certain cranial nerves in the cranium and pelvic splanchnic nerves. The former, including part of the cranial nerves III, VII, IX, and X, targets to the head, the neck, the thoracic viscera (the esophagus, the trachea, the heart, and lungs) and abdominal viscera (except for the digestive tract posterior to the splenic flexure, pelvic viscera, and the external genital organs). The nuclei of pelvic splanchnic nerves, residing at the sacral segments S2 - S4, send nerve fibers to the digestive tract posterior to the splenic flexure, pelvic viscera, and the external genital organs (**Figure 2.4.7**).



**Figure 2.4.7 innervation of the human SNS and PSNS**

(Note: the innervation of the SNS varies in different books)

## 2.5 The Embryogenesis

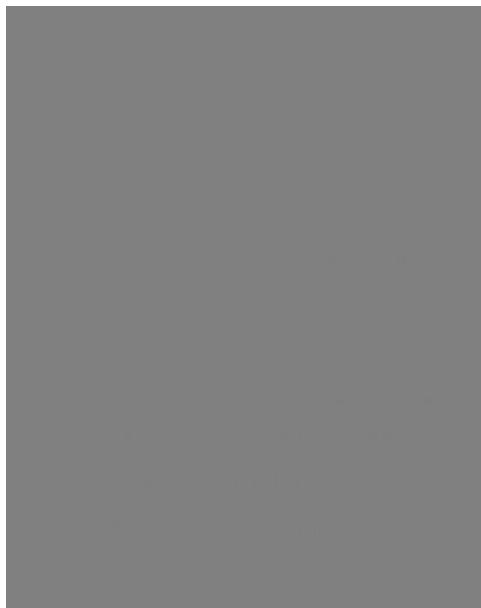
### 2.5.1 The Embryogenesis

A new life starts from a fertilized egg or a zygote. First, the zygote develops into a multi-cellular blastula through rapid cleavage. Then some of the cells from the blastula migrate in different ways, such as epiboly and invagination, and the blastula develops further into a three-layer gastrula (**Figure 2.5.1**). Each layer of the gastrula gives rise to specific tissues and organs (cell fate determination) in the following embryogenesis.



**Figure 2.5.1 development stages from a zygote to a gastrula**

With the formation of the neurula, the ectoderm gives rise to the nervous system, epidermis, and neural crest-derived



**Figure 2.5.2 the formation and differentiation of the somites**



**Figure 2.5.3 the paraxial mesoderm differentiates into the sclerotome and the dermomyotome**

peripheral neurons, glial cells and chromatophores.

The mesoderm consists of five components at this stage: 1) The (embryonic dorsal central) axial mesoderm gives rise to the notochord. 2) The dorsal somatic mesoderm develops into somites and the mesoderm on both sides of the neural tube. They differentiate into muscles, skeleton, cartilages, and dermis in the future (**Figure 2.5.3**). 3) The intermediate mesoderm differentiates into urogenital structures (the male testicles descend into the scrotum later, **Figure 2.3.6**). 4) Lateral plate mesoderm gives rise to the heart, blood vessels, blood cells, the cavities of the trunk and all the mesodermal structures in the limbs (except for the limb muscles); 5) The (mesoderm) mesenchymal cells in the head region develop into facial muscles and connective tissues.

The paraxial mesoderm gives rise to somites in separated blocks (**Figure 2.5.2**). At the early stage, the somatic cells can differentiate into all the cell types of the paraxial mesoderm-deriving structures. As the somites become mature, however, the fate of the cells is determined. The ventromedial part (apart from the back and closest to the neural tube) of the somites, named as the sclerotome, differentiates into mesenchymal cells and then gives rise to vertebrae, ribs, cartilages, and tendons (**Figure 2.5.3**). The dorsolateral region develops into the dermomyotome. The middle region (close to the neural tube) of the dermomyotome further forms the myotome and finally gives rise to skeletal muscles of the truck and the limbs. Besides, the somites determine the migration pathway of the axons of spinal nerve and the neural crest cells (**Figure 2.5.4**). The somites are aligned along the rostro-caudal body axis, which influences the construction of the whole embryo (**Figure 2.5.5**).



**Figure 2.5.4 the neural crest cells migrate ventrally and laterally**



**Figure 2.5.5 muscle, vertebrae and spinal nerves are aligned along the somites**

The endoderm mainly differentiates into the inner layer of the digestive tube, which crosses the thoracic and abdominal cavities. The digestive tube further derives precursor buds which develop into the liver, the gallbladder, and the pancreas in the end. Furthermore, two respiratory buds grow out of both sides of the developing foregut tube and turn into the final lungs. It is important to note that only the epithelial cells derive from the endoderm in the digestive tube while the muscles outside are developed from the mesoderm.

## 2.5.2 The Development of Limbs

Limbs are formed from the outgrowth of the embryo body wall, mainly from tissues of two sources: 1) ectodermal cells from the ectoderm; 2) the lateral plate mesoderm and the central core of the mesenchymal cells from the ventral somites. The primordium of the limbs is called limb bud. At the early developmental stage of limbs, the cells from the somitic mesoderm proliferate along the long axis of the embryo and form a bulge under the ectodermal cells. These cells separate from the lateral plate mesoderm (precursors of the limb skeleton) and the somitic mesoderm (precursor of the limb muscles), form mesenchymal cells, and migrate into the location between the lateral plate mesoderm and the ectoderm. The ectodermal cells above the mesenchymal cells become thicker, extrude outside, enlarge, and turn into a limb bud together with the mesenchymal cells. Later, the precursors of bones and muscles deriving from the lateral plate mesoderm and the somitic mesoderm migrate into the limb bud, proliferate, and develop into the skeleton and muscles of the limb, respectively (**Figure 2.5.6**).



**Figure 2.5.6 precursors of bones and muscles from the lateral plate mesoderm and somitic mesoderm migrate into the limb bud**

Meanwhile, the vascularization begins in the limb bud. Here the (artery) vascularization of the upper limb is taken as an example. Initially, the arteries are aligned with the somites. They extend from the dorsal aorta into the limb bud and form a net of capillaries in the distal region. Gradually, the blood vessels, aligned with the somites, either merge or degenerate; only the 7th intersegmental artery remains and form the single subclavian artery eventually (**Figure 2.5.7**).



**Figure 2.5.7 vascularization (artery) of the upper limb**

On the other hand, the innervation of the limbs also starts. Neural crest cells located on both sides of the neural tube migrate into the limb bud and form chromatophores, glial cells and sensory neurons. The axons of the neurons (mainly motor neurons) in the neural tube extend into the limb bud and finally project to the target skeletal muscles (**Figure 2.5.8**).



**Figure 2.5.8 neural crest cells migrate into the limb bud;  
axons from the neural tube extend into the limb bud**

The limbs of human embryo rotate certain angles at the 8th week post-fertilization. The upper limbs rotate about 90° outwards while the lower limbs rotate about 90° inwards (**Figure 2.5.9**;

**Note:** related with discussions in the next chapter).



**Figure 2.5.9 the upper and lower limbs of a human embryo (8th week post-fertilization) rotate 90° outwards and inwards, respectively.**

## 2.6 Reference and Recommended Books in This Chapter

- [1] 《人体解剖学》（第 3 版），丁自海、范真，人民卫生出版社，2018 年 9 月，ISBN：9787117247856。
- [2] 《系统解剖学》（第 6 版），崔慧先，人民卫生出版社，2008 年 2 月，ISBN：9787117098731。
- [3] 《脊椎动物比较解剖学》，杨安峰、程红、姚锦仙，北京大学出版，2008 年 9 月，ISBN：9787301142417。
- [4] 《普通动物学》（第 4 版），刘凌云、郑光美，高等教育出版社，2018 年 9 月，ISBN：9787040267136。
- [5] 《组织学与胚胎学》（第 3 版），唐军民、张雷，北京大学医学出版社，2013 年 12 月，ISBN：9787565906879。
- [6] 《进化生物学》（第 4 版），沈银柱，高等教育出版社，ISBN：9787040488890。
- [7] 《发育生物学》（第 4 版），张红卫，高等教育出版社，2018 年 8 月，ISBN：9787040501520。
- [8] 《神经生物学》，John G. Nicholls, A. Robert Martin, Bruce G. Wallace, Pawl A. Fuchs (杨雄里译)，科学出版社，2003 年 4 月，ISBN: 9787030109903。
- [9] 《神经解剖学》，蒋文华，复旦大学出版社，2002 年 7 月，ISBN：9787309031195。
- [10] 《生理学》（第 2 版），姚泰、曹济民、樊小力、王庭槐，人民卫生出版社，2010 年 8 月，ISBN：9787117129763。

### Notes of Figures and Tables

| Figures or Tables | source (referring books or websites)   |
|-------------------|--|
| Figure 2.1.1      | adapted from reference [2]   |
| Figure 2.1.2      | adapted from reference [2]   |
| Figure 2.1.3      | adapted from reference [2]   |
| Figure 2.1.4      | adapted from reference [3]   |
| Figure 2.1.5      | adapted from reference [3]   |
| Figure 2.1.6      | adapted from reference [3]   |
| Figure 2.1.7      | adapted from:<br><a href="https://skeletalsystemdev.weebly.com/uploads/7/0/4/3/7043675/4559304_orig.png">https://skeletalsystemdev.weebly.com/uploads/7/0/4/3/7043675/4559304_orig.png</a> |
| Figure 2.1.8      | adapted from reference [3]   |

|                      |  |
|----------------------|--|
| <b>Figure 2.2.1</b>  | adapted from reference [3]   |
| <b>Figure 2.2.2</b>  | adapted from:<br><a href="https://www.med.umich.edu/lrc/coursepages/m1/embryology/embryo/10digestivesystem.htm">https://www.med.umich.edu/lrc/coursepages/m1/embryology/embryo/10digestivesystem.htm</a>   |
| <b>Figure 2.3.1</b>  | designed by the author   |
| <b>Figure 2.3.2</b>  | adapted from reference [3]   |
| <b>Figure 2.3.3</b>  | adapted from reference [3]   |
| <b>Figure 2.3.4</b>  | adapted from reference [2]   |
| <b>Figure 2.3.5</b>  | adapted from reference [2]   |
| <b>Figure 2.3.6</b>  | adapted from: <a href="https://radiologykey.com/the-scrotum-and-testes/">https://radiologykey.com/the-scrotum-and-testes/</a>  |
| <b>Figure 2.3.7</b>  | adapted from: Sharma V, Lehmann T, Stuckas H, Funke L, Hiller M (2018), Loss of <i>RXFP2</i> and <i>INSL3</i> genes in Afrotheria shows that testicular descent is the ancestral condition in placental mammals. <i>PLoS Biol</i> 16(6): e2005293.             |
| <b>Figure 2.3.8</b>  | adapted from:<br><a href="https://baike.so.com/gallery/list?ghid=first&amp;pic_idx=2&amp;eid=3450151&amp;sid=3630554">https://baike.so.com/gallery/list?ghid=first&amp;pic_idx=2&amp;eid=3450151&amp;sid=3630554</a>   |
| <b>Figure 2.3.9</b>  | adapted from: <a href="https://radiologykey.com/applied-anatomy-and-physiology-of-the-gastrointestinal-tract-git/">https://radiologykey.com/applied-anatomy-and-physiology-of-the-gastrointestinal-tract-git/</a>  |
| <b>Figure 2.3.10</b> | adapted from reference [3]   |
| <b>Figure 2.3.11</b> | adapted from reference [3]   |
| <b>Figure 2.4.1</b>  | adapted from reference [2]   |
| <b>Figure 2.4.2</b>  | adapted from: Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel Lamantia, Richard D. Mooney, Michael L. Platt and Leonard E. White, <i>Neuroscience</i> , (Sixth Edition), ISBN-13: 9781605353807                           |
| <b>Figure 2.4.3</b>  | adapted from reference [3]   |
| <b>Figure 2.4.4</b>  | adapted from reference [3]   |
| <b>Figure 2.4.5</b>  | adapted from: Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel Lamantia, Richard D. Mooney, Michael L. Platt and Leonard E. White, <i>Neuroscience</i> , (Sixth Edition), ISBN-13: 9781605353807                           |
| <b>Figure 2.4.6</b>  | adapted from:<br><a href="https://www.apsubiology.org/anatomy/2010/2010_Exam_Reviews/Exam_4_Review/CH_13_Peripheral_Nerve_Terminology.htm">https://www.apsubiology.org/anatomy/2010/2010_Exam_Reviews/Exam_4_Review/CH_13_Peripheral_Nerve_Terminology.htm</a> |
| <b>Figure 2.4.7</b>  | adapted from: Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel Lamantia, Richard D. Mooney, Michael L. Platt and Leonard E. White, <i>Neuroscience</i> , (Sixth Edition), ISBN-13: 9781605353807                           |
| <b>Figure 2.5.1</b>  | adapted from: <a href="https://www.onlinebiologynotes.com/developmental-biology-of-frog-embryonic-development/">https://www.onlinebiologynotes.com/developmental-biology-of-frog-embryonic-development/</a>  |
| <b>Figure 2.5.2</b>  | adapted from: R Bellairs, (1979), The mechanism of somite segmentation in the chick embryo, <i>J Embryol Exp Morphol</i> , Jun;51:227-43.  |
| <b>Figure 2.5.3</b>  | adapted from reference [7]   |
| <b>Figure 2.5.4</b>  | adapted from: Cichorek, Mirosława, Wachulska, Małgorzata, Stasiewicz, Aneta, (2013), Heterogeneity of neural crest-derived melanocytes, <i>Open life sciences</i> , v.8 no.4 pp. 315-330   |
| <b>Figure 2.5.5</b>  | adapted from:<br><a href="https://www.memorangapp.com/flashcards/62092/GS+H%2FE+19+Trunk+Development/">https://www.memorangapp.com/flashcards/62092/GS+H%2FE+19+Trunk+Development/</a>   |
| <b>Figure 2.5.6</b>  | adapted from: John M. DeSesso, Anthony R. Scialli, (2018), <i>Bone</i>   |

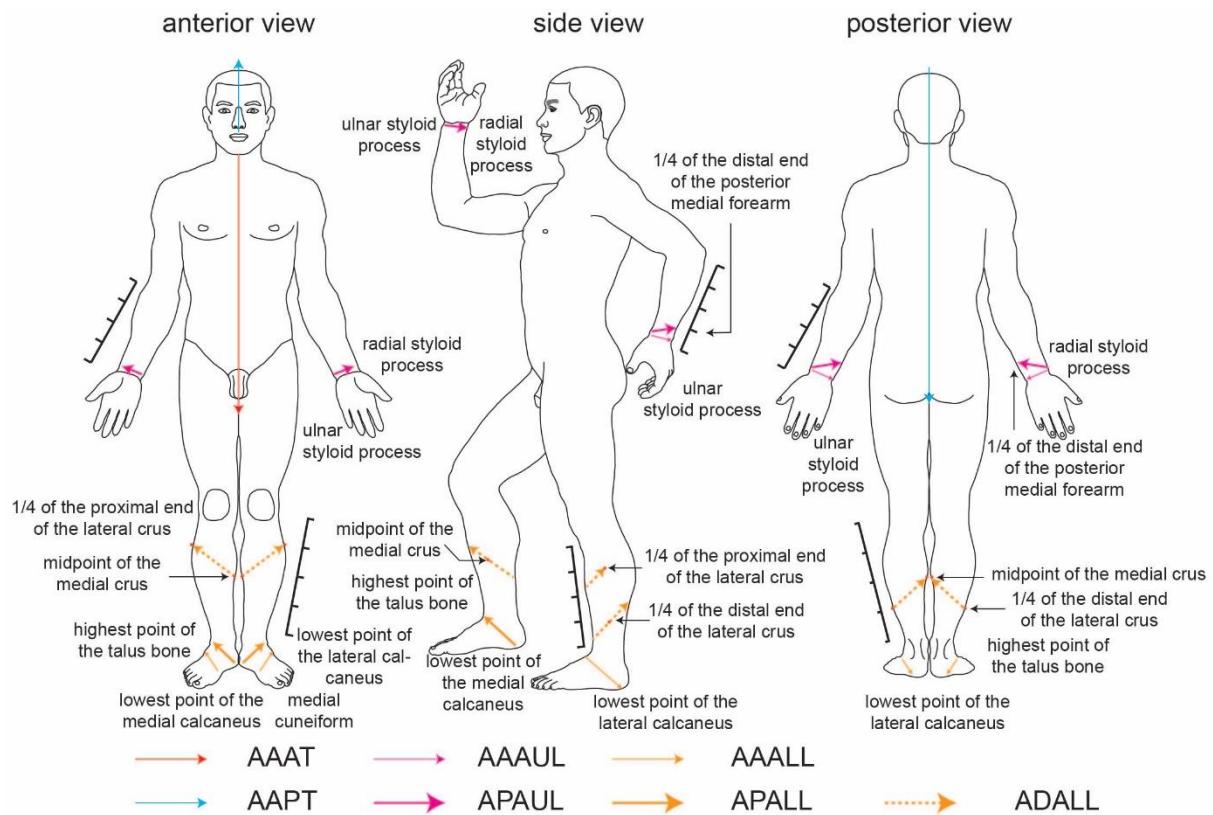
|                     |  |
|---------------------|--|
|                     | development in laboratory mammals used in developmental toxicity studies, <i>Birth Defects Res.</i> 2018 Sep 1;110(15):1157-1187. doi: 10.1002/bdr2.1350.                          |
| <b>Figure 2.5.7</b> | adapted from: John M DeSesso, Vascular ontogeny within selected thoracoabdominal organs and the limbs, <i>Reproductive Toxicology</i> , 2017 Jun;70:3-20.                          |
| <b>Figure 2.5.8</b> | adapted from: <a href="https://basicmedicalkey.com/limb-development/">https://basicmedicalkey.com/limb-development/</a>  |
| <b>Figure 2.5.9</b> | adapted from:<br><a href="https://webcampus.drexelmed.edu/neurobio/embryology/page21/page22/page24/">https://webcampus.drexelmed.edu/neurobio/embryology/page21/page22/page24/</a> |
| <b>Table 2.1.1</b>  | adapted from reference [3]   |

## Chapter 3 - Classification of Acupoints and the New Model

We are going to talk about the key point of this book in detail – reclassification of the acupoints and the new model based on the classification result. We should point it out that all the viscera are named according to the modern anatomical terms instead of the nomenclature of the TCM in this chapter.

### 3.1 The Definition of Axes of Acupoints (穴位轴)

We introduce several new definitions to proceed to the following discussions before talking about any details in this chapter. The meaning and underlying principles of these new definitions are going to be explained later in further discussions of this chapter. We strongly suggest the readers learning the positions and directions of these newly defined axes by heart (**Figure 3.3.1**).



**Figure 3.3.1** the newly defined axes on the human body in this chapter shown from the anterior (left panel), the side (middle panel), and the posterior (right panel) views. The outline of human body, the AAAT, the AAPT, the AAUL, and the AALL are shown in black, red, cyan, magenta, and orange, respectively. Among them, the AAAUL and the AAALL are represented with thin lines, others thick lines. The ADALL is shown in dashed lines.

The Axis of Acupoints on the Anterior Trunk (AAAT, 穴位体前轴) starts from the laryngeal prominence, descends along the anterior median line to the midpoint (RN1, Huiyin; 会阴穴) of the external genital organ and the anus (**Figure 3.3.1**).

The Axis of Acupoints on the Posterior Trunk (AAPT, 穴位体后轴) starts from the maxilla, ascends along the anterior median line, through the top of the skull, and descends along the posterior median line to the end of the midpoint (RN1, Huiyin; 会阴穴) of the external genital organ and the anus.

The Acupoint Anterior Axis of the Upper Limb (AAAUL, 穴位手臂前轴) starts from the styloid process of radius and extends along the posterior distal forearm to the styloid process of ulna.

The Acupoint Posterior Axis of the Upper Limb (APAUL, 穴位手臂后轴) starts from the styloid process of ulna, extends along the anterior distal forearm to the styloid process of radius and then continues along the posterior distal forearm to the 1/4 of the distal end of the posterior medial (ulnar) forearm.

The Acupoint Axis of the Upper Limb (AAUL, 穴位手臂轴) consists of the AAAUL and the APAUL.

The Acupoint Reverse Axis of the Upper Limb (ARAUL, 穴位手臂反向轴), the reverse axis of the AAUL, starts from the 1/4 of the distal end of the posterior medial (ulnar) forearm and extends along the AAUL reversely to the styloid process of ulna, rotating about 540°.

The Acupoint Anterior Axis of the Lower Limb (AAALL, 穴位腿足前轴) starts from the medial cuneiform and extends along the dorsum of the foot to the lowest point of the lateral calcaneus.

The Acupoint Posterior Axis of the Lower Limb (APALL, 穴位腿足后轴) starts from the lowest point of the medial calcaneus and extends along the medial side of the foot to the highest point of the talus bone.

The Acupoint Axis of the Lower Limb (AALL, 穴位腿足轴) consists of the APALL and the AAALL.

The Acupoint Reverse Axis of the Lower Limb (ARALL, 穴位腿足反向轴), the reverse axis of the AALL, starts from the highest point of the talus bone and extends along the AALL reversely to the medial cuneiform, rotating about 450°.

The Acupoint Drifting Axis of the Lower Limb (ADALL, 穴位腿足游离轴) starts from the highest point of the talus bone, ascends along the anterior lateral leg to the 1/4 of the distal end of the lateral calf (rotating about 90°), continues ascending and rotating to the midpoint of the medial crus (rotating about 180°) through the posterior crus, and ascends (rotating 180°) to the 1/4 of the proximal end of the lateral crus through the anterior crus. In total, the ADALL rotates about 450° around the crus.

## 3.2 The Classification of Acupoints

### 3.2.1 Acupoints in the Facial and Head Region

The points in the terminal regions of the three Hand's Yang Meridians and the initial areas of the three Foot's Yang Meridians are in the facial and head region. Overall, the areas covered by the Yang Supreme, the Minor Yang and the Major Yang Meridians on the head are distributed in the Frontal Head (the face and the forehead), the Temporal Head and the Hind Head, respectively. Most of the acupoints on the head (including the face) are local-effective acupoints (局部穴), only effective locally or to the tissue and organs in vicinity. In fact, the functions of these acupoints are related to their locations, not restricted to the TCM meridians. For instance, the following acupoints, BL1 (Jingming, 睛明), ST1 (Chengqi, 承泣), TE23 (Sizhukong, 丝竹空), GB14 (Yangbai, 阳白), NH4 (Yuyao, 鱼腰) and GB1 (Tongziliao, 瞳子髎), belong to different meridians, but they are all in the vicinity of the eyes and effective for eye diseases.

#### Definitions:

The Boundary of the Frontal Head and the Temporal Head (B-FH-TH) starts from the midpoint of GV22 (Xinhui, 囉会) and GV21 (Qianding, 前顶), via the ST8 (Tuowei, 头维), GB7 (Qubin, 曲鬓), GB2 (TInghui, 听会), and ST6 (Jiache, 颊车), and ends at the LI18 (Futu, 扶突) (**Figure 3.2.1**).

The Boundary of the Temporal Head and the Hind Head (B-TH-HH) starts from the midpoint of GV22 (Xinhui, 囉会) and GV21 (Qianding, 前顶), via the ST8 (Shuaigu, 率谷), the midpoint of the GB10 (Fubai, 浮白) and TE19 (Luxi, 颧息), and GV15 (Yamen, 哑门), and ends at the SI16 (Tianchuang, 天窗) (**Figure 3.2.1**).

Note: the GV22 (Xinhui, 囉会) is at the intersection of the sagittal and the coronal sutures, where the frontal bone, deriving from neural crest cells, and the parietal bones, formed from the paraxial mesoderm, meet. Moreover, the petrous region of the temporal bone is developed from the paraxial mesoderm while other parts of the temporal bone derive from the neural crest cells. The innervation (the skin, muscles, and special sensory organs) of the face and the frontal bone region is mainly from the cranial nerves while the other regions above the parietal bones, occipital bone and the petrous portion of the temporal bones are mainly innervated by the cervical nerves. GV21 (Qianding, 前顶) is at the intersection of regions innervated by the cranial nerves and the spinal nerves. Therefore, the B-FH-TH and the B-TH-HH are defined to intersect at the midpoint of GV22 (Xinhui, 囉会) and GV21 (Qianding, 前顶), anterior and posterior to the temporal bone, respectively (**Appendix 2**).

The three regions, the Frontal Head, the Temporal Head and the Hind Head, are defined as following in this book:

The Frontal Head refers to the region of the head, anterior to the left and the right B-FH-THs. The Temporal Head refers to the region of the head between the B-FH-TH and the ipsilateral B-TH-HH. Correspondingly, the Hind Head is defined as the region of the head, posterior to the left and the right B-TH-HHs (**Table 3.2.1**, **Figure 3.2.1**, and **Appendix 2**).

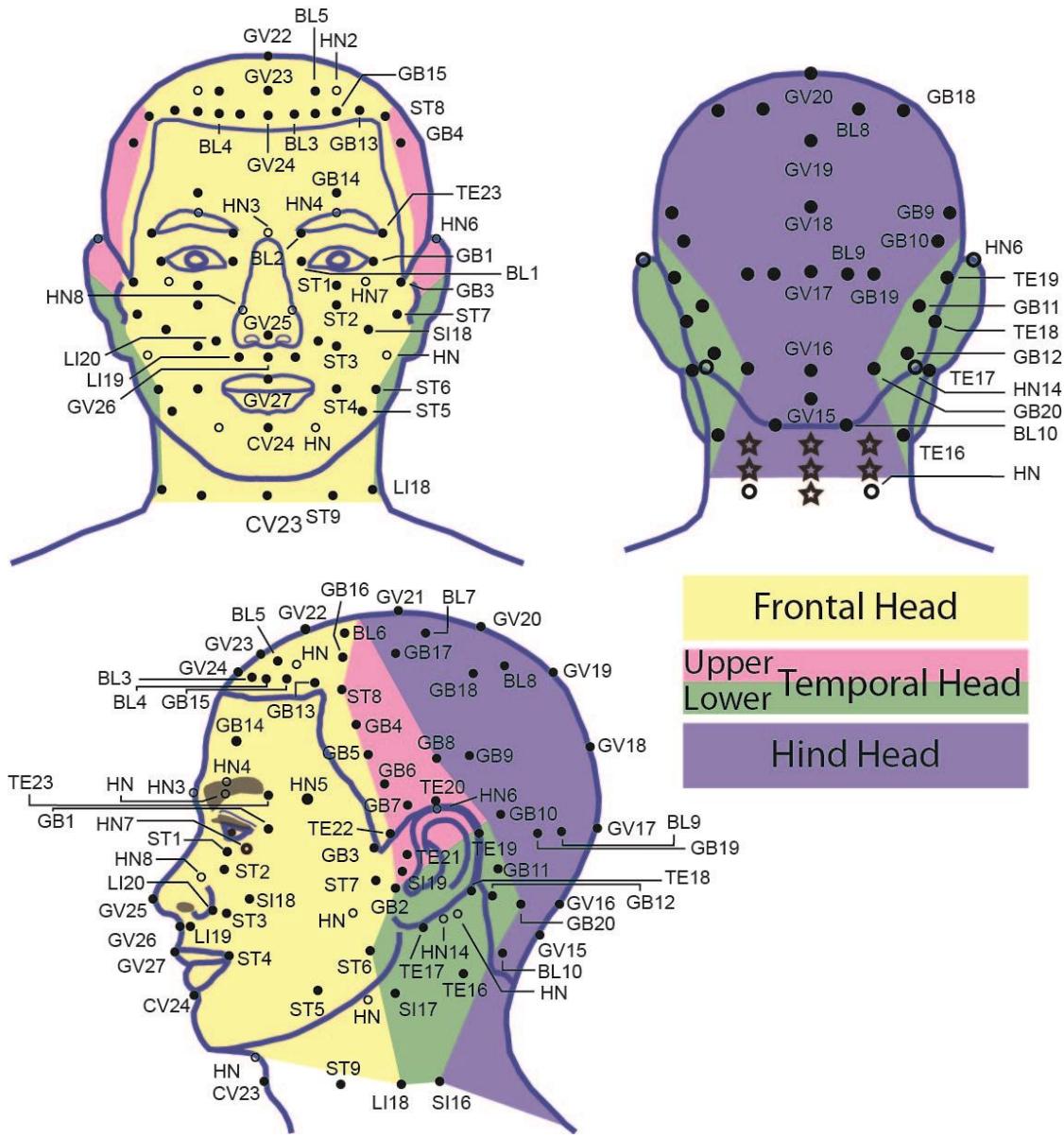
Acupoints in the Frontal Head are mainly effective for the pain of the forehead, diseases related to the mouth, the tongue, teeth, the nose, the face, the cheek, and eyes. The Temporal Head

acupoints are mainly used to cure migraine, disorders of the vestibular system, ears and eyes. Acupoints in the Hind Head region are mainly effective to parietal headache, pains of the neck (nape) and Shenzhibing (mental disorders, 神志病, **Appendix 1**).

As we have mentioned above, the functions of the acupoints in these three areas are related with their positions rather than the meridians to which they belong. Besides, acupoints (especially for acupoints close to the boundary) from adjacent regions share some of the same functions. For instance, stimulating the acupoint GB7 (Qubin, 曲鬚) in the Temporal Head can relieve migraine (Temporal Head) and cure eye diseases (Frontal Head) while acupoint ST7 (Xiaguan, 下关) in the Frontal Head can be used to relieve toothache (Frontal Head) and cure deafness and tinnitus (Temporal Head).

**Table 3.2.1** the classification of the acupoints on the head

|               |   |
|---------------|---|
| Frontal Head  | GV24 (Chengjiang, 承浆), HN (Jiachengjiang, 挫承浆), GV27 (Duiduan, 兑端), LI19 (Kouheliao, 口禾髎), GV26 (Shuigou, 水沟), GV25 (Suliao, 素髎), LI20 (Yingxiang, 迎香), HN8 (Shangyingxiang, 上迎香), ST3 (Juliao, 巨髎), SI18 (Quanliao, 颧髎), HN (Biantao, 扁桃), HN (Qianzheng, 牵正), ST4 (Dicang, 地仓), ST5 (Daying, 大迎), ST2 (Sibai, 四白), ST1 (Chengqi, 承泣), BL1 (Jingming, 睛明), HN (Shangming, 上明), TE23 (Sizhukong, 丝竹空), GB1 (Tongziliao, 瞳子髎), HN7 (Qiuhou, 球后), ST7 (Xiaguan, 下关), GB3 (Shangguan, 上关), HN3 (Yintang, 印堂), HN4 (Yuyao, 鱼腰), GB14 (Yangbai, 阳白), GV24 (Shengting, 神庭), BL3 (Meichong, 眉冲), BL4 (Qucha, 曲差), GB15 (Toulinqi, 头临泣), GB13 (Benshen, 本神), GV23 (Shangxing, 上星), BL5 (Wuchu, 五处), HN (Dangyang, 当阳), GV22 (Xinhui, 囊会), BL6 (Chengguang, 承光), and GB16 (Muchuang, 目窗) |
| Temporal Head | ST8 (Touwei, 头维), GB4 (Hanyan, 颌厌), GB5 (Xuanlu, 悬颅), GB8 (Shuaigu, 率谷), GB6 (Xuanli, 悬厘), TE20 (Jiaosun, 角孙), GB7 (Qubin, 曲鬚), TE22 (Erheliao, 耳和髎), TE19 (Luxi, 颧息), TE21 (Ermen, 耳门), SI19 (Tinggong, 听宫), GB2 (Tinghui, 听会), GB11 (Touqiaoying, 头窍阴), TE18 (Chimai, 瘰脉), GB12 (Wangu, 完骨), HN (Anmian, 安眠), HN14 (Yiming, 翳明), TE17 (Yifeng, 翳风), ST6 (Jiache, 颊车), TE16 (Tianyou, 天牖), SI17 (Tianrong, 天容), and LI18 (Futu, 扶突)  |
| Hind Head     | GV21 (Qianding, 前顶), BL7 (Tongtian, 通天), GB17 (Zhengying, 正营), GV20 (Baihui, 百会), GB18 (Chengling, 承灵), BL8 (Luoque, 络却), GV19 (Houding, 后顶), GB9 (Tianchong, 天冲), GV18 (Qiangjian, 强间), GB19 (Naokong, 脑空), GV17 (Naohu, 脑户), BL9 (Yuzhen, 玉枕), GB20 (Fengchi, 风池), GV16 (Fengfu, 风府), GV15 (Yamen, 哑门), BL10 (Tianzhu, 天柱), GB10 (Fubai, 浮白), and SI16 (Tianchuang, 天窗)   |



**Figure 3.2.1 the partition (classification) of acupoints on the head.** The head area is divided into three regions, the Frontal Head (yellow), the Temporal Head (further divided into the Upper Temporal Head, in magenta, and the Lower Temporal Head, in dark green), and the Hind Head (purple). The blue lines outline the human head. Black dots or circles (Extra points) represent acupoints. The pentagrams represent predicted new acupoints.

### 3.2.2 Acupoints on the Distal Limbs with Functions Related to the Head

According to the classical TCM meridian theory, “stimulating acupoints can cure diseases occurring in the body regions which are connected to the acupoints through meridians (“经络循行”). For example, the three Hand’s Yang Meridians start from the back of the hand, extend through the posterior upper limb and the neck, and end in the face and head regions. The three Foot’s Yang Meridians start from the head, extend through the neck, the trunk, and the leg, and end on the dorsum of the foot. Correspondingly, acupoints of the Hand’s (Foot’s) Yang Supreme, the Minor Yang, and the Major Yang Meridians in the distal regions of the limbs are effective to diseases in the Frontal Head, the Temporal Head, and the Hind Head regions, respectively. The following examples are taken to explain this. Acupoints on the posterior lateral (radial) distal upper limb, such as LI3 (Hegu, 合谷), LI2 (Sanjian, 三间), and EU5 (Dagukong, 大骨空), are often used to treat disorders of the mouth, the nose, and the face clinically. In contrast, acupoints located between the ulnar and the radial bones on the posterior forearm like TE10 (Tianjing, 天井), TE9 (Sidu, 四渎), TE6 (Zhigou, 支沟) and TE5 (Waiguan, 外关) and acupoints on the posterior medial (ulnar) distal upper limb, such as SI3 (Houxi, 后溪), and SI2 (Qiangu, 前谷), are used to treat migraine, deafness, and other diseases in the Temporal Head region. Pains of the neck (nape) in the Hind Head region are often treated with acupoints on the posterior medial (ulnar) distal upper limb, like SI7 (Zhizheng, 支正), SI5 (Yanggu, 阳谷), SI4 (Wangu, 腕骨), and SI3 (Houxi, 后溪).

Since the correspondence of functions and locations of the acupoints near the distal end of the three Foot’s Yang Meridians (including the Foot’s Absolute Yin Liver Meridian, 足厥阴肝经) are like that of the three Hand’s Yang Meridians on the upper limb, the details about it are not discussed here. The readers most likely notice the two following points from the examples above.

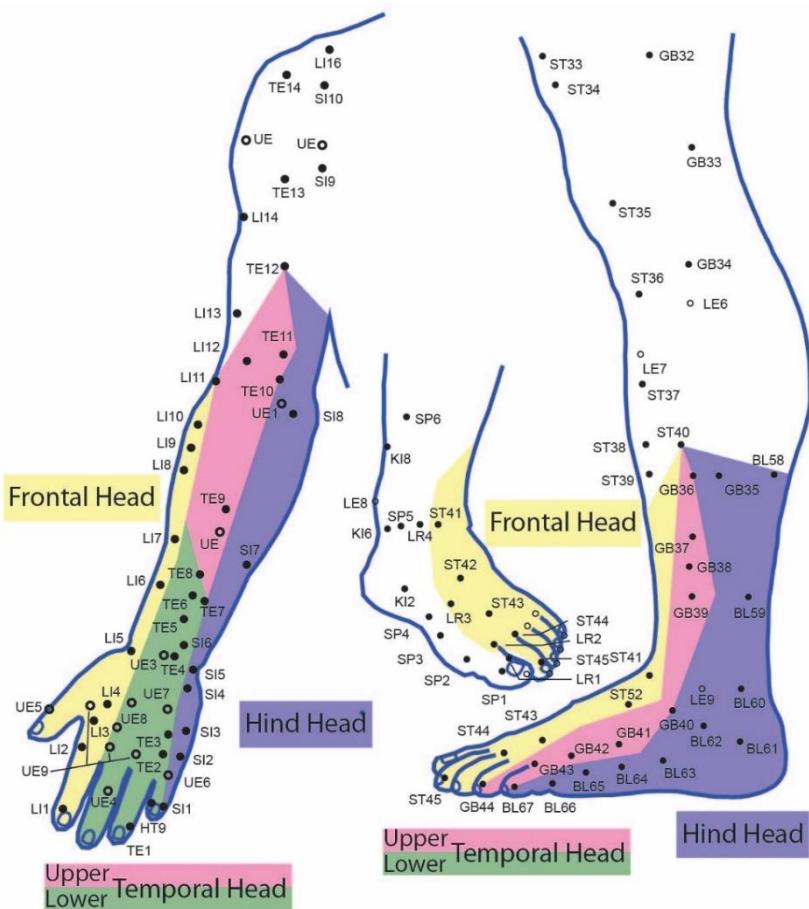
#### **Point 3.3.1,**

We would claim that the functions of distal long-distance acupoints (长程穴) on the posterior lateral upper limb (anterior medial lower limb), between the radial (tibial, lower limb) and ulnar (fibular, lower limb) bones, and on the posterior medial upper limb (anterior lateral lower limb), other than the long-distance acupoints from the Yang Supreme, the Minor Yang, and the Major Yang Meridians near the distal end of the limbs, correspond to the Front Head, the Temporal Head, and the Hind Head, respectively (**Figure 3.2.2**). The acupoints’ functions are related with the acupoints’ positions but not the distribution of the traditional meridians. For instance, EU5 (Dagukong, 大骨空) and UE6 (Xiaogukong, 小骨空) are both Extra Points. They are on the posterior lateral and medial upper limb and their functions correspond to the Front Head and the Hind Head, respectively. Here we further state the relationship between the functions and locations of acupoints using the new definitions in

Chapter 3.1. The essential idea of this paragraph is briefly summarized as: along the AAAUL (or the AAALL), the functions of the long-distance acupoints from the distal posterior upper (anterior and lateral lower) limb are corresponding to the Frontal Head, the Temporal Head, and the Hind Head, respectively (**Figure 3.2.1** and **Figure 3.2.2**; note, at the initial (distal) region of the Foot's Absolute Yin Liver Meridian, the functions of the acupoints correspond to the Frontal Head, **Appendix 3**).

### **Point 3.3.2,**

In the corresponding relationship above, acupoints in adjacent regions on the posterior upper limb (anterior and lateral lower limb) share some of the same functions regarding the disease occurring on the head. For instance, stimulating the acupoints on the posterior medial upper limb (corresponding to the Hind Head), such as SI4 (Wangu, 腕骨), SI3 (Houxi, 后溪), and SI2 (Qiangu, 前谷), is also effective for diseases of the Temporal Head like deafness. However, acupoints on the posterior medial upper limb are rarely used clinically for the disorders of the Frontal Head.



**Figure 3.2.2 the partition (classification) of long-distance acupoints on the distal limbs with functions related to the head.** The distal region of the posterior upper (anterior and lateral lower) limb is divided into three areas. The three areas correspond to the Frontal Head (yellow), the Temporal Head (further divided into the Upper Temporal Head, in magenta, and the Lower Temporal Head, in dark green), and the Hind Head (purple). The blue lines outline the human limbs. Black dots or circles (Extra points) represent acupoints.

**Table 3.2.2** classification of long-distance acupoints on the posterior upper (anterior and lateral lower) limb with functions related with the head

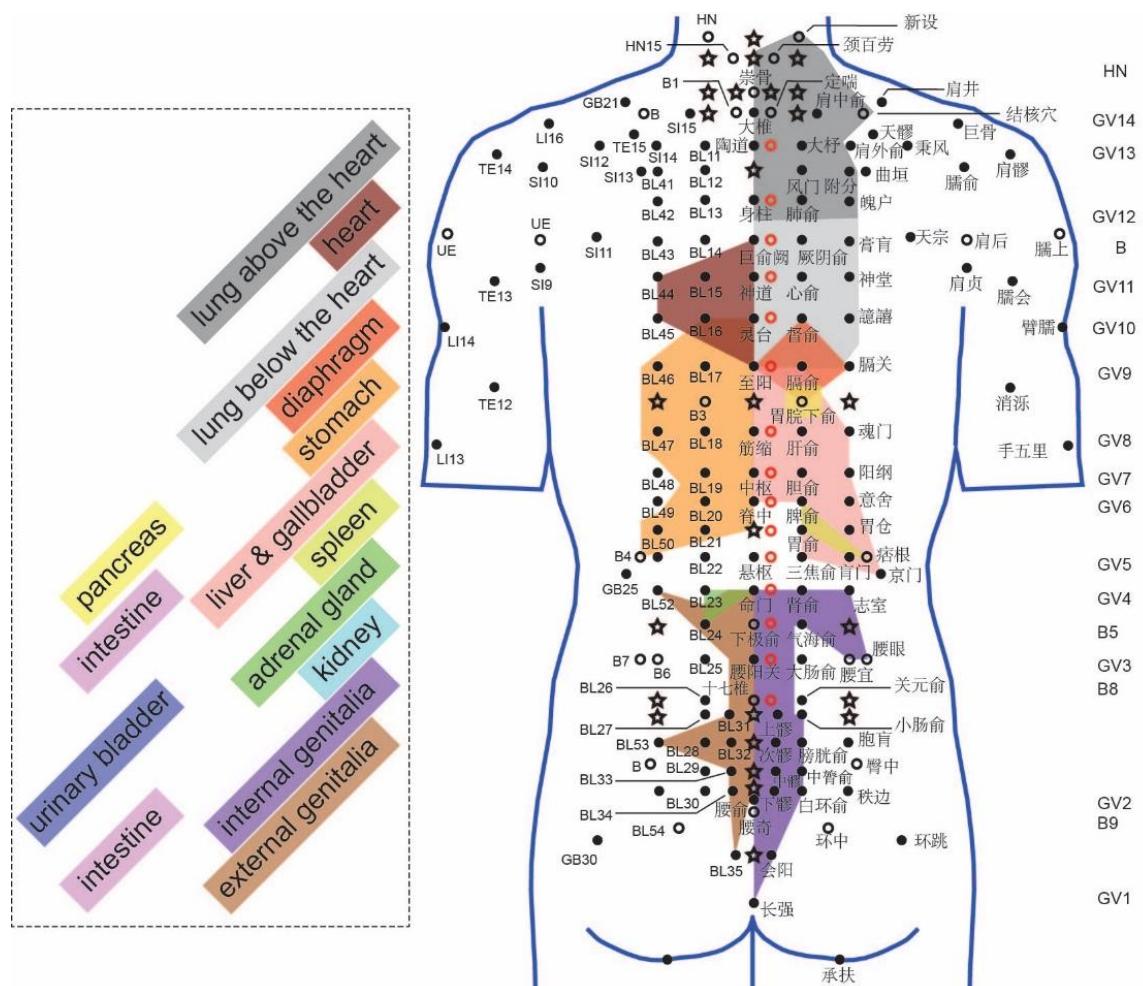
| Corresponding regions on the head | upper limb acupoints   | lower limb acupoints   |
|-----------------------------------|--|--|
| Frontal Head                      | LI1 (Shangyang, 商阳), LI2 (Erjian, 二间), LI3 (Sanjian, 三间), UE5 (Dagukong, 大骨空), LI4 (Hegu, 合谷), LI5 (Yangxi, 阳溪), LI6 (Pianli, 偏历), LU7 (Lieque, 列缺), LI7 (Wenliu, 温溜), LI8 (Xialian, 下廉), LI9 (Shanglian, 上廉), LI10 (Shousanli, 手三里), and LI11 (Quchi, 曲池)   | ST45 (Lidui, 厉兑), LR2 (Xingjian, 行间), LR3 (Taichong, 太冲), ST44 (Neiting, 内庭), ST43 (Xiangu, 陷谷), ST42 (Chongyang, 冲阳), and ST41 (Jiexi, 解溪)  |
| Temporal Head                     | TE1 (Guanchong, 关冲), UE4 (Zhongkui, 中魁), TE2 (Yemen, 液门), TE3 (Zhongzhu, 中渚), UE8 (Wailaogong, 外劳宫), TE4 (Yangchi, 阳池), UE3 (Zhongquan, 中泉), SI6 (Yanglao, 养老), TE5 (Waiguan, 外关), and TE6 (Zhigou, 支沟)<br><b>(Lower Temporal Head);</b><br>TE8 (Sanyangluo, 三阳络), TE9 (Sidu, 四渎), TE10 (Tianjing, 天井), TE11 (Qinglengyuan, 清冷渊), and TE12 (Xiaolu, 消泺)<br><b>(Upper Temporal Head);</b> | GB44 (Zuqiaoyin, 足窍阴), GB43 (Xiaxi, 侠溪), GB41 (Zulinqi, 足临泣), GB42 (Diwuhui, 地五会), GB40 (Qiuxu, 丘墟), GB38 (Yangfu, 阳辅), GB39 (Xuanzhong, 悬钟), and GB37 (Guangming, 光明)<br><b>(Upper Temporal Head)</b>   |
| Hind Head                         | SI1 (Shaoze, 少泽), UE6 (Xiaogukong, 小骨空), SI2 (Qiangu, 前谷), SI3 (Houxi, 后溪), SI4 (Wangu, 腕骨), SI5 (Yanggu, 阳谷), TE7 (Huizong, 会宗), SI7 (Zhizheng, 支正), and SI8 (Xiaohai, 小海)  | BL67 (Zhiyin, 至阴), BL66 (Zutonggu, 足通谷), BL65 (Shugu, 束骨), BL63 (Jinmen, 金门), BL62 (Shenmai, 申脉), BL64 (Jinggu, 京骨), BL61 (Pucan, 卜参), BL60 (Kunlun, 昆仑), BL59 (Fuyang, 跗阳), GB35 (Yangjiao, 阳交), GB36 (Waiqiu, 外丘), ST40 (Fenglong, 丰隆), and BL58 (Feiyang, 飞扬) |

Some of the acupoints in the distal regions of the posterior upper limb (anterior and lateral lower limbs) are also effective for visceral diseases and this topic will be further discussed in the following sections. Here we also skip the functions of acupoints to relieve the local pains on the upper and lower limbs (local effects).

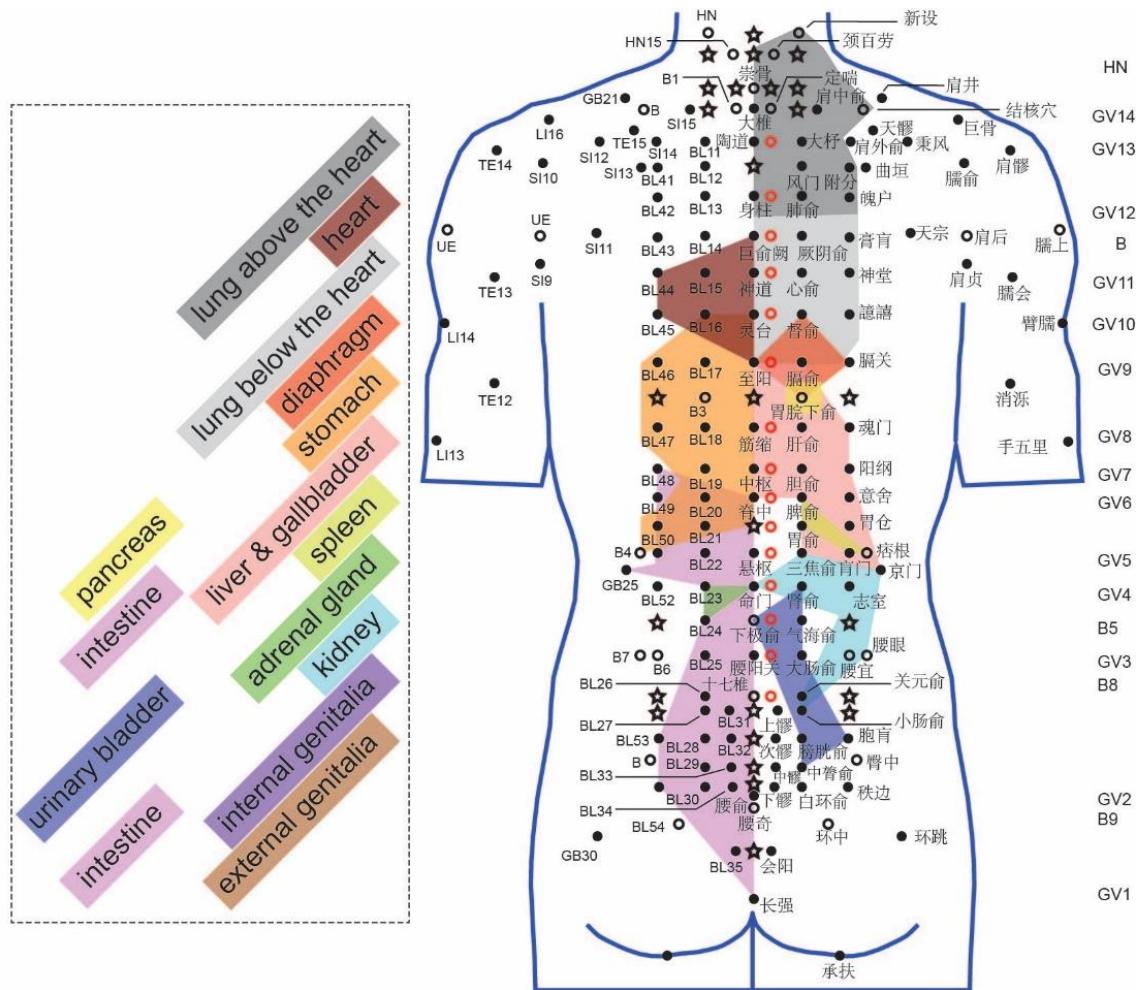
### 3.2.3 Acupoints on the (Anterior, Posterior and Side) Trunk

The functions and distribution patterns of acupoints in the middle segments of the three Foot's Yang Meridians are different from those acupoints on either end of these meridians. Here we start our discussions from the trunk segment of the Foot's Yang Meridians since these meridians start from the head, across the entire trunk and the leg, and end on the foot. Meanwhile, because the functions of the acupoints in the Governing Vessel (Shenzhibing, 神志病, will be discussed separately, **Appendix 1**) are quite like those of the Foot's Major Yang Urinary Bladder Meridian, we talk about acupoints of these two meridians and the Extra Points on the posterior trunk together.

As a matter of fact, it has been shown previously that these posterior trunk acupoints are aligned functionally along the vertebral column (Chapter 2). Here we emphasize that the segmental distribution of these acupoints corresponds to the viscera in anatomy or the somites in the developmental biology (along the posterior median line of the trunk from the top to the bottom or rostro-caudally), but not the Zang-Fu organs (脏腑) in the TCM.



**Figure 3.2.3.1 the partition (classification) of acupoints on the posterior trunk.** Black dots or circles (Extra points) represent acupoints. The pentagrams represent predicted new acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.3.1** and **Figure 3.2.3.2**.



**Figure 3.2.3.2 the partition (classification) of acupoints on the posterior trunk.** Black dots or circles (Extra points) represent acupoints. The pentagrams represent predicted new acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.3.1** and **Figure 3.2.3.2**.

**Table 3.2.3** classification of the posterior trunk acupoints related with the viscera

| viscera                 | acupoints with functions related with the inner organ  |
|-------------------------|--|
| lung above the heart *  | HN (Xinshe, 新设), HN15 (Jingbailao, 颈百劳), HN (Chonggu, 崇骨), GV14 (Dazhui, 大椎), B1 (Dingchuan, 定喘), SI15 (Jianzhongshu, 肩中俞), B (Jiehexue, 结核穴), GV13 (Taodao, 陶道), BL11 (Dazhu, 大杼), BL12 (Fengmen, 风门), and BL41 (Fufen, 附分)   |
| heart                   | B4 (Juqueshu, 巨阙俞), BL14 (Jueyinshu, 厥阴俞), GV11 (Shendao, 神道), BL15 (Xinshu, 心俞), BL44 (Shentang, 神堂), GV10 (Lingtai, 灵台), BL16 (Dushu, 督俞), BL45 (Yixi, 谙譖), GV9 (Zhiyang, 至阳), GV12 (Shenzhu, 身柱), BL13 (Feishu, 肺俞), and BL42 (Pohu, 魄户)                            |
| lung below the heart ** | B4 (Juqueshu, 巨阙俞), BL14 (Jueyinshu, 厥阴俞), BL43 (Gaohuang, 膏肓), GV11 (Shendao, 神道), BL15 (Xinshu, 心俞), BL44 (Shentang, 神堂), GV10 (Lingtai, 灵台), BL16 (Dushu, 督俞), BL45 (Yixi, 谙譖), GV9 (Zhiyang, 至阳), BL17 (Geshu, 膈俞), BL46 (Geguan, 膈关), and B3 (Weiwanxiashu, 胃脘下俞) |
| diaphragm               | BL16 (Dushu, 督俞), GV9 (Zhiyang, 至阳), BL17 (Geshu, 膈俞), BL46 (Geguan, 膈关), and B3 (Weiwanxiashu, 胃脘下俞)  |

|   |   |
|---|---|
| stomach   | GV10 (Lingtai, 灵台), BL16 (Dushu, 督俞), GV9 (Zhiyang, 至阳), BL17 (Geshu, 脾俞), BL46 (Geguan, 膈关), B3 (Weiwanxiashu, 胃脘下俞), GV8 (Jinsuo, 筋缩), BL18 (Ganshu, 肝俞), BL47 (Hunmen, 魂门), GV7 (Zhongshu, 中枢), BL19 (Danshu, 胆俞), GV6 (Jizhong, 脊中), BL20 (Pishu, 脾俞), BL21 (Weishu, 胃俞), BL50 (Weicang, 胃仓), and B4 (Pigen, 痞根)  |
| liver and gallbladder                               | GV9 (Zhiyang, 至阳), BL17 (Geshu, 脾俞), B3 (Weiwanxiashu, 胃脘下俞), GV8 (Jinsuo, 筋缩), BL18 (Ganshu, 肝俞), BL47 (Hunmen, 魂门), GV7 (Zhongshu, 中枢), BL19 (Danshu, 胆俞), BL48 (Yanggang, 阳纲), GV6 (Jizhong, 脊中), BL20 (Pishu, 脾俞), BL49 (Yishe, 意舍), BL21 (Weishu, 胃俞), BL50 (Weicang, 胃仓), BL22 (Sanjiaoshu, 三焦俞), BL51 (Huangmen, 育门), and B4 (Pigen, 痞根)   |
| spleen  | BL20 (Pishu, 脾俞), BL21 (Weishu, 胃俞), BL51 (Huangmen, 育门), and B4 (Pigen, 痞根)  |
| pancreas  | B3 (Weiwanxiashu, 胃脘下俞)   |
| adrenal gland                                       | GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), and BL24 (Qihaishu, 气海俞)   |
| kidney  | BL22 (Sanjiaoshu, 三焦俞), GB25 (Jingmen, 京门), GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), BL52 (Zhishi, 志室), B6 (Yaoyi, 腰宜), B7 (Yaoyan, 腰眼), BL26 (Guanyuanshu, 关元俞), and BL27 (Xiaochangshu, 小肠俞)  |
| urinary bladder                                     | BL23 (Shenshu, 肾俞), B5 (Xiajizhu, 下极俞), BL24 (Qihaishu, 气海俞), BL25 (Dachangshu, 大肠俞), BL26 (Guanyuanshu, 关元俞), BL27 (Xiaochangshu, 小肠俞), BL28 (Pangguangshu, 膀胱俞), and BL29 (Zhongluishu, 中膂俞)  |
| intestine   | BL48 (Yanggang, 阳纲), GV6 (Jizhong, 脊中), BL20 (Pishu, 脾俞), BL49 (Yishe, 意舍), BL21 (Weishu, 胃俞), BL50 (Weicang, 胃仓), GV5 (Xuanshu, 悬枢), BL22 (Sanjiaoshu, 三焦俞), BL51 (Huangmen, 育门), GB25 (Jingmen, 京门), GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), B5 (Xiajizhu, 下极俞), BL24 (Qihaishu, 气海俞), GV3 (Yaoyangguan, 腰阳关), BL25 (Dachangshu, 大肠俞), BL26 (Guanyuanshu, 关元俞), B8 (Shiqizhui, 十七椎), BL31 (Shangliao, 上髎), BL27 (Xiaochangshu, 小肠俞), BL28 (Pangguangshu, 膀胱俞), BL32 (Ciliao, 次髎), BL53 (Baohuang, 胞肓), BL33 (Zhongliao, 中髎), BL29 (Zhongluishu, 中膂俞), BL34 (Xialiao, 下髎), GV2 (Yaoshu, 腰俞), BL30 (Baihuanshu, 白环俞), BL54 (Zhibian, 秩边), B9 (Yaoqi, 腰奇), BL35 (Huiyang, 会阳), and GV1 (Changqiang, 长强) |
| internal genitalia                                  | GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), BL52 (Zhishi, 志室), B5 (Xiajishu, 下极俞), BL24 (Qihaishu, 气海俞), GV3 (Yaoyangguan, 腰阳关), B6 (Yaoyi, 腰宜), B7 (Yaoyan, 腰眼), B8 (Shiqizhui, 十七椎), BL31 (Shangliao, 上髎), BL27 (Xiaochangshu, 小肠俞), BL28 (Pangguangshu, 膀胱俞), BL32 (Ciliao, 次髎), BL33 (Zhongliao, 中髎), BL29 (Zhongluishu, 中膂俞), BL34 (Xialiao, 下髎), GV2 (Yaoshu, 腰俞), BL30 (Baihuanshu, 白环俞), B9 (Yaoqi, 腰奇), BL35 (Huiyang, 会阳) and GV1 (Changqiang, 长强),  |
| external genitalia                                  | GV4 (Mingmen, 命门), BL52 (Zhishi, 志室), B5 (Xiajishu, 下极俞), BL24 (Qihaishu, 气海俞), GV3 (Yaoyangguan, 腰阳关), B8 (Shiqizhui, 十七椎), BL31 (Shangliao, 上髎), BL32 (Ciliao, 次髎), BL28 (Pangguangshu, 膀胱俞), BL53 (Baohuang, 胞肓), BL33 (Zhongliao, 中髎), BL34 (Xialiao, 下髎), and BL35 (Huiyang, 会阳)   |
| *, throat and trachea; **, bronchus; ?, suspicious. |   |

As we can see, from the acupoints on the top of the back, such as HN (Xinshe, 新设), HN15 (Jingbailao, 颈百劳), GV14 (Dazhui, 大椎), B1 (Dingchuan, 定喘), and BL11 (Dazhu, 大杼), to the acupoints at the bottom of the back, BL35 (Huiyang, 会阳) and GV1 (Changqiang, 长强), acupoints show a segmental distribution pattern with acupoints from adjacent regions sharing some of the same functions with each other. Their functions correspond overall to the lung (“lung above the heart”), the heart, the lung (“lung below the heart”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (**Appendix 4**). Among them, the segmental areas of acupoints corresponding to the stomach, the liver, the gallbladder, the spleen, and the pancreas overlap highly with each other. Similarly, segmental areas of acupoints corresponding to the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia overlap with each other on a high level as well (**Table 3.2.3** and **Figure 3.2.3**). The Frontal Head, the Temporal Head, the Hind Head regions and the trunk regions corresponding to each of the inner organs above are aligned along the Axis of Acupoints on the Posterior Trunk (AAPT) when the acupoints on the head are also taken into consideration. We define the order from the Frontal Head to the internal and the external genitalia as the **standard order**. The distribution pattern, in which the acupoints are functionally aligned in the **standard order**, is defined as a topographic map of acupoints (or acupointotopy). Therefore, the acupoints distributed along the AAPT above as a whole form the Topographic Map of the Axis of Acupoints on the Posterior Trunk (TM - AAPT).

The inner organs spleen, pancreas, and adrenal gland are discussed separately here.

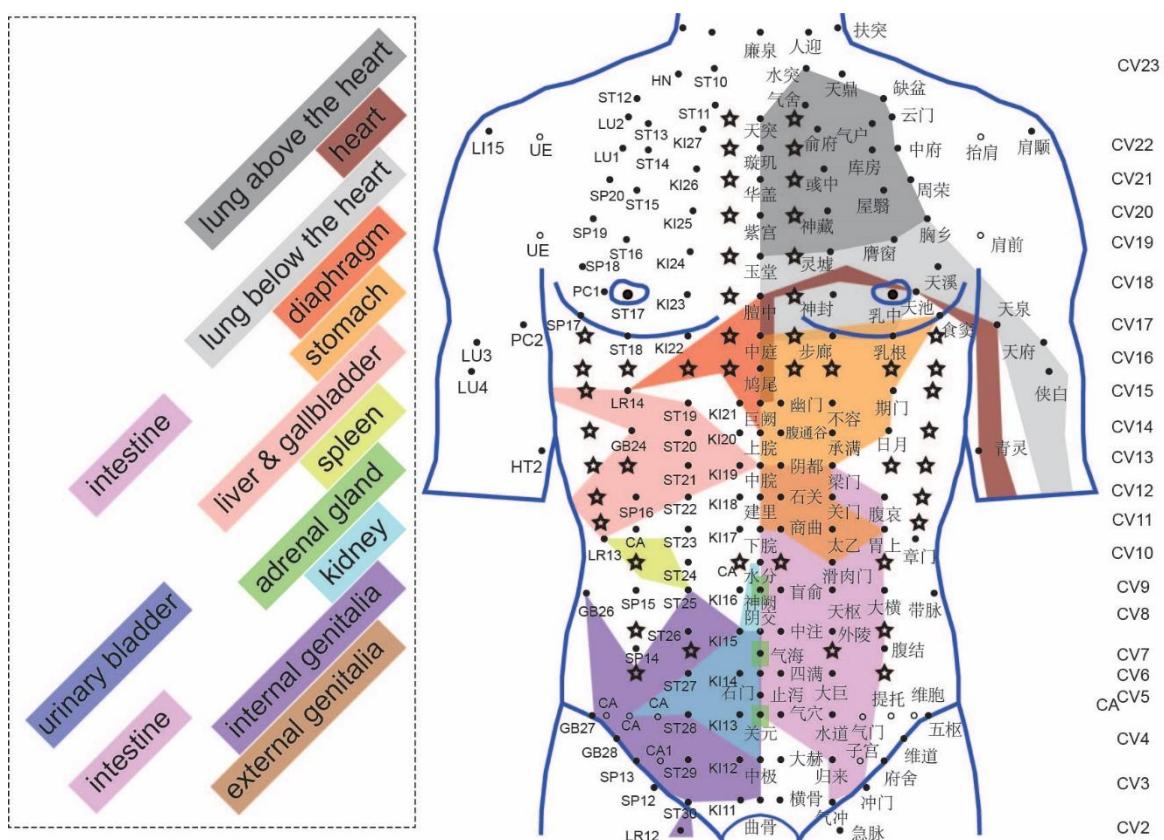
The definition of the **spleen** (Pi, 脾) in the TCM is quite different from that in anatomy. Also, there are no definitions of the pancreas and the adrenal gland in the TCM at all (the anatomic structure of the **spleen** in the TCM looks like the spleen or the pancreas in modern anatomy). Diseases related with the spleen, such as chronic hemorrhagic disorder, leukopenia, and hepatosplenomegaly, are often clinically treated with BL20 (Pishu, 脾俞) and B4 (Pigen, 痘根) while B3 (Weiwanxiashu, 胃脘下俞) is often used to treat problems of the blood sugar level related with the pancreas (**Figure 3.2.3**).

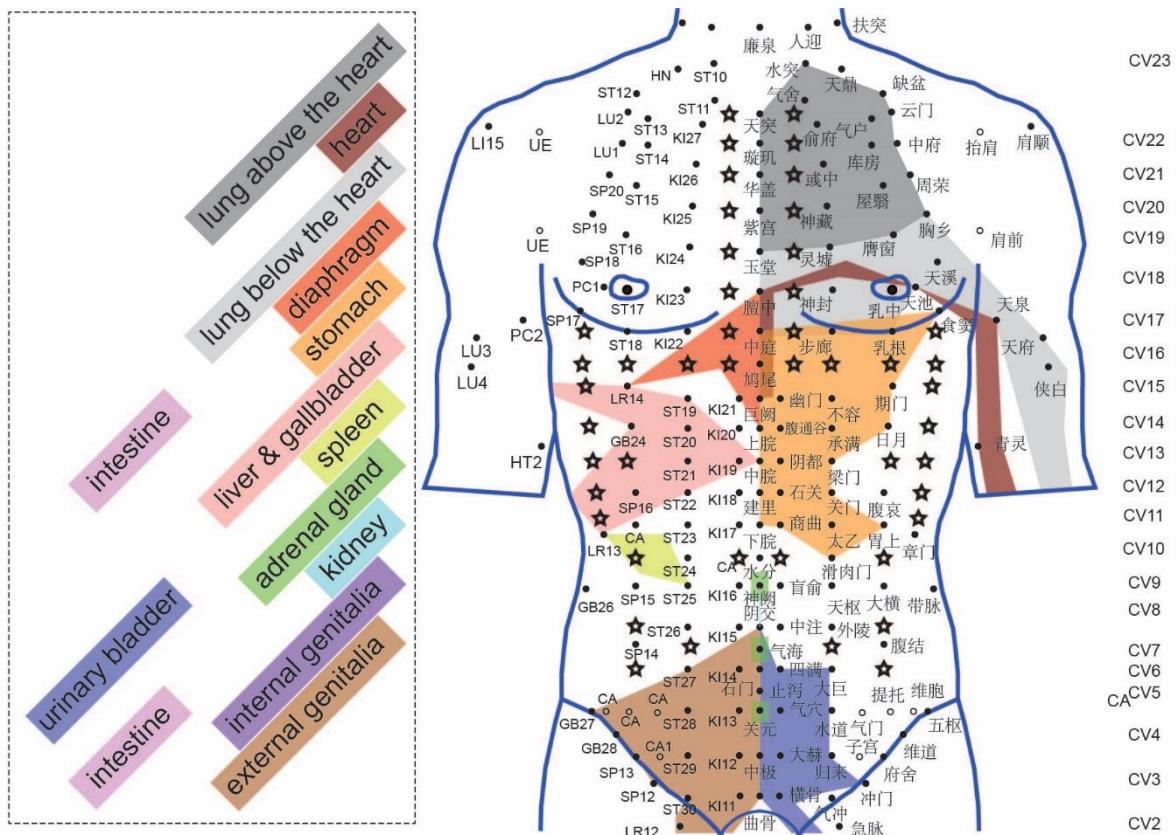
The functions of the adrenal gland are complicated:

The cortex of the adrenal gland secretes glucocorticoids, mineralocorticoids, and androgens. The glucocorticoids have many functions, such as regulating the substance metabolism and the water-electrolyte metabolism, influencing the effects of other hormones, inhibiting immunoreaction, activating haematopoiesis, influencing the development of fetus, and promoting secretion of the acid

and proteinases in the stomach. The mineralocorticoids have effects on the kidney, activating reabsorption of sodium and water, as well as the active secretion of potassium. The androgens are effective for females in the whole life, promoting the growth of hair and maintaining sexual desire. In males, androgens influence the development of the sex organs during the early development.

The adrenal medulla secretes adrenaline, norepinephrine, and small amount of dopamine. The effects of adrenaline and noradrenaline resemble the activation of the sympathetic nervous system. The adrenal medulla and the sympathetic nervous system, forming the sympathoadrenal system, keep the alert status and ready to respond rapidly to external stimuli, accelerate and deepen breath, increase the ventilation of the lung; increase the heart rate, strengthen the contraction of the heart, increase the cardiac output, accelerate blood circulation, increase blood pressure, redistribute the blood in the body to provide enough blood supply for important inner organs in emergency, and increase the blood sugar and free fat acids in the blood by accelerating the glycogenolysis and lipolysis. In summary, all the changes above are characteristic of the fight-or-flight response in emergency.





**Figure 3.2.4.2 the partition (classification) of acupoints on the anterior trunk.** Black dots or circles (Extra points) represent acupoints. The pentagrams represent predicted new acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.4.1** and **Figure 3.2.4.2**.

The adrenal gland is obviously largely like the **kidney** (Shen, 肾) in the TCM in terms of its functions. But the details will not be discussed here. We think that acupoints, CV6 (Qihai, 气海), CV4 (Guanyuan, 关元), GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), and BL24 (Qihaishu, 气海俞), can adjust the functions (activities) of the adrenal gland.

Next, we analyze the distribution pattern and functions of acupoints on the anterior trunk and on the side of the trunk, including acupoints from the Foot's Major Yin Spleen Meridian, the Foot's Absolute Yin Liver Meridian, the Foot's Minor Yin Kidney Meridian, the Foot's Yang Supreme Stomach Meridian, the Foot's Minor Yang Gallbladder Meridian and the Conception Vessel, and the Extra Points in these two regions. In fact, as we can see, the distribution pattern of these acupoints is consistent with that of the acupoints on the posterior trunk – acupoints are aligned from the top to the bottom along the anterior median line. Alternatively, we can claim that the acupoints correspond functionally to the lung (“above the heart”), the heart, the lung (“below the heart”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia along the Axis of

Acupoints on the Anterior Trunk (AAAT) (**Figure 3.2.4** and **Table 3.2.4; Appendix 4**). According to the definition of the topographic map, we name the distribution pattern of the acupoints aligned functionally along the AAAT as the Topographic Map of the Axis of Acupoints on the Anterior Trunk (TM - AAAT). Since the TM - AAAT does not contain acupoints corresponding to the head regions, we call this type of topographic map as an incomplete topographic map.

**Table 3.2.4** classification of the anterior trunk acupoints related with the viscera

| viscera                 | acupoints with functions related with the inner organ   | note    |
|-------------------------|---|---------|
| lung above the heart *  | ST10 (Shuitu, 水突), ST11 (Qishe, 气舍), ST12 (Quepen, 缺盆), CV22 (Tiantu, 天突), ST13 (Qihu, 气户), LU2 (Yunmen, 云门), KI27 (Shufu, 俞府), CV21 (Xuanji, 环玑), ST14 (Kufang, 库房), LU1 (Zhongfu, 中府), KI26 (Yuzhong, 戟中), CV20 (Huagai, 华盖), SP20 (Zhourong, 周荣), ST15 (Wuyi, 屋翳), CV19 (Zigong, 紫宫), and KI25 (Shencang, 神藏)  |         |
| heart                   | CV17 (Danzhong, 膈中), PC1 (Tianchi, 天池), CV16 (Zhongting, 中庭), CV15 (Jiuwei, 鸠尾), and CV14 (Juque, 巨阙)   |         |
| lung below the heart ** | CV18 (Yutang, 玉堂), KI24 (Lingxu, 灵墟), ST16 (Yingchuang, 膽窗), SP19 (Xiongxiang, 胸乡), GB22 (Yuanye, 渊腋), GB23 (Zhejin, 辙筋), SP21 (Dabao, 大包), CV17 (Danzhong, 膈中), KI23 (Shenfeng, 神封), PC1 (Tianchi, 天池), SP18 (Tianxi, 天溪), CV16 (Zhongting, 中庭), KI22 (Bulamng, 步廊), and ST18 (Rugen, 乳根)  |         |
| diaphragm               | CV17 (Danzhong, 膈中), CV16 (Zhongting, 中庭), CV15 (Jiuwei, 鸠尾), CV13 (Shangwan, 上脘), CV14 (Juque, 巨阙), KI21 (Youmen, 幽门), and LR14 (Qimen, 期门)  |         |
| stomach                 | GB23 (Zhejin, 辙筋), SP17 (Shidou, 食窦), CV16 (Zhongting, 中庭), KI22 (Bulang, 步廊), ST18 (Rugen, 乳根), V15 (Jiuwei, 鸠尾), LR14 (Qimen, 期门), CV14 (Juque, 巨阙), KI21 (Youmen, 幽门), ST19 (Burong, 不容), CV13 (Shangwan, 上脘), KI20 (Futonggu, 腹通谷), ST20 (Chengman, 承满), GB24 (Riyue, 日月), CV12 (Zhongwan, 中脘), KI19 (Yindu, 阴都), ST21 (Liangmen, 梁门), CV11 (Jianli, 建里), KI18 (Shiguan, 石关), ST22 (Guanmen, 关门), CV10 (Xiawan, 下脘), KI17 (Shangqu, 商曲), ST23 (Taiyi, 太乙), CA (Weishang, 胃上), and ST24 (Huaroumen, 滑肉门) |         |
| liver and gallbladder   | SP21 (Dabao, 大包), LR14 (Qimen, 期门), ST19 (Burong, 不容), ST20 (Chengman, 承满), GB24 (Riyue, 日月), CV12 (Zhongwan, 中脘), KI19 (Yindu, 阴都), ST21 (Liangmen, 梁门), ST22 (Guanmen, 关门), SP16 (Fu'ai, 腹哀), GB25 (Jingmen, 京门), and LR13 (Zhangmen, 章门)   |         |
| spleen                  | LR13 (Zhangmen, 章门) and ST25 (Tianshu, 天枢)  |         |
| pancreas                |   | absent? |
| adrenal gland           | CV8 (Shenque, 神阙), CV4 (Guanyuan, 关元), and CV6 (Qihai, 气海)  |         |
| kidney                  | CV9 (Shuifen, 水分), GB25 (Jingmen, 京门), CV8 (Shenque, 神阙), CV7 (Yinjiao, 阴交), KI15 (Zhongzhu, 中注), CV6 (Qihai, 气海), CV5 (Shimen,   |         |

|   |  |  |
|---|--|--|
|   | 石门), KI14 (Siman, 四满), ST27 (Daju, 大巨), CA (Zhixie, 止泻), CV4 (Guanyuan, 关元), KI13 (Qixue, 气穴), ST28 (Shuidao, 水道), CA (Qimen, 气门), CA (Tituo, 提托), and CV3 (Zhongji, 中极)   |  |
| urinary bladder                                     | CV7 (Yinjiao, 阴交), CV6 (Qihai, 气海), CV5 (Shimen, 石门), KI14 (Siman, 四满), ST27 (Daju, 大巨), CA (Zhixie, 止泻), CV4 (Guanyuan, 关元), KI13 (Qixue, 气穴), ST28 (Shuidao, 水道), CV3 (Zhongji, 中极), KI12 (Dahe, 大赫), ST29 (Guilai, 归来), SP12 (Chongmen, 冲门), CV2 (Qugu, 曲骨), and KI11 (Henggu, 横骨)  |  |
| intestine   | CV12 (Zhongwan, 中脘), KI19 (Yindu, 阴都), ST21 (Liangmen, 梁门), CV11 (Jianli, 建里), KI18 (Shiguan, 石关), ST22 (Guanmen, 关门), SP16 (Fu'ai, 腹哀), CV10 (Xiawan, 下脘), KI17 (Shangqu, 商曲), ST23 (Taiyi, 太乙), CA (Weishang, 胃上), CV9 (Shuifen, 水分), ST24 (Huaroumen, 滑肉门), CV8 (Shenque, 神阙), KI16 (Huangshu, 盲俞), ST25 (Tianshu, 天枢), SP15 (Daheng, 大横), CV7 (Yinjiao, 阴交), KI15 (Zhongzhu, 中注), ST26 (Wailing, 外陵), CV6 (Qihai, 气海), SP14 (Fujie, 腹结), CV5 (Shimen, 石门), KI14 (Siman, 四满), ST27 (Daju, 大巨), CA (Zhixie, 止泻), CV4 (Guanyuan, 关元), KI13 (Qixue, 气穴), ST28 (Shuidao, 水道), CA (Qimen, 气门), ST29 (Guilai, 归来), SP12 (Chongmen, 冲门), CA1(Zigong, 子宫), and ST30 (Qichong, 气冲) |  |
| internal genitalia                                  | ST25 (Tianshu, 天枢), GB26 (Daimai, 带脉), CV7 (Yinjiao, 阴交), KI15 (Zhongzhu, 中注), ST26 (Wailing, 外陵), CV6 (Qihai, 气海), CV5 (Shimen, 石门), KI14 (Siman, 四满), ST27 (Daju, 大巨), CA (Zhixie, 止泻), CV4 (Guanyuan, 关元), KI13 (Qixue, 气穴), ST28 (Shuidao, 水道), CA (Qimen, 气门), CA (Tituo, 提托), CA (Weibao, 维胞), GB27 (Wushu, 五枢), GB28 (Weidao, 维道), CV3 (Zhongji, 中极), KI12 (Dahe, 大赫), ST29 (Guilai, 归来), CA1 (Zigong, 子宫), SP13 (Fushe, 府舍), CV2 (Qugu, 曲骨), KI11 (Henggu, 横骨), ST30 (Qichong, 气冲), and SP12 (Chongmen, 冲门)  |  |
| external genitalia                                  | CV7 (Yinjiao, 阴交), CV6 (Qihai, 气海), CV5 (Shimen, 石门), KI14 (Siman, 四满), ST27 (Daju, 大巨), CA (Zhixie, 止泻), CV4 (Guanyuan, 关元), KI13 (Qixue, 气穴), ST28 (Shuidao, 水道), CA (Qimen, 气门), CA (Tituo, 提托), CA (Weibao, 维胞), GB27 (Wushu, 五枢), GB28 (Weidao, 维道), CV3 (Zhongji, 中极), KI12 (Dahe, 大赫), ST29 (Guilai, 归来), CA1 (Zigong, 子宫), SP13 (Fushe, 府舍), CV2 (Qugu, 曲骨), KI11 (Henggu, 横骨), ST30 (Qichong, 气冲), and SP12 (Chongmen, 冲门)  |  |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |  |

### 3.2.4 Limb Long-distance Acupoints with Functions Related to Viscera

Now let us analyze the distribution pattern of the long-distance acupoints on the limbs with functions related with inner organs. Using the same principle above, we do not consider to which meridians the acupoints belong.

#### 3.2.4.1 Upper Limb Long-distance Acupoints with Functions Related to Viscera

Acupoints, related with (correspond to) the same inner organ, are classified as one acupoint group. For instance, all these acupoints, PC3 (Quze, 曲泽), LU5 (Chize, 尺泽), PC4 (Ximen, 郄门), PC5 (Jianshi, 间使), PC6 (Neiguan, 内关), PC7 (Daling, 大陵), UE3 (Zhongquan, 中泉), LI4 (Hegu, 合谷), LI3 (Sanjian, 三间), and UE5 (Dagukong, 大骨空), influence the function of the stomach. Therefore, they are classified as one group corresponding to the stomach. Here we show the classification in the following table in detail (**Table 3.2.5**).

**Table 3.2.5** classification of the upper limb long-distance acupoints related with the viscera

| viscera                 | acupoints with functions related with the inner organ  | note             |
|-------------------------|--|------------------|
| lung above the heart *  |  | absent?          |
| heart                   | HT1 (Jiquan, 极泉), PC2 (Tianquan, 天泉), HT2 (Qingling, 青灵), HT3 (Shaohai, 少海), PC3 (Quze, 曲泽), PC4 (Ximen, 郄门), PC5 (Jianshi, 间使), PC6 (Neiguan, 内关), PC7 (Daling, 大陵), HT4 (Lingdao, 灵道), HT5 (Tongli, 通里), HT6 (Yinxi, 阴郄), HT7 (Shenmen, 神门), PC8 (Laogong, 劳宫), and HT8 (Shaofu, 少府) |                  |
| lung below the heart ** | PC2 (Tianquan, 天泉), LU3 (Tianfu, 天府), LU4 (Xiabai, 侠白), LU5 (Chize, 尺泽), PC4 (Ximen, 郄门), LU6 (Kongzui, 孔最), LU7 (Lieque, 列缺), LU8 (Jingqu, 经渠), LU9 (Taiyuan, 太渊), LU10 (Yuji, 鱼际), UE3 (Zhongquan, 中泉)   |                  |
| diaphragm               | PC6 (Neiguan, 内关)  |                  |
| stomach                 | PC3 (Quze, 曲泽), LU5 (Chize, 尺泽), PC4 (Ximen, 郄门), PC5 (Jianshi, 间使), PC6 (Neiguan, 内关), PC7 (Daling, 大陵), UE3 (Zhongquan, 中泉), LI4 (Hegu, 合谷), LI3 (Sanjian, 三间), and UE5 (Dagukong, 大骨空)  |                  |
| Liver and gallbladder   | TE5 (Waiguan, 外关), TE6 (Zhigou, 支沟), SI3 (Houxi, 后溪), SI4 (Wangu, 腕骨), and HT7 (Shenmen, 神门)   |                  |
| spleen                  |  | SI3 (Houxi, 后溪)? |
| pancreas                | LI11 (Quchi, 曲池), TE6 (Zhigou, 支沟), TE4 (Yangchi, 阳池), and SI4 (Wangu, 腕骨)   |                  |

|   |  |                 |
|---|--|-----------------|
| adrenal gland                                       |  | LI4 (Hegu, 合谷)? |
| kidney  | LI6 (Pianli, 偏历)   |                 |
| urinary bladder                                     | LI8 (Xialian, 下廉), LI9 (Shanglian, 上廉), LI6 (Pianli, 偏历), SI2 (Qiangu, 前谷), and HT8 (Shaofu, 少府)   |                 |
| intestine   | LU5 (Chize, 尺泽), LI11 (Quchi, 曲池), LI10 (Shousanli, 手三里), LI8 (Xialian, 下廉), LI9 (Shanglian, 上廉), LI7 (Wenliu, 温溜), TE6 (Zhigou, 支沟), LI3 (Sanjian, 三间), and UE5 (Dagukong, 大骨空) |                 |
| internal genitalia                                  |  | LI4 (Hegu, 合谷)? |
| external genitalia                                  | HT8 (Shaofu, 少府)   |                 |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |                 |

The acupoints related with the heart are on the anterior medial (ulnar) upper arm, on the anterior median (between the radial and the ulnar bones) and the anterior medial forearm, and in the median and the medial palm (**Figure 3.2.5** and **Table 3.2.5**).

The region corresponding to the lung is on the anterior lateral (radial) upper limb and rotates outwards towards the posterior (back of the) lateral hand near the radial styloid process.

The region corresponding to the diaphragm is in the distal area of the anterior median (between the radial and ulnar bones) forearm.

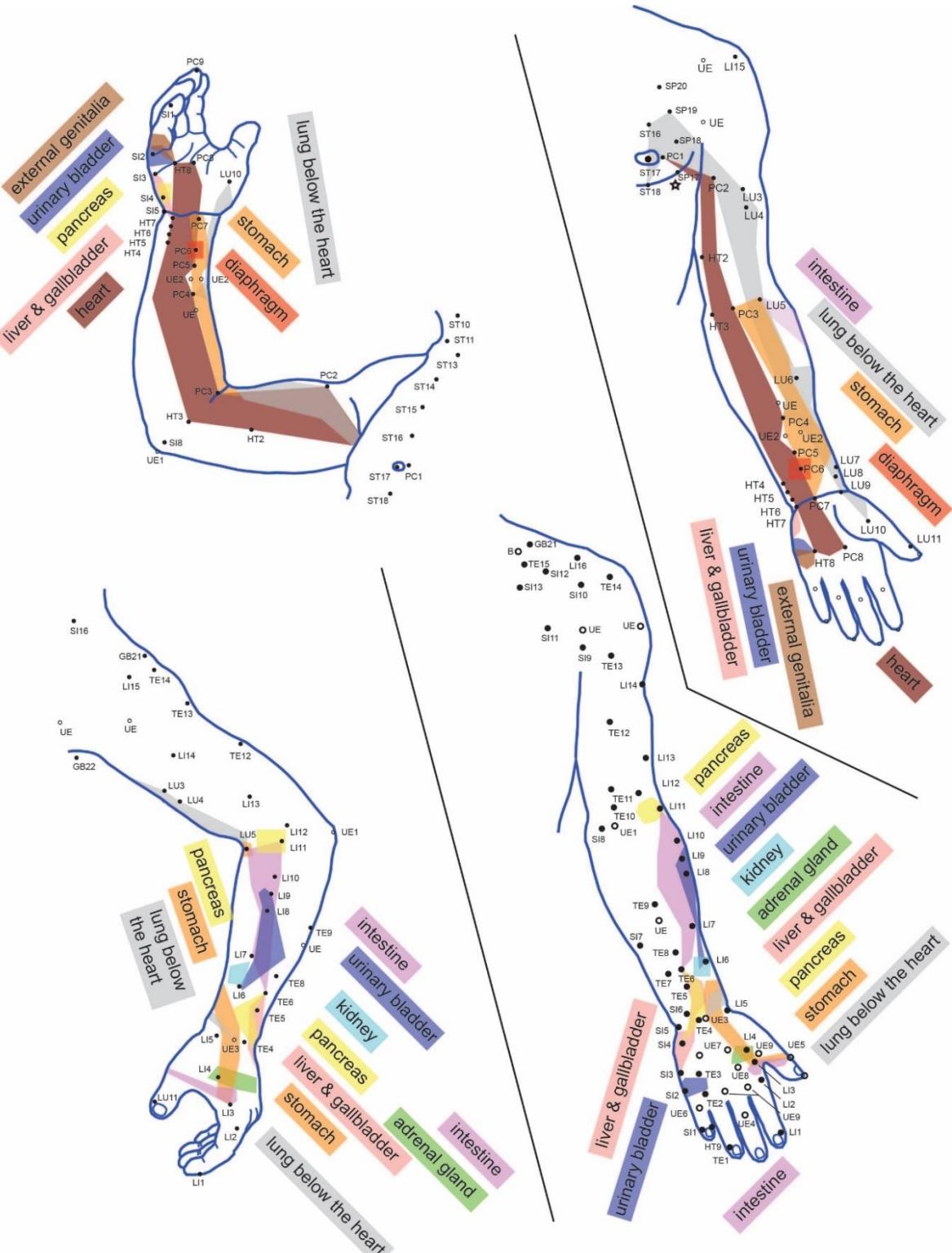
Acupoints which can influence and change the activity of the stomach are mainly distributed on the anterior median (between the radial and the ulnar bones) forearm, slightly towards the lateral (radial) side, and the region rotates outwards towards the posterior (back of the) lateral (radial) hand near the radial styloid process.

The region covered by acupoints corresponding to the liver and the gallbladder extends from the 1/4 distal posterior median (between the radial and the ulnar bones) forearm towards the posterior (back of the) medial (ulnar) hand (the 5th metacarpal bone) and then rotates around the 5th metacarpal bone to the medial (ulnar) palm. This region is adjacent to the stomach representing region above on the distal lateral (radial) forearm near the wrist joint.

The region covered by acupoints corresponding to the pancreas extends from the 1/4 distal posterior median (between the radial and the ulnar bones) forearm towards the posterior (back of the) medial (ulnar) hand (the 5th metacarpal bone) and then rotates around the 5th metacarpal bone to the medial (ulnar) palm. In addition, the acupoint, LI11 (Quchi, 曲池), on the posterior proximal forearm near the elbow joint, is often used to activate the function of pancreas. This

discrete point is adjacent to the stomach representing region in the proximal lateral (radial) forearm near the elbow joint.

The representing region of the adrenal gland is only one point, LI4 (Hegu, 合谷; suspected, Appendix 6), on the lateral (radial) back of the hand.



**Figure 3.2.5 the classification of upper limb long-distance acupoints related with viscera.**  
Black dots or circles (Extra points) represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.

The representing region of kidney is only one acupoint, LI6 (Pianli, 偏历), in the 1/4 distal posterior lateral (radial) forearm.

The representing region of the urinary bladder starts from the posterior lateral forearm below the elbow joint and extends to the 1/4 distal posterior lateral (radial) forearm. Meanwhile, another two acupoints, SI2 (Qiangu, 前谷) and HT8 (Shaofu, 少府), are separated from the main representing region. These two acupoints are adjacent to the regions corresponding to the liver and the gallbladder on the posterior (back of the) hand and the external genitalia representing region in the palm. In fact, these two acupoints are on the extended line (from posterior proximal lateral forearm to the posterior distal medial forearm) of the representing region of the urinary bladder on the forearm.

The regions corresponding to the intestine starts from the posterior lateral forearm below the elbow joint and extends to the 1/4 distal lateral posterior (radial) forearm. This region is connected to the stomach representing region at the acupoint LU5 (Chize, 尺泽) on the proximal anterior lateral (radial) forearm. Another small discrete region is on the posterior (back) lateral (radial) hand, connected to the stomach representing region at the acupoint LI3 (Sanjian, 三间).

The internal genitalia representing region does not exist on the upper limb. It is also possibly only one single point, LI4 (Hegu, 合谷), on the back of the hand (suspected, **Appendix 6**).

The external genitalia representing region is only one single point, HT8 (Shaofu, 少府), on the medial (ulnar) palm.

We draw the following two conclusions from the discussion about the acupoints on the (anterior, posterior and side of) trunk: 1) the distribution of acupoints shows topographic maps along the Axis of Acupoints on the Posterior Trunk (AAPT) and the Axis of Acupoints on the Anterior Trunk (AAAT); 2) the segmental areas of acupoint groups corresponding to neighboring (adjacent) inner organs (or the head regions) share overlapping regions with each other (**Figure 3.2.3** and **Figure 3.2.4**). We notice that the region representing the lung surrounds the heart representing region on the anterior and the posterior trunk, and it extends downward (the upper region likely corresponds to the throat and trachea). For instance, acupoints, KI22 (Bulang, 步廊), BL17 (Geshu, 脾俞), and BL46 (Geguan, 膻关) are all below the heart representing region, but they still correspond to the lung. Based on this, we propose **one hypothesis** about the distribution of acupoints on the upper limb here **that upper limb acupoints corresponding to the lung are comparable to those trunk acupoints, which correspond to the lung but are located below the heart representing region.**

In addition, the numbers of upper limb long-distance acupoints corresponding to the viscera, including the spleen and its following inner organs in the **standard order**, are significantly small. Meanwhile, because the acupoints representing the intestine are adjacent to those acupoints corresponding to the stomach, the liver, the gallbladder, and the pancreas, we think these (intestine representing) acupoints correspond to the digestive tract from the pylorus to the ileocecal conjunction (or in short, the small intestine).

Next, we analyze the distribution pattern of upper limb long-distance acupoints related with the viscera.

Let us observe the acupoints in the following order, starting from the anterior medial (ulnar) forearm to the anterior lateral (radial) forearm, continuing from the posterior lateral (radial) forearm to the posterior medial (ulnar) forearm. Or more specifically, we observe the acupoints along the Acupoint Posterior Axis of the Upper Limb (APAUL) (**Figure 3.1.1**). We find that the acupoints are functionally corresponding to the lung (“**lung above the heart**”, **but it doesn't exist here; named as “the absent lung above the heart”**), the heart, (the lung, it is the lung representing region hypothesized to be below the heart ; in short “**lung below the heart**”), the diaphragm, the stomach, the liver, the gallbladder, (the spleen, it doesn't exist here; named as “**the absent spleen**”), the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine (**incomplete, we think it is the small intestine**), the internal genitalia (**only one acupoint or absent**), and the external genitalia (**only one acupoint**) in this order (**Figure 3.2.5**).

We will explain the hypothesis and the conclusion above in detail as follow (**Appendix 5**).

### **Point 3.2.1,**

For the acupoints distributed along the Acupoint Posterior Axis of the Upper Limb (APAUL), their functions are overall corresponding to the lung (“**lung above the heart**”), the heart, the lung (“**lung below the heart**”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (the order from the lung (“**lung below the heart**”), the diaphragm to the stomach varies; see **Point 3.2.2**). But acupoints corresponding to some of the viscera, such as the spleen and the internal genitalia, do not exist (**Figure 3.2.5** and **Table 3.2.5**).

### **Point 3.2.2,**

Acupoints corresponding to different inner organs and in adjacent regions (especially for those close to boundaries) share some of the same functions. For example, PC6 (Neiguan, 内关) and PC7 (Daling, 大陵) correspond to the stomach and the heart at the same time.

### **Point 3.2.3,**

The absent visceral representing regions mentioned above, such as “**the absent lung above the heart**”, possibly exist in the corresponding location but have not been found clinically. For instance, the representing region of the spleen will be in in the vicinity of the representing regions of the stomach, the liver, the gallbladder, and the pancreas if the region exists on the upper limb. Of course, these “absent regions” may not exist on the upper limb at all. We will explain the reason for the absence of these regions at the end of this chapter in the section of the acupoint distribution model.

### **Point 3.2.4,**

The region “**lung below the heart**” largely overlaps with the representing region of the stomach and it is adjacent to the heart representing area. We can draw the conclusion of the corresponding relationship in **Point 3.2.1** when the region “**lung below the heart**” is hypothesized to be the lung representing region below the representing region of the heart (“**lung above the heart**” corresponds to the throat and trachea, see the discussion about the lower limb acupoints). Therefore, we proposed the hypothesis in the discussion above.

### **Point 3.2.5,**

Some of the acupoints on the distal (mainly) posterior upper limb are corresponding to the head and viscera at the same time. We think that this corresponding relationship is related with the needling depth. More specifically, the shallow layer of these acupoints corresponds to the head regions, the deep layer related to the viscera (note: 1 we will explain this in the following section of acupoint distribution model, but not using the three-layer theory (三才刺理论) of the TCM; 2 deeper inserting needles can stimulate the acupoints on the anterior upper limb. For instance, the needling method of penetrating from TE5 (Waiguan, 外关) to PC6 (Neiguan, 内关) is often used clinically. Later we are going to explain this with our acupoint distribution model instead of the TCM Yin-Yang doctrine (阴阳理论).) For instance, shallow needling of acupoint, LI4 (Hegu, 合谷), is used to cure diseases of Frontal Head while deep needling of the same acupoint is applicable to digestive disorders of the stomach and intestine (reference [9]).

### **Point 3.2.6,**

Upper limb long-distance acupoints are functionally aligned in the **standard order** along the Acupoint Axis of the Upper Limb (AAUL) when the posterior upper limb acupoints related with the head are taken into consideration. In another word, these long-distance acupoints together form the Topographic Map of the Acupoint Axis of the Upper Limb (TM - AAUL). This distribution pattern is consistent with the early development pattern of vertebrate, the segmental projection of nerves, and the alignment of the blood vessels (along the midline of the body) (Chapter 2).

### 3.2.4.2 Lower Limbs Long-distance Acupoints with Functions Related to Viscera

We classify the lower limb long-distance acupoints with the same method above. For instance, acupoints ST42 (Chongyang, 冲阳), ST44 (Neiting, 内庭), SP2 (Dadu, 大都), SP3 (Taibai, 太白), SP4 (Gongsun, 公孙), SP5 (Shangqiu, 商丘), LR3 (Taichong, 太冲), ST36 (Zusanli, 足三里), and ST34 (Liangqiu, 梁丘) can influence the function of the stomach. Therefore, they are classified as one acupoint group corresponding to the stomach. The details result of the classification shows in the following table (**Table 3.2.6**).

**Table 3.2.6** classification of the lower limb long-distance acupoints related with the viscera

| viscera                 | acupoints with functions related with the inner organ   | note               |
|-------------------------|---|--------------------|
| lung above the heart *  | KI1 (Yongquan, 涌泉), KI2 (Rangu, 然谷), KI3 (Taixi, 太溪), KI4 (Dazhong, 大钟), KI6 (Zhaohai, 照海), and ST40 (Fenglong, 丰隆)   |                    |
| heart                   |   | SP4 (Gongsun, 公孙)? |
| lung below the heart ** |   | absent             |
| diaphragm               | SP3 (Taibai, 太白)  |                    |
| stomach                 | ST42 (Chongyang, 冲阳), ST44 (Neiting, 内庭), SP2 (Dadu, 大都), SP3 (Taibai, 太白), SP4 (Gongsun, 公孙), SP5 (Shangqiu, 商丘), LE6 (Dannang, 胆囊), ST36 (Zusanli, 足三里), and ST34 (Liangqiu, 梁丘)  |                    |
| liver and gallbladder   | LR3 (Taichong, 太冲), LR4 (Zhongfeng, 中封), SP5 (Shangqiu, 商丘), GB40 (Qixu, 丘墟), GB41 (Zulinqi, 足临泣), GB42 (Diwuhui, 地五会), GB43 (Xiaxi, 侠溪), GB38 (Yangfu, 阳辅), GB39 (Xuanzhong, 悬钟), GB35 (Yangjiao, 阳交), GB36 (Waiqiu, 外丘), LE6 (Dannang, 胆囊), GB34 (Yanglingquan, 阳陵泉), and SP9 (Yinlingquan, 阴陵泉)                            |                    |
| spleen                  | SP1 (Yinbai, 隐白) and SP10 (Xuehai, 血海)  |                    |
| pancreas                |   | absent?            |
| adrenal gland           | SP6 (Sanyinjiao, 三阴交) and ST36 (Zusanli, 足三里)   |                    |
| kidney                  | KI3 (Taixi, 太溪), KI4 (Dazhong, 大钟), KI8 (Jiaoxin, 交信), KI7 (Fuliu, 复溜), SP6 (Sanyinjiao, 三阴交), LR5 (Ligou, 蠕沟), SP7 (Lougu, 漏谷), SP8 (Diji, 地机), SP9 (Yinlingquan, 阴陵泉), ST36 (Zusanli, 足三里), LR8 (Ququan, 曲泉), and BL58 (Feiyang, 飞扬)  |                    |
| urinary bladder         | LR1 (Dadun, 大敦), LR2 (Xingjian, 行间), LR3 (Taichong, 太冲), LR4 (Zhongfeng, 中封), KI6 (Zhaohai, 照海), KI5 (Shuquan, 水泉), KI3 (Taixi, 太溪), SP6 (Sanyinjiao, 三阴交), LR5 (Ligou, 蠕沟), KI9 (Zhulin, 筑宾), SP7 (Lougu, 漏谷), SP8 (Diji, 地机), SP9 (Yinlingquan, 阴陵泉), LR8 (Ququan, 曲泉), KI10 (Yingu, 阴谷), LR9 (Yinba, 阴包), SP11 (Jimen, 箕门) |                    |

|   |  |  |
|---|--|--|
|   | 门), LR10 (Zuwuli, 足五里), and LR11 (Yinlian, 阴廉)   |  |
| intestine   | SP1 (Yinbai, 隐白), SP2 (Dadu, 大都), SP3 (Taibai, 太白), SP4 (Gongsun, 公孙), SP5 (Shangqiu, 商丘), ST44 (Neiting, 内庭), ST43 (Xiangu, 陷谷), ST41 (Jiexi, 解溪), LR4 (Zhongfeng, 中封), KI8 (Jiaoxin, 交信), KI7 (Fuliu, 复溜), SP6 (Sanyinjiao, 三阴交), SP8 (Diji, 地机), SP9 (Yinlingquan, 阴陵泉), SP7 (Lougu, 漏谷), LR5 (Zhongdu, 中都), ST39 (Xiajuxu, 下巨虚), ST38 (Tiaoku, 条口), ST37 (Shangjuxu, 上巨虚), ST36 (Zusanli, 足三里), LE7 (Lanwei, 阑尾), BL38 (Fuxi, 浮郄), BL40 (Weizhong, 委中) and BL57 (Chengshan, 承山)  |  |
| internal genitalia                                  | SP1 (Yinbai, 隐白), LR1 (Dadun, 大敦), LR2 (Xingjian, 行间), LR3 (Taichong, 太冲), KI2 (Rangu, 然谷), LR4 (Zhongfeng, 中封), KI6 (Zhaohai, 照海), KI7 (Fuliu, 复溜), KI3 (Taixi, 太溪), KI4 (Dazhong, 大钟), KI5 (Shuiquan, 水泉), KI8 (Jiaoxin, 交信), SP6 (Sanyinjiao, 三阴交), LR5 (Ligou, 蠕沟), SP7 (Lougu, 漏谷), LR5 (Zhongdu, 中都), SP8 (Diji, 地机), ST36 (Zusanli, 足三里), SP9 (Yinlingquan, 阴陵泉), LR8 (Ququan, 曲泉), KI10 (Yingu, 阴谷), LR9 (Yinbao, 阴包), SP10 (Xuehai, 血海) SP11 (Jimen, 箕门), BL55 (Heyang, 合阳), LR10 (Zuwuli, 足五里), and LR11 (Yinlian, 阴廉) |  |
| external genitalia                                  | LR1 (Dadun, 大敦), LR2 (Xingjian, 行间), LR3 (Taichong, 太冲), LR4 (Zhongfeng, 中封), KI2 (Rangu, 然谷), KI6 (Zhaohai, 照海), KI5 (Shuiquan, 水泉), KI4 (Dazhong, 大钟), KI8 (Jiaoxin, 交信), SP6 (Sanyinjiao, 三阴交), LR5 (Ligou, 蠕沟), LR5 (Zhongdu, 中都), LR8 (Ququan, 曲泉), SP9 (Yinlingquan, 阴陵泉), KI10 (Yingu, 阴谷), LR9 (Yinbao, 阴包), BL55 (Heyang, 合阳), LR10 (Zuwuli, 足五里), LR11 (Yinlian, 阴廉), and LR12 (Jimai, 急脉)   |  |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |  |

The representing region of the lung (“**lung above the heart**”) starts from the bottom (plantar side) of the foot (KI1 (Yongquan, 涌泉)), extends medially to the medial ankle, then upward backwards from the navicular bone, rotates around the Achilles tendon, extends upward anteriorly, and ends at the midpoint of the anterior crus (**Figure 3.2.6** and **Table 3.2.6**).

Acupoints corresponding to the diaphragm are in the region medial to the distal end of the 1st metatarsal bone (near the intersection of the plantar side and the dorsum of the foot).

Acupoints which influence and change the activity of the stomach are distributed in a large area which lies overall above the representing region of the lung (“lung above the heart”). This region starts from the dorsum of the foot, distal end of the 1st and the 2nd metatarsal bones, extends along the medial cuneiform and the navicular bone, continues from the medial ankle upward backward, rotates around the Achilles tendon, extends upward anteriorly, crosses the anterior lateral crus medially and upward, and ends near the lateral region above the upper edge of the patella.

The region corresponding to the liver and the gallbladder starts from the dorsum of the foot, between the 2nd and the 3rd metatarsal bones, extends along the medial cuneiform and the navicular bone, continues from the medial ankle upward backward, rotates around the Achilles tendon, extends upward anteriorly, crosses the anterior lateral crus medially and upward, and ends near the medial upper edge of the tibia. Meanwhile, the initial region on the dorsum of the foot extends slightly laterally to the 4th metatarsal bone.

The representing regions of the spleen, the pancreas, and the adrenal gland look quite discrete due to the low number of acupoints.

The representing region of the spleen starts from the first toe, extends upward from the region between the 1st and the 2nd metatarsal bones, continues along the medial cuneiform and the navicular bone, extends from the medial ankle upward backward, rotates around the Achilles tendon, extends upward anteriorly, and ends near the medial region above the upper edge of the patella.

The representing region of the pancreas starts from the dorsum of the foot, the proximal end of the 2nd metatarsal bone, extends along the medial cuneiform and the navicular bone, continues from the medial ankle upward backward, rotates around the Achilles tendon, extends upward anteriorly, and ends near the medial region above the upper edge of the patella.

The representing region of the adrenal gland starts from the medial crus above the ankle joint (1/5 distal end of medial crus; SP6 (Sanyinjiao, 三阴交)), extends upward backward, rotates around the Achilles tendon, extends upward anteriorly, and ends near the 1/5 proximal end of the anterior crus (ST36 (Zusanli, 足三里)).

The representing region of the kidney starts from the region below the medial ankle joint, extends along the medial crus upward, and ends at the proximal end of medial crus (the knee joint).

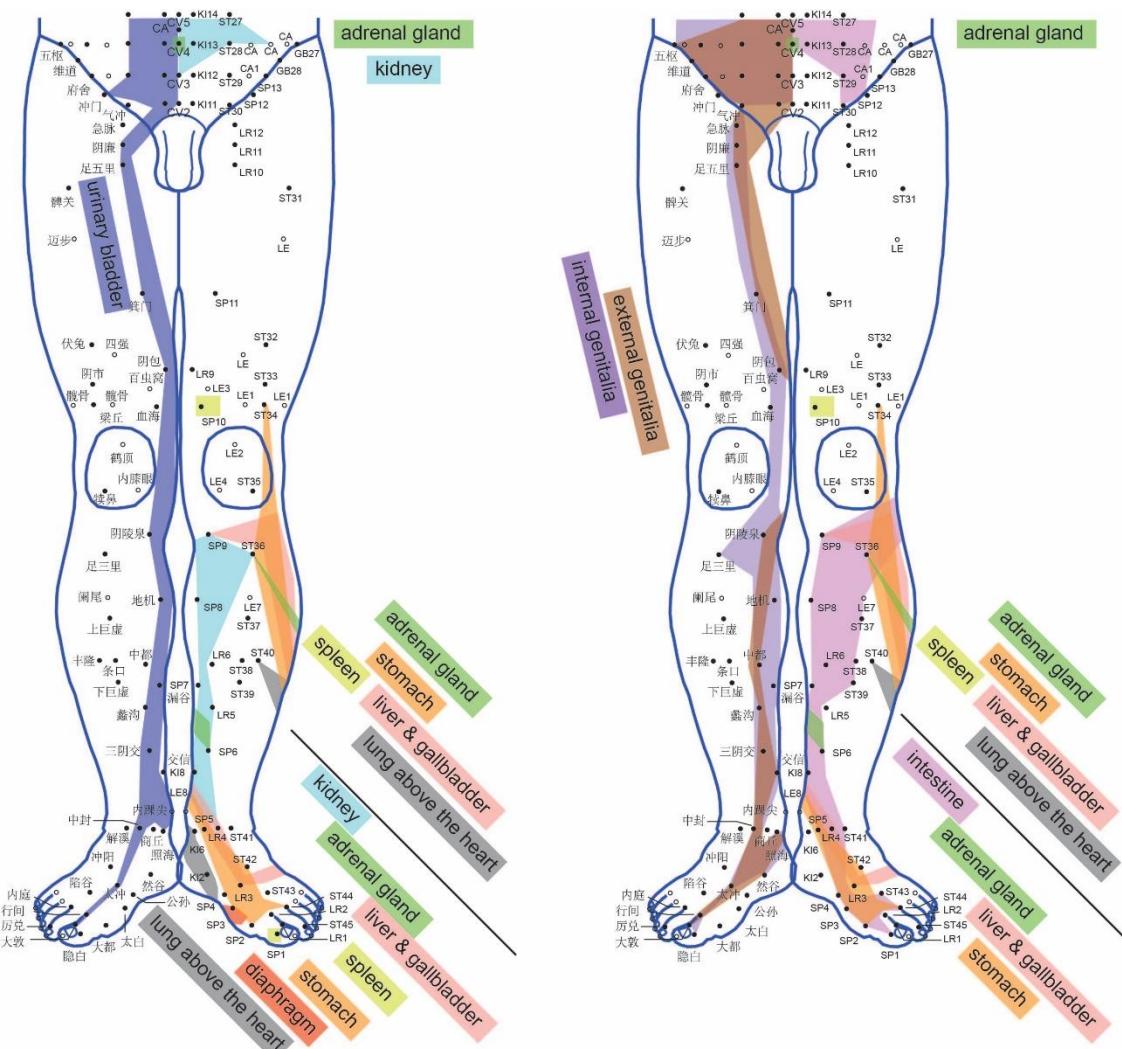
The representing area of the urinary bladder starts from the dorsum of the foot, the 1st toe, extends along the dorsum of the foot and the medial crus upward to the proximal end of the medial crus (the knee joint), and continues upward to the hip joint merging with the urinary bladder representing region on the anterior trunk. Another small branch of the representing area enters and ends in the popliteal fossa from the medial knee joint.

The representing area of the intestine starts from the dorsum of the foot, the 1st toe, extends between the 1st and the 2nd metatarsal bones upwards, continues along the medial crus upward to the knee joint, and enters the popliteal fossa from the medial knee joint. Another small branch extends upward backward from the medial ankle joint, rotates around the Achilles tendon (only about 90°), and ends at the midpoint of the posterior crus.

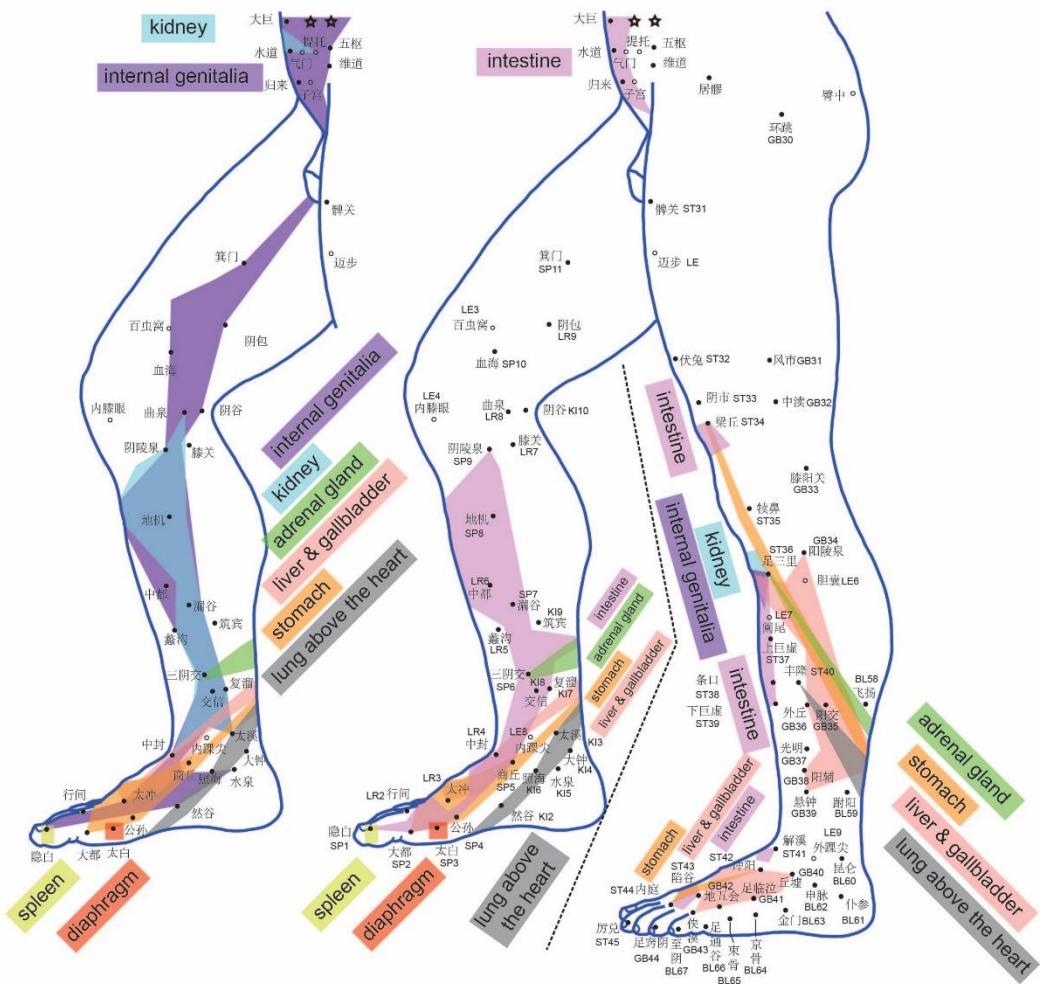
The representing area of the internal genitalia starts from the dorsum of the foot, the 1st toe, extends between the 1st and the 2nd metatarsal bones upwards, continues along the medial crus upward to the hip joint, and merges with the representing area of the internal genitalia on the anterior trunk.

The representing area of the external genitalia starts from the dorsum of the foot, the 1st toe, extends between the 1st and the 2nd metatarsal bones upwards, continues along the medial crus upward to the hip joint, and merges with the representing area of the external genitalia on the anterior trunk.

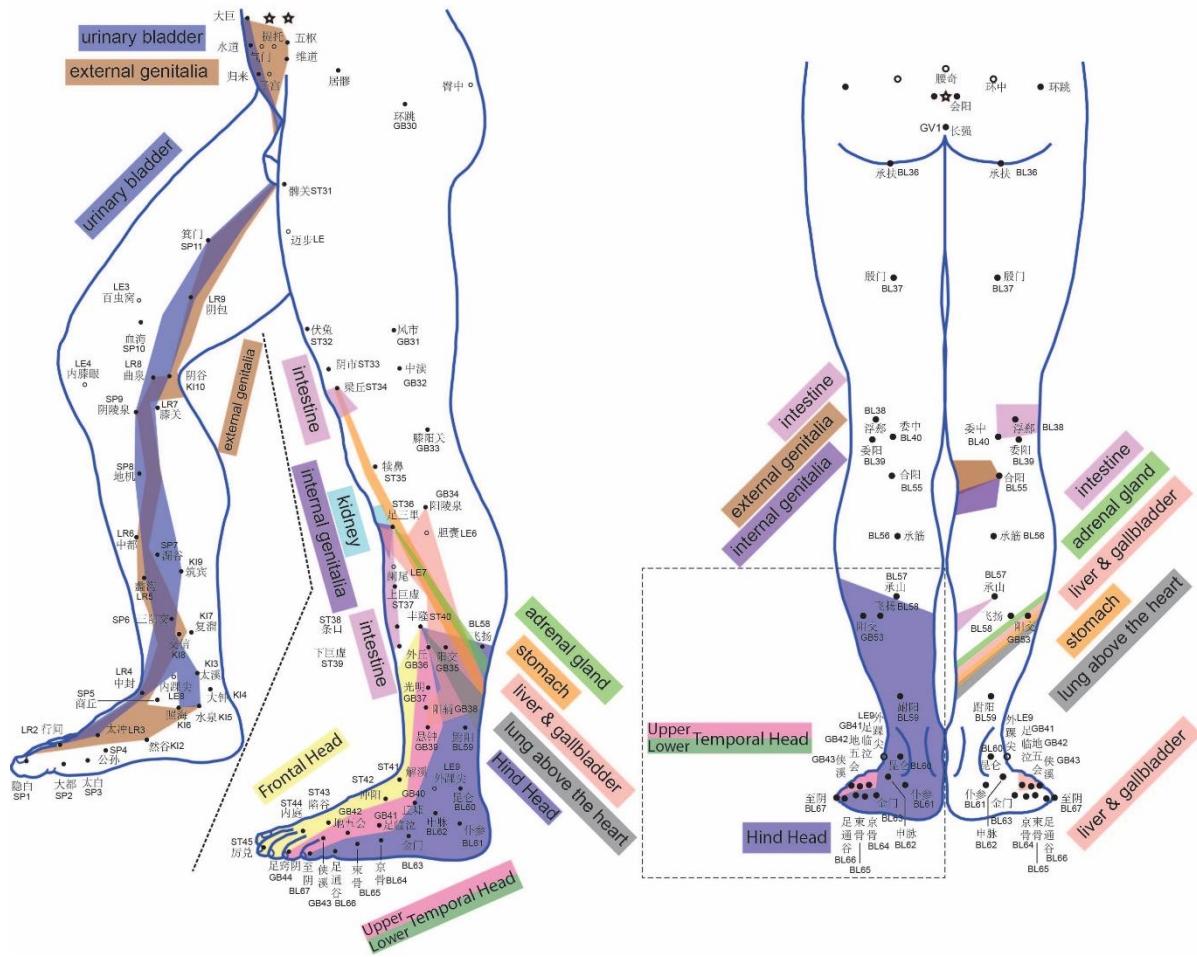
One small branch of the representing area of the internal (and external) genitalia rotates from the medial knee joint laterally and enters the popliteal fossa. Additionally, the representing area of the internal (and external) genitalia on the dorsum of the foot has another small branch extending to the medial ankle joint but not rotating around the Achilles tendon.



**Figure 3.2.6.1 the classification of lower limb long-distance acupoints related with viscera.**  
 Black dots or circles (Extra points) represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.6.1**, **Figure 3.2.6.2**, and **Figure 3.2.6.3**.



**Figure 3.2.6.2 the classification of lower limb long-distance acupoints related with viscera.**  
 Black dots or circles (Extra points) represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.6.1**, **Figure 3.2.6.2**, and **Figure 3.2.6.3**.



**Figure 3.2.6.3 the classification of lower limb long-distance acupoints related with viscera.** Black dots or circles (Extra points) represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. For visualization, some colored regions are shown separately in **Figure 3.2.6.1**, **Figure 3.2.6.2**, and **Figure 3.2.6.3**.

Next, we analyze the overall distribution pattern of lower limb long-distance acupoints related with the viscera.

Let us observe the acupoints in the following order, starting from the lowest point of the medial tuber calcaneus upwards and anteriorly to the posterior process of the talus and the highest point of the talus. More specifically, we observe the acupoints along the Acupoint Posterior Axis of the Lower Limb (APALL). We find that the long-distance acupoints are functionally corresponding to the lung (“**lung above the heart**”), (**the heart, does not exist here; named as “the absent heart”**), (**the “lung below the heart”, absent**), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia in this order (**Figure 3.2.6** and **Appendix 4**).

We will explain the hypothesis and the conclusion above in detail as follow.

### **Point 3.3.1,**

For the acupoints distributed along the Acupoint Posterior Axis of the Lower Limb (APALL), their functions are overall corresponding to the lung (“lung above the heart”), the heart, the lung (“lung below the heart”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (**Figure 3.2.6**). But acupoints corresponding to some of the inner organs, like the heart (or SP4 (Gongsun, 公孙)), do not exist.

### **Point 3.3.2,**

Acupoints corresponding to different inner organs and in adjacent regions (especially for those close to boundaries) share some of the same functions. For example, SP3 (Taibai, 太白) corresponds to the stomach and the diaphragm at the same time (**Figure 3.2.6**).

### **Point 3.3.3,**

The absent visceral representing regions mentioned above, like “**the absent heart**”, possibly exist in the corresponding location but have not been found clinically. The representing region of the heart will be between the representing regions of the lung (“**lung above the heart**”) and the stomach if the region exists on the lower limb (like SP4 (Gongsun, 公孙); “**the absent heart**” region extending along the medial 1st metatarsal bone and the navicular bone upward backward, rotating around the Achilles tendon, extending upward anteriorly, and ending above the midpoint of the anterior crus.). Of course, these “absent regions” may not exist on the lower limb at all. We will explain the reason for the absence of these regions in the discussion about the acupoint distribution model at the end of this chapter.

#### **Point 3.3.4,**

The representing regions of the lung (“lung below the heart”), the stomach, the liver, the gallbladder, the spleen, the pancreas (**not obvious for the spleen and the pancreas due to the low number of the corresponding acupoints**), and the adrenal gland extend from the medial foot upward backward, rotate around the Achilles tendon and extend upward anteriorly. Therefore, these regions appear to be aligned along the Acupoint Drifting Axis of the Lower Limb (ADALL) on the anterior lateral and posterior crus. In fact, the ADALL and the Acupoint Posterior Axis of the Lower Limb (APALL) share the same orientation, the latter in the extended line of the former and resulting from rotation movement of the former around the Achilles tendon (**Figure 3.1.1**). In contrast, the represent regions of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, extend along the medial crus upward directly without rotation around the crus (or the Achilles tendon).

#### **Point 3.3.5,**

Some of the acupoints on the dorsum of the foot or distal crus correspond to the head region and viscera at the same time. We think that this corresponding relationship is related with the needling depth. More specifically, the shallow layer of these acupoints corresponds to the head, the deep layer related to the viscera (**note: not proved clinically yet**). For instance, shallow needling of acupoint, GB41 (Zulinqi, 足临泣), is used to cure headache and eye diseases while deep needling of the same acupoint is applicable to disorders of gallbladder (**note: not proved clinically yet**). Stimulating the acupoint, LR3 (Taichong, 太冲), in the shallow layer can cure headache, eye diseases, and vertigo while deep needling of the same acupoint is useful for the disorders of the liver, the gallbladder and the internal genitalia (**note: not proved clinically yet**).

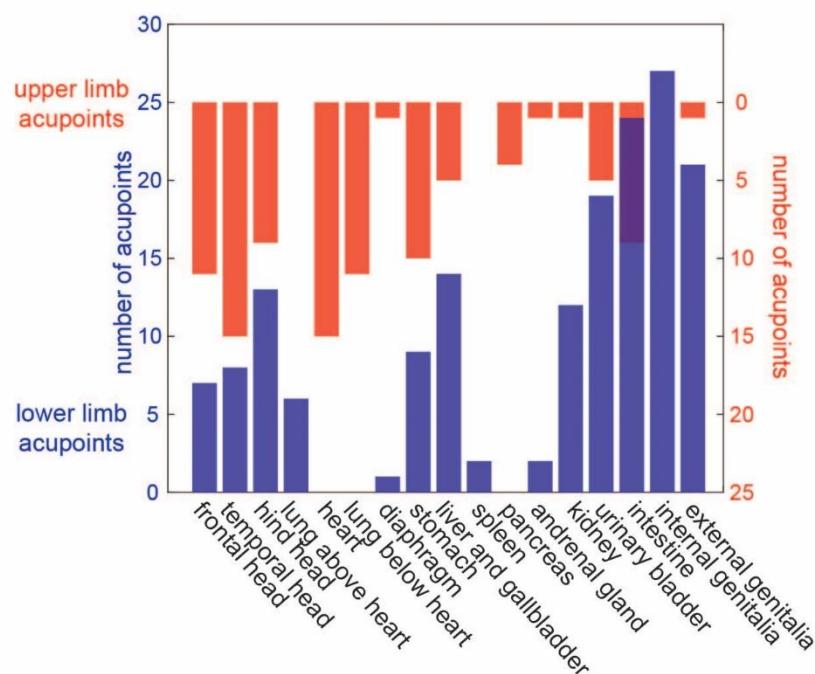
#### **Point 3.3.6,**

The lower limb long-distance acupoints are functionally aligned in the **standard order** along the Acupoint Axis of the Lower Limb (AALL) when the lower limb acupoints related with the head are taken into consideration. In another word, these acupoints jointly form the Topographic Map of the Acupoint Axis of the Lower Limb (TM - AALL). This distribution pattern is consistent with the early development pattern of vertebrate, the segmental projection of nerves, and the alignment of the blood vessels (along the midline of the body) (Chapter 2).

### 3.2.4.3 A Brief Summary of Limb Long-distance Acupoints with Functions Related to Viscera

We see clearly that acupoints on the anterior trunk, the posterior trunk, the upper limb and the lower limb are aligned along the Axis of Acupoints on the Anterior Trunk (AAAT), the Axis of Acupoints on the Posterior Trunk (AAPT), the Acupoint Axis of the Upper Limb (AAUL) and the Acupoint Axis of the Lower Limb (AALL), respectively, corresponding to the viscera with topographic maps. In fact, these axes are exactly defined based on the distribution pattern of the acupoints (In addition, please compare these acupoint axes above and the innervation of the dermatome in **Figure 3.1.1** and **Figure 2.4.5**). We introduced the definitions of these axes in **Chapter 3.1** just for the convenience of discussion.

Meanwhile, we find that more acupoints correspond to the heart, the lung ("lung below the heart") and the stomach on the upper limb while more acupoints are corresponding to the liver, the gallbladder, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia on the lower limb. In another word, there is a complementary relationship between the numbers of acupoints corresponding to the viscera on the upper and the lower limbs, respectively (**Figure 3.2.7**). For instance, nearly all the acupoints corresponding to the heart are on the upper limb but almost none of this kind of acupoints is on the lower limb (or only SP4 (Gongsun, 公孫)). On the contrary, acupoints corresponding to the (internal and the external) genitalia are almost all on the lower limb but almost absent on the upper limb.



**Figure 3.2.7 the numbers of acupoints corresponding to the viscera (and the head) on the upper and the lower limbs are complementary to each other.** The Y axis indicates the number of acupoints from either side of the limbs. The data are from **Table 3.2.2**, **Table 3.2.5**, and **Table 3.2.6**.

We can see that the numbers of acupoints corresponding to the viscera (and the head) on the upper and the lower limbs are complementary to each other when the limb acupoints related with the head are considered (**Figure 3.2.7** and **Appendix 6**).

Furthermore, we need to point it out clearly that in this book we **did not** analyze the following acupoints and functions:

#### **Point 3.4.1,**

Acupoints related with mental disorders (Shenzhibing, 神志病) or diseases of the nervous system, such insomnia, schizophrenia, depression, anxiety, and lethargy. Most of these diseases are not caused by disorders of specific viscera but related with the central nervous system directly. Therefore, they are not discussed in the main body of this book (see discussions in **Appendix 1**).

#### **Point 3.4.2,**

The functions of acupoints near the tips of the fingers and toes. Most of these acupoints have the function of “Xing Nao Kai Qiao” (awakening the brain and opening orifices according to the TCM, 醒脑开窍) likely due to the dense sensory nerve fibers in these regions. We do not know how to define the function, “Xing Nao Kai Qiao”, from the perspective of biology. Therefore, this function is not discussed in this book.

#### **Point 3.4.3,**

The detailed corresponding relationship of acupoints with the small intestine and the large intestine. The intestine was not discussed in detailed sections of the jejunum, the ileum, the colon, and the rectum due to the limit knowledge of the author about the digestive tract. Here we need to point it out that in the **standard order**, 1) the small intestine is closely adjacent (posterior) to the stomach, the liver, the gallbladder, and the pancreas while the large intestine lies closer to the internal genitalia; 2) the small and the large intestine occupy the whole region from the areas below the stomach, the liver, the gallbladder and so on till to the reproductive system (internal and external genitalia).

### 3.3 The Acupoint Distribution Model

After the discussion of the distribution patterns of the trunk and limb acupoints, we propose the acupoint distribution model of this book in this section.

#### 3.3.1 The Acupoint Distribution Model

##### 3.3.1.1 Acupoints on the Head and the Posterior Trunk

Along the Axis of Acupoints on the Posterior Trunk (AAPT), the acupoints are functionally aligned in the **standard order**, showing the Topographic Map of the Axis of Acupoints on the Posterior Trunk (TM - AAPT) (**Figure 3.2.3** and **Figure 3.3.4**).

In this distribution model, the spinal column can be regarded as a reference and the skull is considered as two “special vertebrae”, the “special vertebra 0” deriving from neural crest cells and the “special vertebra 1” developed from the paraxial mesoderm (see Chapter 2.1). The former is mainly innervated by the cranial nerves (the trigeminal nerve and the facial nerve) while the latter is mainly projected by the cervical nerves (C1 - C3). In terms of muscles, the acupoints on the posterior trunk lie in the epaxial muscles. During the embryogenesis, these muscles derive from the mesodermal epimere. Regarding the innervation, these acupoints are in the regions projected by the posterior rami of the spinal nerves.

##### 3.3.1.2 Acupoints on the Anterior Trunk and Limbs

###### Acupoints on the Anterior Trunk

Along the Axis of Acupoints on the Anterior Trunk (AAAT), the acupoints are functionally aligned in the **standard order**, showing the Topographic Map of the Axis of Acupoints on the Anterior Trunk (TM - AAAT) (**Figure 3.2.4** and **Figure 3.3.4**). Meanwhile, compared with the posterior trunk acupoints with the same functions, the vertical locations of the anterior trunk acupoints are relatively lower (**Appendix 8**). For instance, posterior trunk acupoints corresponding to the adrenal gland (GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), and BL24 (Qihai, 气海俞)) are largely on the same vertical level as the navel, but the counterpart on the anterior trunk (CV6 (Qihai, 气海) and CV4 (Guanyuan, 关元)) lies mainly below the navel.

In terms of muscles, the anterior trunk acupoints lie in the hypaxial muscles. During the embryogenesis, these muscles derive from the mesodermal hypomere. Regarding the innervation, these acupoints are in the regions projected by the anterior rami of the spinal nerves.

### *Upper Limb Acupoints*

On the upper limb, representing regions of the Frontal Head, the Temporal Head, and the Hind Head extend from the back of the hand along the posterior upper limb towards the elbow joint. The relative locations of these three regions are aligned lateromedially (from the radial side towards the ulnar side).

The representing region of the heart extends from the armpit along the anterior medial (ulnar) upper limb to the center of the palm. Meanwhile, this region extends reversely towards the chest region on the anterior trunk and connects with the heart representing area in the chest region. The representing region of the diaphragm is in the distal region of the median anterior forearm, close to the wrist. The representing area of the lung ("lung below the heart") extends from the proximal upper limb along the anterior lateral (radial) upper limb and rotates towards the lateral side of the back of the hand from above the radial styloid process. The representing region of the stomach extends from the proximal anterior forearm along the anterior median (between the radial and the ulnar bones) forearm towards the distal end and rotates towards the lateral side of the back of the hand from above the radial styloid process.

The regions representing the other viscera, including the liver and other following inner organs in the **standard order**, rotate and extend overall from the lateral elbow joint via the ulnar styloid process of the distal forearm towards the anterior midpoint of the 5th metacarpal bone. But due to the small number of acupoints, 1) acupoints corresponding to the liver, the gallbladder and the pancreas are mainly located between the 1/4 distal end of the posterior forearm and the anterior midpoint of the 5th metacarpal bone; 2) Acupoints corresponding to the spleen and the adrenal gland are overall absent (or only a few acupoints like LI4 (Hegu, 合谷)); 3) The representing area of the kidney has a few acupoints, distributed on the 1/4 distal end of the posterior lateral (radial) forearm sparsely; 4) The representing area of the urinary bladder almost keeps the entire pattern, rotating and extending from the lateral elbow joint via the ulnar styloid process of the distal forearm towards the anterior midpoint of the 5th metacarpal bone. But the pattern in the 1/4 distal end of the posterior forearm has been disrupted by the representing areas of the liver, the gallbladder, and the pancreas; 5) The representing area of the intestine extends from the lateral elbow joint to the 1/4 distal end of the posterior lateral (radial) forearm; 6) The representing area of the internal genitalia likely does not exist on the upper limb. The region should be located medial to the intestine representing area if it exists (this is one reason why we think that LI4 (Hegu, 合谷) corresponds to the adrenal gland; **Appendix 6**); 7) Only the distal end (near the 5th metacarpal bone) of the representing area of the external genitalia exists (**Table 3.3.1** and **Figure 3.3.4**).

In terms of the muscles, the upper limb acupoints are in muscles of the upper limb. During the embryogenesis, these muscles derive from the mesodermal hypomere, homologous to the hypaxial muscles of the anterior trunk. Regarding the innervation, these acupoints are in the regions projected by the anterior rami of the brachial plexus (cervical nerves C5 - C8, thoracic nerve T1).

To better describe the distribution model of acupoints on the upper limb, we simulate the upper limb using a frustum in 3-dimension and the topographic map of the upper limb acupoints with a series of conic helixes (**Figure 3.3.1**, **Figure 3.3.2**, and **Appendix 7**).

$\theta$ : the intersecting angle of the geometric projection of point A on the lower circular base and the X axis

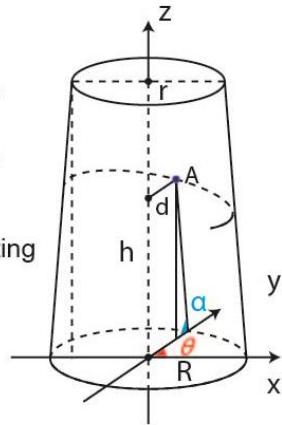
r and R: the radii of the circular bases

d: the distance between the point A and the axis

$\alpha$ : the angle between the lateral surface and the lower circular base

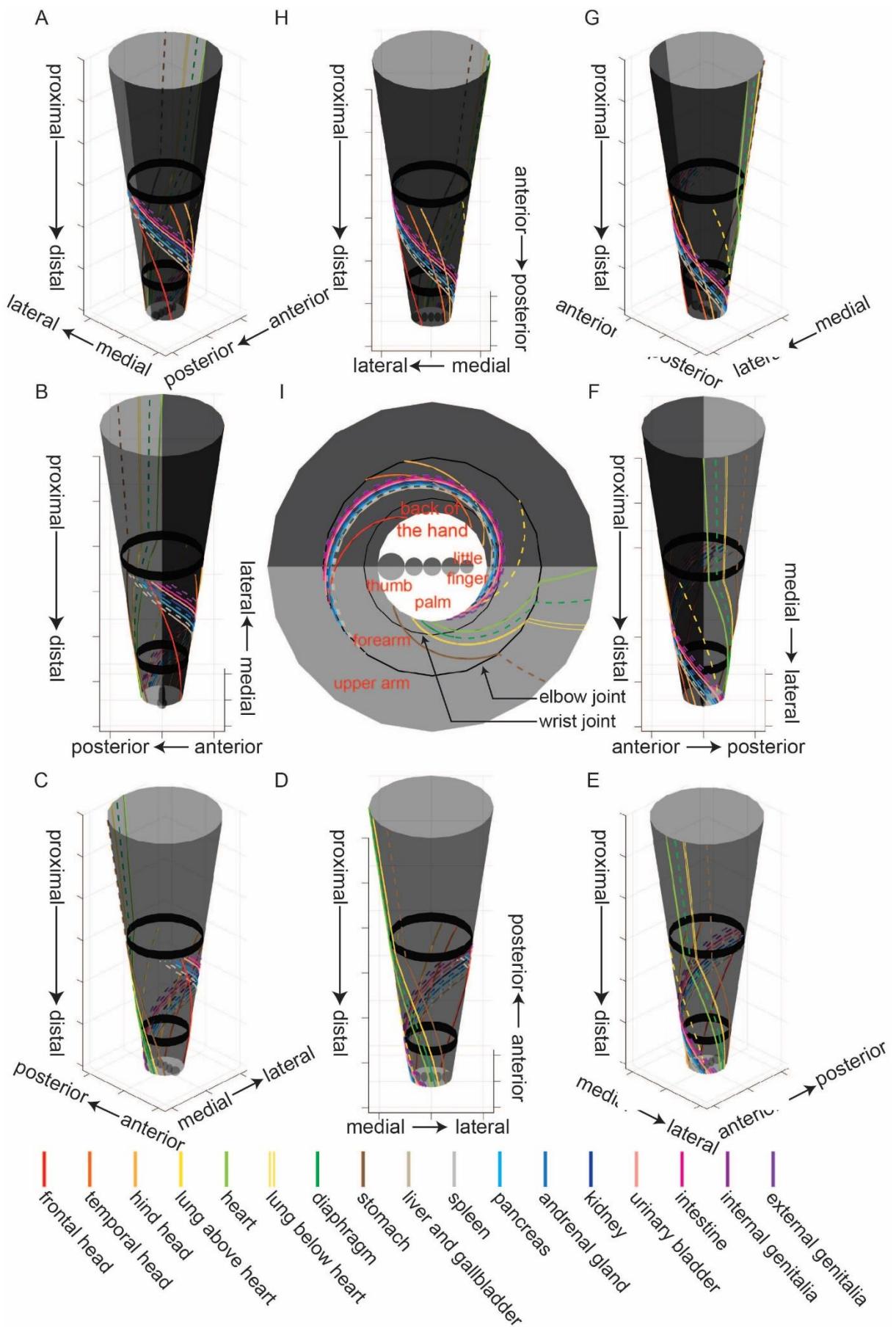
k and m: parameters of the linear function for fitting data

$$\begin{cases} x = (R-(k\theta+m)) \cdot \cot(\alpha) \cdot \cos(\theta+\theta_0) \\ y = (R-(k\theta+m)) \cdot \cot(\alpha) \cdot \sin(\theta+\theta_0) \\ z = k\theta+m \end{cases}$$



**Figure 3.3.1 the 3-D conic helix function**

**Figure 3.3.2 the distribution of left upper limb acupoints in a 3-D model.** The representing regions of the Frontal Head, the Temporal Head, the Hind Head, and viscera are indicated with different colors. The dished lines indicate that the representing areas of these inner organs have not been found clinically. Meanwhile, the representing areas of these inner organs will be in the dashed line areas if they exist. (A) - (H) show the distribution of left upper limb acupoints in the 3-D model, corresponding to the view angles 45° (posterior lateral), 90° (lateral), 135° (anterior lateral), 180° (anterior), 225° (anterior medial), 270° (medial), 315° (posterior medial), and 360° (posterior), respectively. The azimuth view angle of the model is 30°. The upper limb model is in the standard anatomical position, palms facing forward and fingertips (except for the thumb) pointing downwards. (I) The projection plot of the distribution of left upper limb acupoints in the 3-D model. The projecting direction is from the distal end (fingertips) to the proximal end (shoulder joint) of the upper limb. The light and the dark gray areas represent the anterior and the posterior upper limb, respectively. The small and the large black rings indicate the wrist and the elbow joints, respectively.



**Table 3.3.1** distribution pattern of upper limb long-distance acupoints in the model

| viscera (or the head)   | distributing regions in brief   | note  |
|---|---|---|
| Frontal Head, Temporal Head, and Hind Head  | Extends from the back of the hand along the posterior forearm, via the posterior wrist, to the location proximal to the elbow joint   |   |
| lung ("lung above the heart") and heart   | Extends from the shoulder joint along the anterior medial (ulnar) upper limb distally to the center of the palm   | lung ("lung above the heart") absent                        |
| lung ("lung below the heart")   | Extends from the shoulder joint along the anterior lateral (radial) upper limb distally and rotates from the radial styloid process towards the lateral (radial) back of the hand |   |
| diaphragm and stomach   | Extends along the forearm distally between the radial and ulnar bones and rotates from the radial styloid process towards the lateral back of the hand                            | A few acupoints for diaphragm; mainly in the distal forearm |
| *liver, gallbladder, spleen, and pancreas   | Between the 1/4 distal end of the posterior forearm and the anterior midpoint of the 5th metacarpal bone.   | spleen absent?  |
| *adrenal gland**  |   | absent or LI4 (Hegu, 合谷)?                                   |
| *kidney**   | Distributed on the 1/4 distal end of the posterior lateral (radial) forearm sparsely  |   |
| *urinary bladder**  | Disrupted by the representing areas of the liver, the gallbladder, and the pancreas in the 1/4 distal end of the posterior forearm.   |   |
| *intestine  | Extends to the 1/4 distal end of the posterior lateral (radial) forearm.  | only corresponds to the small intestine                     |
| *internal genitalia**   | (located medially to the intestine representing region based on the acupointotopy)  | LI4 (Hegu, 合谷)?   |
| *external genitalia**   | only one acupoint, HT8 (Shaofu, 少府); near the 5th metacarpal bones  |   |
| *, according to our model, rotating and extending overall from the lateral elbow joint via the ulnar styloid process of the distal forearm along the posterior upper limb towards the anterior midpoint of the 5th metacarpal bone; |   |   |
| **, the number of the acupoints is quite small;   |   |   |
| ?, suspicious.  |   |   |

### *Lower Limb Acupoints*

On the lower limbs, the representing regions of the reproductive system and the urinary bladder start from the lower abdomen and extend along the medial lower limb downwards, via the medial knee joint to the medial foot. The whole representing areas keep connected with the corresponding representing regions on the anterior trunk. The neighboring representing regions corresponding to the intestine and the kidney, start from the medial knee joint, extend along the medial crus downwards, the former ending on the medial dorsum of the foot and the latter ending near the medial ankle joint. The representing region of the adrenal gland starts from the medial crus above the ankle joint, extends along the crus upward backward, rotates around the Achilles tendon, extends upward anteriorly, and ends below the patella. The representing regions of the pancreas, the spleen, the gallbladder, the liver, the stomach, the diaphragm, the lung (“lung below the heart”, absent), the heart, the lung (“lung above the heart”), extend from below the medial ankle joint backward upwards, rotate around the Achilles tendon, extend upward anteriorly, and end on the anterior crus or near the knee joint while keeping the alignment pattern along the Acupoint Posterior Axis of the Lower Limb (APALL). The representing regions of the Frontal Head, the Temporal Head, and the Hind Head extend and rotate from the dorsum of the foot upward backward, and end at the midpoint of the lateral (close to the posterior lateral) crus (**Figure 3.3.4** and **Table 3.3.2**).

Overall, we think that representing regions of the reproductive system and the urinary bladder extend from the lower abdomen along the medial lower limb down to the medial foot. The neighboring regions of the intestine and the kidney extend from medial knee joint towards the distal end of the lower limb. The representing regions of the lung (“lung above the heart”), the heart, the lung (“lung below the heart”, absent), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, and the adrenal gland start from the anterior crus near the knee joint, extend downwards and posteriorly, rotate around the Achilles tendon, and extend downward anteriorly to the medial ankle joint and the medial foot (**Figure 3.3.3**, **Figure 3.3.4**, and **Appendix 7**).

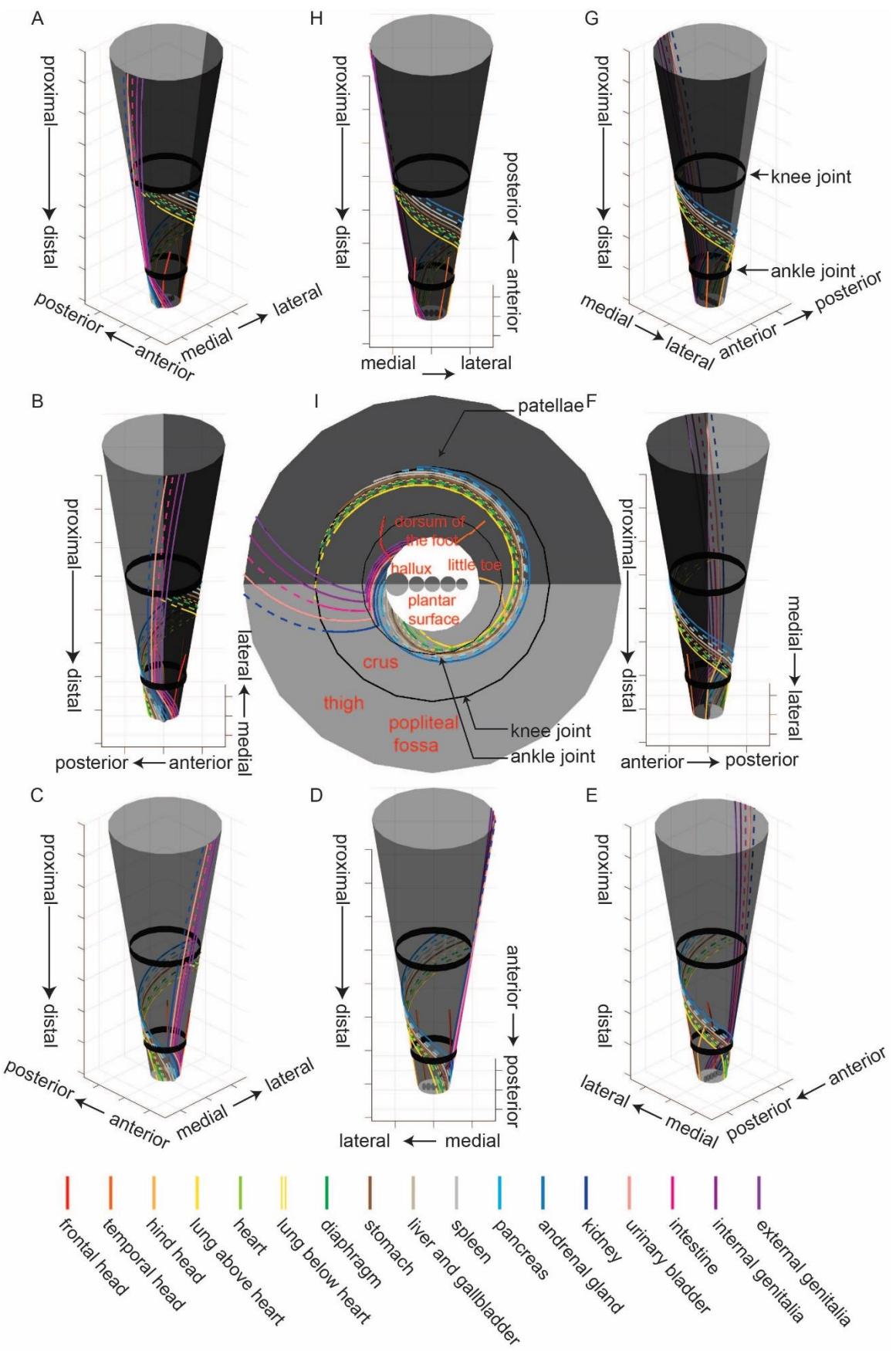
The representing areas of the Frontal Head, the Temporal Head, and the Hind Head are adjacent to the representing areas of the lung (“lung above the heart”) and the heart, and these three head regions should be theoretically located in the medial foot (close to the plantar side), below the representing areas of the lung (“lung above the heart”) and the heart above. But the head representing areas rotate to the dorsum of the foot (via the regions plantaris pedis laterally) due to lack of space (see details below). The heart and the diaphragm representing regions are only in the medial foot area and incomplete. More acupoints corresponding to these two viscera possibly do not exist on the lower limb. But if more acupoints corresponding to these two inner organs exist, they

are supposed to lie between the representing regions of the lung ("lung above the heart") and the stomach, parallel to the latter two as well.

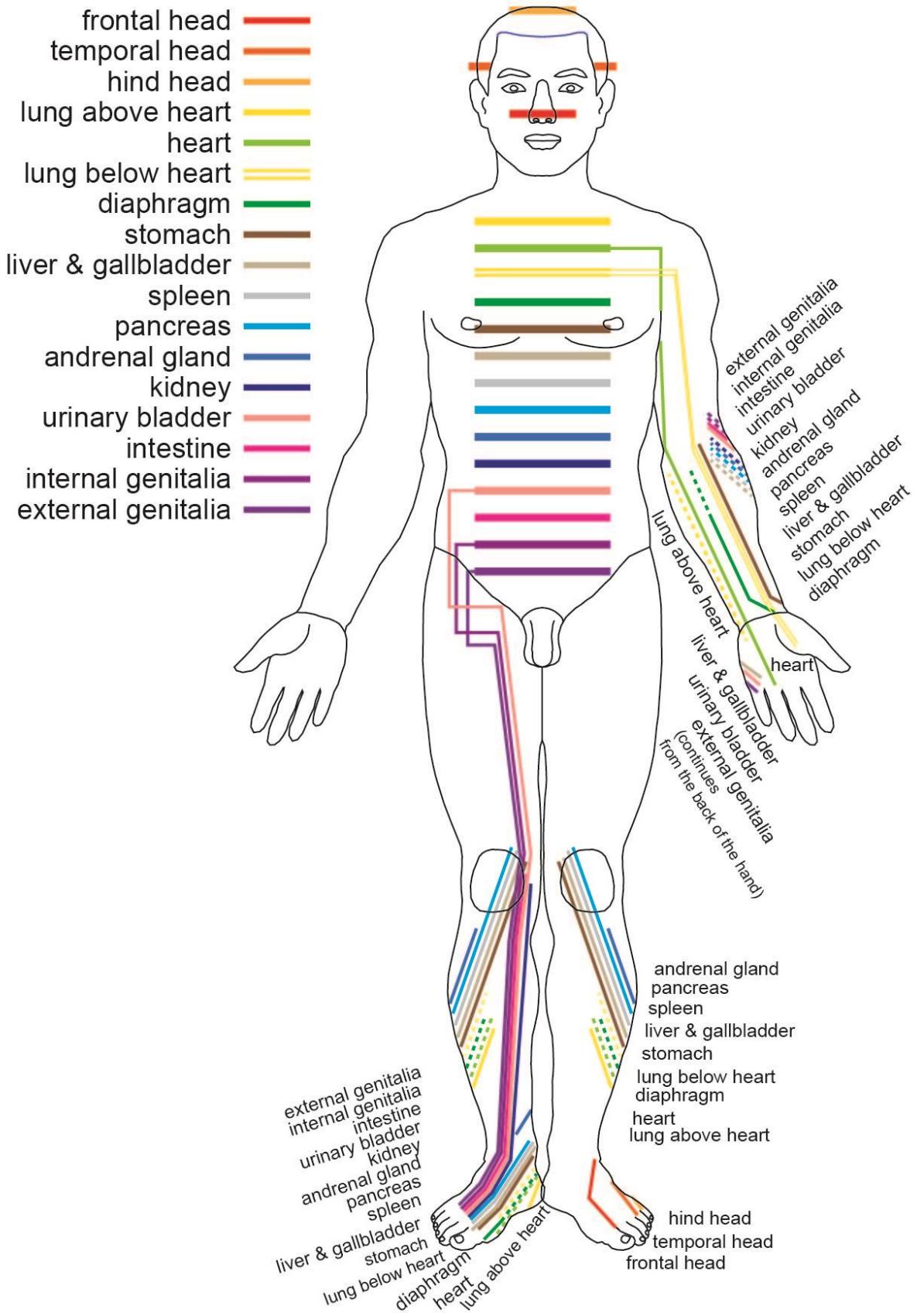
In terms of muscles, the lower limb acupoints are in muscles of lower limb. During the embryogenesis, these muscles derive from the mesodermal hypomere, homologous to the hypaxial muscles of the anterior trunk. Regarding the innervation, these acupoints are in the regions projected by the anterior branch of the lumbosacral plexus (anterior rami of the thoracic nerve T12 to coccygeal nerve Co1).

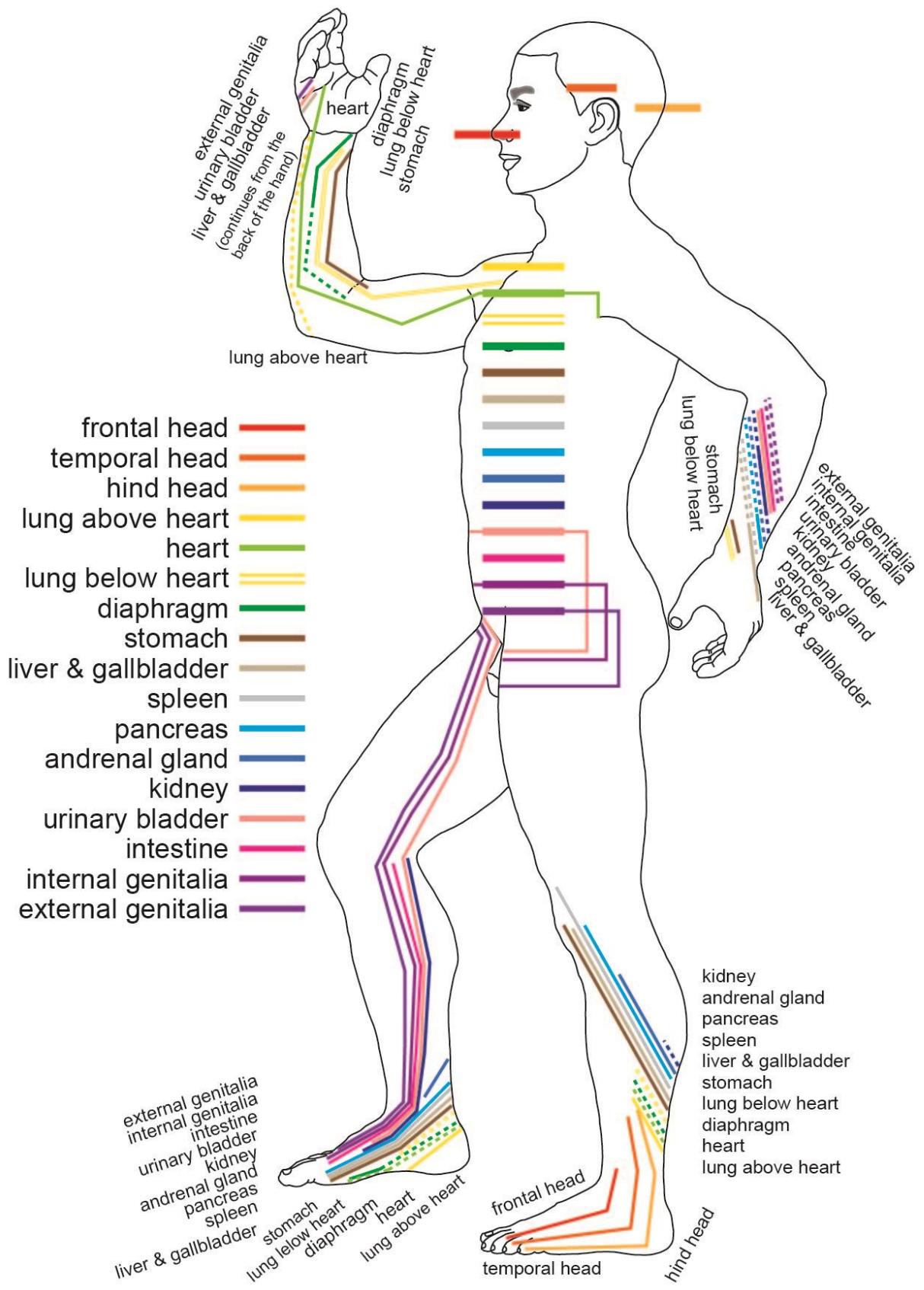
**Table 3.3.2** Distribution pattern of lower limb long-distance acupoints in the model

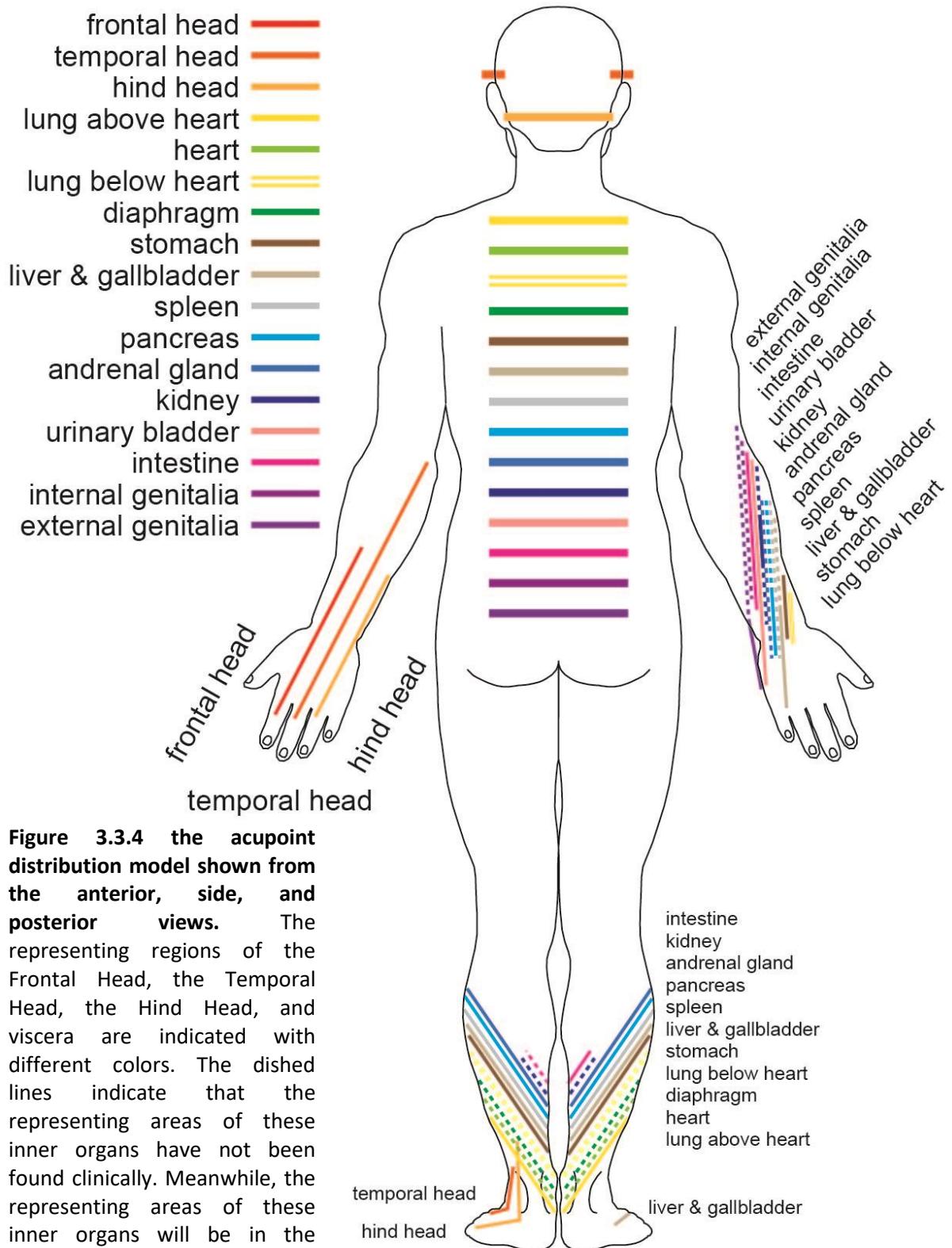
| viscera (or head)   | distributing regions in brief  | note  |
|---|--|---|
| Frontal Head, Temporal Head, and Hind Head  | Extending and rotating from the dorsum of the foot upward backward and ending at the midpoint of the lateral (close to posterior lateral) crus, adjacent to the representing region of the lung ("lung above the heart") in the anterior lateral crus. | The representing region of the Frontal Head extends medially, overlapping with the initial part of the Liver Meridian   |
| lung ("lung above the heart"), heart, lung ("lung below the heart"), diaphragm, stomach, liver, gallbladder, spleen, pancreas, and adrenal gland  | Extending from the medial ankle upward backward, rotating around the Achilles tendon, extending upward anteriorly, ending on the anterior crus near the knee joint.  | The representing region of the heart and the lung ("lung below the heart") are overall absent. Only a few acupoints for the diaphragm, the spleen, and the pancreas.  |
| kidney and intestine  | Extending from the medial knee joint along the medial crus downwards; the former ending at the dorsum of the foot, the latter ending at the medial ankle.  | The two regions also extend towards the anterior lateral crus. The collateral branch of the representing area of the intestine rotates around the Achilles tendon and ends near the midpoint of the posterior lateral crus.                           |
| urinary internal and genitalia and external   | Extending from the medial foot upward along the medial crus, through the medial knee joint, continuing extending upward along the medial thigh, connecting with the corresponding representing regions on the anterior trunk.                          | The collateral branches of the representing areas of the internal and external genitalia extend from the medial foot to the medial ankle with the tendency to rotate around the Achilles tendon; another collateral branch enters the popliteal fossa |
| Note: all the distribution regions above have no directions; it is the same to extend from the proximal leg distally to the foot and to extend from the foot proximally to the hip joint. |  |   |



**Figure 3.3.3 the distribution of left lower limb acupoints in a 3-D model.** The representing regions of the Frontal Head, the Temporal Head, the Hind Head, and viscera are indicated with different colors. The dished lines indicate that the representing areas of these inner organs have not been found clinically. Meanwhile, the representing areas of these inner organs will be in the dashed line areas if they exist. (A) - (H) show the distribution of left lower limb acupoints in the 3-D model, corresponding to the view angles 45° (anterior medial), 90° (medial), 135° (posterior medial), 180° (posterior), 225° (posterior lateral), 270° (lateral), 315° (anterior lateral), and 360° (anterior), respectively. The azimuth view angle of the model is 30°. The lower limb model is not in the standard anatomical position. The leg stands upright, the knee facing forward. But the gastrocnemius muscles are contracted and the toe tips point downwards. (I) The projection plot of the distribution of left lower limb acupoints in the 3-D model. The projecting direction is from the distal end (toe tips) to the proximal end (hip joint) of the lower limb. The light and the dark gray areas represent the posterior and anterior lower limb, respectively. The small and the large black rings indicate the ankle and knee joints, respectively.







**Figure 3.3.4** the acupoint distribution model shown from the anterior, side, and posterior views. The representing regions of the Frontal Head, the Temporal Head, the Hind Head, and viscera are indicated with different colors. The dashed lines indicate that the representing areas of these inner organs have not been found clinically. Meanwhile, the representing areas of these inner organs will be in the dashed line areas if they exist.

### 3.3.2 The Prediction of Unknown Acupoints

According to the acupoint distribution pattern and our model, we think that 1) unknown human acupoints most likely exist; 2) the functions of these unknown new acupoints can be predicted according to their locations. More specifically, functions of the new acupoints should be the same as or similar to those of the known acupoints in the same or nearby regions in the topographic maps (**Appendix 1**).

For instance, the midpoint of the two acupoints, HN15 (Jingbailao, 颈百劳) and B1 (Dingchuan, 定喘), is predicted to be one new acupoint. This acupoint is in the posterior neck region (nape), within the lung (“lung above the heart”) region of the TM - AAPT. Therefore, we predict that stimulating this acupoint can adjust the function of the lung and the trachea, and relieve the pain or tension of the neck (nape). Similarly, one acupoint is predicted to be the midpoint of the two acupoints, GV13 (Taodao, 陶道) and GV12 (Shenzhu, 身柱), with the main effects of adjusting the function of the lung and the trachea. One acupoint should exist between the acupoints, BL46 (Geguan, 脾关) and BL47 (Hunmen, 魂门). Another acupoint is predicted to be between the acupoints, GV9 (Zhiyang, 至阳) and GV8 (Jinsuo, 筋缩). These two new acupoints can adjust the functions of the stomach, the liver, the gallbladder, the spleen, and the pancreas predictively. One acupoint exists between the acupoints, GV6 (Jizhong, 脊中) and GV5 (Xuanshu, 悬枢), with its effects of adjusting the functions of the stomach, the liver, the gallbladder, and the spleen according to our model. One new acupoint is predicted to be between the acupoints, BL52 (Zhishi, 志室) and B6 (Yaoyi, 腰宜), adjusting the function of the urinary bladder, the kidney, and the internal genitalia. Four acupoints should be in the posterior median line and on the same vertical level as acupoints, BL31 (Shangliao, 上髎), BL32 (Ciliao, 次髎), BL33 (Zhongliao, 中髎), BL34 (Xialiao, 下髎), with their functions of adjusting the genitalia and the distal end of the digestive tract (**Table 3.3.3**).

In the TCM acupuncture, the anterior trunk acupoints below the processus xiphoideus lie in the anterior median line (the Conception Vessel), the vertical line 0.5 cun (the Foot's Minor Yin Kidney Meridian), 2 cun (the Foot's Yang Supreme Stomach Meridian) and the 4 cun (the Foot's Major Yin Spleen Meridian) horizontally apart from the anterior median line; the anterior trunk acupoints above the processus xiphoideus are in the anterior median line (the Conception Vessel), vertical lines 2 cun (the Foot's Minor Yin Kidney Meridian), 4 cun (the Foot's Yang Supreme Stomach Meridian) and 6 cun (the Foot's Major Yin Spleen Meridian) horizontally apart from the anterior median line. The posterior trunk acupoints are in the posterior median line (the Governing Vessel), vertical lines 0.5 cun (the paravertebral points), 1.5 cun (the Foot's Major Yang Urinary Bladder

Meridian) and 3 cun (the Foot's Major Yang Urinary Bladder Meridian) away horizontally from the posterior median line.

In fact, we can predict that acupoints also exist in the vertical lines 0.5 cun and 6 cun horizontally away from the anterior median line on the entire anterior trunk according to our analysis of the acupoint distribution pattern.

When the prediction is generalized from the perspective of potential clinical application, we think that acupoints exist in all the vertical lines  $0.5 \times N$  cun ( $N$  is an integer) horizontally apart from the anterior (posterior) median line, on the same vertical level as the acupoints of the Conception Vessel (Governing Vessel; note, plus the predicted new acupoints in the trunk median lines and possibly more unknown acupoints between the known ones) on the trunk. In addition, the functions of these acupoints are consistent with the TM - AAAT (TM - AAPT).

Theoretically, “acupoints” are not fixed circular points but they are divided areas classified in our model. For instance, KI17 (Shangqu, 商曲) and ST23 (Taiyi, 太乙) are located close to each other with similar functions in our model. We can infer that any point between these two acupoints can be theoretically used as an acupoint with the same or similar function to these two acupoints (though the clinical effects may differ on some level). But some principles should be considered clinically, 1) blood vessels, nerves, nipples, mucosa, and viscera should be avoided during needling (moxibustion) in case of physical harm to the tissue and organs of the human body; 2) we need to ensure the reproducibility of the needling location in clinic (0.5 cun is used as a unit to localize the acupoints) for the stable effectiveness and safety.

As a matter of fact, some of the acupoints predicted with our model have been used clinically previously. Readers can learn more about the predicted acupoints on the anterior and posterior trunk from the following table (**Table 3.3.3**). But the detailed discussions will be omitted here.

**Table 3.3.3** Predicted acupoints on the trunk and their functions

| location relative to the median line                   | predicted locations   | predicted functions  | evidence for testing the prediction |
|--|---|--|-------------------------------------|
| PML, posterior median line; AML, anterior median line; |   |  |                                     |
| <b>Posterior Trunk</b>                                 |   |  |                                     |
| 0.5 cun away from the PML horizontally                 | the midpoint of HN15 (Jingbailao, 颈百劳) and B1 (Dingchuan, 定喘) | adjusting the function of the lung and relieve the tension of the neck |                                     |
| 1.5 cun away from the PML                              | 1.5 cun horizontally away from the GV14                       | adjusting the function of the lung and relieve the                     | Xiabailao, 下百劳                      |

|  |  |  |   |
|--|--|--|---|
| horizontally                           | (Dazhui, 大椎)   | tension of the neck  | 《针灸经外奇穴图谱》  |
| in the PML                             | the midpoint of GV13 (Taodao, 陶道) and GV12 (Shenzhu, 身柱) | adjusting the function of the lung   | Peigen Point, 培根穴<br>《蓝琉璃》<br>Wuming point, 无名穴<br>《针灸经外奇穴图谱》               |
| 2 cun away from the PML horizontally   | 0.5 cun horizontally away from BL16 (Dushu, 督俞)          | adjusting the function of the lung, the heart the diaphragm and the stomach  | Dushu, 督俞 (isonym)<br>《针灸经外奇穴图谱》  |
| 3 cun away from the PML horizontally   | the midpoint of BL46 (Geguan, 脾关) and BL47 (Hunmen, 魂门)  | adjusting the function of the stomach, the liver, the gallbladder, the spleen, and the pancreas                        |   |
| 2.5 cun away from the PML horizontally | 1 cun horizontally away from BL19 (Danshu, 胆俞)           | adjusting the function of the stomach, the liver, and the gallbladder  | Zhuoyu, 濁浴<br>《针灸经外奇穴图谱》  |
| in the PML                             | the midpoint of GV9 (Zhiyang, 至阳) and GV8 (Jinsuo, 筋缩)   | adjusting the function of the stomach, the liver, the gallbladder, the spleen, and the pancreas                        | Liver Point, 肝穴<br>《蓝琉璃》<br>Weiguanxiashu three points 胃管下俞三穴<br>《针灸经外奇穴图谱》 |
| 1 cun away from the PML horizontally   | 1 cun horizontally away from GV8 (Jinsuo, 筋缩)            | adjusting the function of the stomach, the liver, the gallbladder, the spleen, and the pancreas                        | Qizhuma, 骑竹马<br>《针灸经外奇穴图谱》  |
| 1 cun away from the PML horizontally   | 1 cun horizontally away from GV7 (Zhongshu, 中枢)          | adjusting the function of the stomach, the liver, the gallbladder, and the spleen                                      | Shubian, 枢边<br>《针灸经外奇穴图谱》   |
| in the median line                     | the midpoint of GV6 (Jizhong, 脊中) and GV5 (Xuanshu, 悬枢)  | adjusting the function of the stomach, the liver, the gallbladder, and the spleen                                      | Sanmusai Point, “三木塞”穴<br>《蓝琉璃》<br>Jiegu, 接骨<br>《针灸经外奇穴图谱》                  |
| 1 cun away from the PML horizontally   | 1 cun horizontally away from GV4 (Mingmen, 命门)           | adjusting the function of the adrenal gland, the kidney, the urinary bladder, the intestine and the internal genitalia | Changfeng, 肠风<br>《针灸经外奇穴图谱》   |
| 4 cun away from the PML horizontally   | 4 cun horizontally away from GV4 (Mingmen, 命门)           | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the              | Jijupikuai, 积聚痞块<br>《针灸经外奇穴图谱》  |

|                                      |   |  |  |
|--------------------------------------|---|--|--|
|                                      |   | external genitalia   |  |
| 3 cun away from the PML horizontally | the midpoint of BL52 (Zhishi, 志室) and B6 (Yaoyi, 腰宜)  | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia                   | Zhishi, 志室 (isonym)<br>《针灸经外奇穴图谱》  |
| 2 cun away from the PML horizontally | 0.5 cun horizontally away from BL24 (Qihaishu, 气海俞)   | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia                   | Qihaishu, 气海俞 (isonym)<br>《针灸经外奇穴图谱》   |
| 2 cun away from the PML horizontally | 0.5 cun horizontally away from BL26 (Guanyuanshu, 关元俞)  | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia                   | Guanyuanshu, 关元俞 (isonym)<br>《针灸经外奇穴图谱》  |
| 3 cun away from the PML horizontally | 3 cun horizontally away from B8 (Shiqizhui, 十七椎)  | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia                   |  |
| 3 cun away from the PML horizontally | 1.5 cun horizontally away from BL27 (Xiaochangshu, 小肠俞)   | adjusting the function of the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia                   | Yaogen, 腰根<br>《针灸经外奇穴图谱》   |
| in the PML                           | in the PML, on the same vertical level as BL31 (Shangliao, 上髎), BL32 (Ciliao, 次髎), BL33 (Zhongliao, 中髎), BL34 (Xialiao, 下髎)                           | adjusting the function of the urinary bladder, the internal genitalia, the external genitalia, and the end of the lower gastrointestinal tract | Gujing Point, 固精穴, Xiaielongmen Point, 下泄隆门穴, Gangmen Point, 肛门穴, Hanzheng Main Point, 寒症总穴<br>《蓝琉璃》<br>Qibuban, 七步癥, Jiuqi, 鸠杞, Xiazhui, 下椎, Yutian, 玉田<br>《针灸经外奇穴图谱》 |
| 2 cun away from the PML horizontally | 2 cun horizontally away from the PML, on the same vertical level as BL31 (Shangliao, 上髎), BL32 (Ciliao, 次髎), BL33 (Zhongliao, 中髎), BL34 (Xialiao, 下髎) | adjusting the function of the urinary bladder, the internal genitalia, the external genitalia, and the end of the lower gastrointestinal tract | Yingwei four points, 营卫四穴<br>《针灸经外奇穴图谱》  |

| Anterior Trunk                         |   |  |                                       |
|--|---|--|---------------------------------------|
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV22 (Tiantu, 天突)  | adjusting the function of the throat and the lung  | Qitang, 气堂<br>《针灸经外奇穴图谱》              |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV21 (Xuanji, 环玑)  | adjusting the function of the throat and the lung  | Chixue, 赤穴<br>《针灸经外奇穴图谱》              |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV20 (Huagai, 华盖)  | adjusting the function of the throat and the lung  | Xinleitou, 新肋头<br>《针灸经外奇穴图谱》          |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV19 (Zigong, 紫宫)  | adjusting the function of the throat and the lung  | Xinleitou, 新肋头 (isonym)<br>《针灸经外奇穴图谱》 |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV19 (Zigong, 紫宫)  | adjusting the function of the throat and the lung  | Feimu, 肺募<br>《针灸经外奇穴图谱》               |
| 7 cun away from the AML horizontally   | 3 cun horizontally away from ST17 (Ruzhong, 乳中)   | adjusting the function of the throat, the lung, and the stomach                                | Chuanshi, 传尸<br>《针灸经外奇穴图谱》            |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV17 (Danzhong, 脘中)  | adjusting the function of the lung and the heart   | Xiongtang, 胸膛<br>《针灸经外奇穴图谱》           |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV16 (Zhongting, 中庭)   | adjusting the function of the lung, the heart, and the stomach                                 |                                       |
| 6 cun away from the AML horizontally   | between SP17 (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as CV16 (Zhongting, 中庭) | adjusting the function of the lung, the stomach, the liver, and the gallbladder                | Yinxi, 饮郄<br>《针灸经外奇穴图谱》               |
| 5 cun away from the AML horizontally   | 1 cun horizontally away from ST18 (Rugen, 乳根)   | adjusting the function of the lung and the stomach,  | Zuoyi, 左宜、Youyi, 右宜<br>《针灸经外奇穴图谱》     |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV15 (Jiwei, 鸠尾)   | adjusting the function of the lung, the heart, and the diaphragm                               |                                       |
| 2 cun away from the AML horizontally   | 2 cun horizontally away from CV15 (Jiwei, 鸠尾)   | adjusting the function of the lung, the diaphragm, the stomach, the liver, and the gallbladder |                                       |
| 4 cun away from the AML                | below ST17 (Ruzhong, 乳中), on the same vertical level as CV15  | adjusting the function of the stomach, the liver, and  | Yingtū, 应突<br>《针灸经外奇穴图谱》              |

|  |   |  |                                    |
|--|---|--|------------------------------------|
| horizontally                           | (Jiwei, 鸠尾)   | the gallbladder  |                                    |
| 6 cun away from the AML horizontally   | between SP17 (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as CV15 (Jiwei, 鸠尾) | adjusting the function of the stomach, the liver, and the gallbladder                                  |                                    |
| 2.5 cun away from the AML horizontally | 0.5 cun medially away from LR14 (Qimen, 期门)   | adjusting the function of the stomach, the liver, and the gallbladder                                  | Liqimen, 里期门<br>《针灸经外奇穴图谱》         |
| 6 cun away from the AML horizontally   | between SP17 (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as LR14 (Qimen, 期门) | adjusting the function of the stomach, the liver, and the gallbladder                                  | Jimen, 纪门<br>《针灸经外奇穴图谱》            |
| 2.5 cun away from the AML horizontally | 2.5 cun horizontally away from CV13 (Shangwan, 上腕)  | adjusting the function of the stomach, the liver, and the gallbladder                                  | Qiankong, 钱孔<br>《针灸经外奇穴图谱》         |
| 6 cun away from the AML horizontally   | between (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as GB24 (Riyue, 日月)      | adjusting the function of the stomach, the liver, and the gallbladder                                  |                                    |
| 4 cun away from the AML horizontally   | below GB24 (Riyue, 日月), on the same vertical level as CV12 (Zhongwan, 中脘)                         | adjusting the function of the stomach, the liver, and the gallbladder                                  |                                    |
| 6 cun away from the AML horizontally   | between (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as CV12 (Zhongwan, 中脘)   | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Shiguan, 石关 (isonym)<br>《针灸经外奇穴图谱》 |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV12 (Zhongwan, 中脘)  | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Shiguan, 食关<br>《针灸经外奇穴图谱》          |
| 3 cun away from the AML horizontally   | 3 cun horizontally away from CV12 (Zhongwan, 中脘)  | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Shicang, 食仓<br>《针灸经外奇穴图谱》          |
| 1 cun away from the AML                | 1 cun horizontally away from CV11   | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Shiguan, 食关 (isonym)<br>《针灸经外奇穴图谱》 |

|  |   |  |                                     |
|--|---|--|-------------------------------------|
| horizontally                           | (Jianli, 建里)  | part of the intestine  |                                     |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV11 (Jianli, 建里)  | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Zuoyouguan, 左右关<br>《针灸经外奇穴图谱》       |
| 6 cun away from the AML horizontally   | between (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as CV11 (Jianli, 建里) | adjusting the function of the stomach, the liver, the gallbladder, and the upper part of the intestine | Zuoshu, 左俞、Youshu, 右俞<br>《针灸经外奇穴图谱》 |
| 6 cun away from the AML horizontally   | between (Shidou, 食窦) and LR13 (Zhangmen, 章门), on the same vertical level as CV10 (Xiawan, 下腕) | adjusting the function of the stomach, the spleen, and the upper part of the intestine                 |                                     |
| 0.5 cun away from the AML horizontally | 0.5 cun horizontally away from CV9 (Shuifen, 水分)  | adjusting the function of the intestine  |                                     |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV9 (Shuifen, 水分)  | adjusting the function of the intestine  | Xinglong, 兴隆<br>《针灸经外奇穴图谱》          |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV9 (Shuifen, 水分)  | adjusting the function of the spleen and the intestine   | Shuifen, 水分 (isonym)<br>《针灸经外奇穴图谱》  |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV8 (Shenque, 神阙)  | adjusting the function of the adrenal gland and the intestine  | Hunshe, 魂舍<br>《针灸经外奇穴图谱》            |
| 2.5 cun away from the AML horizontally | 2.5 cun horizontally away from CV8 (Shenque, 神阙)  | adjusting the function of the adrenal gland, the spleen, and the intestine                             | Changgu, 长谷<br>《针灸经外奇穴图谱》           |
| 3.5 cun away from the AML horizontally | 3.5 cun horizontally away from CV8 (Shenque, 神阙)  | adjusting the function of the spleen and the intestine   | Hengwen, 横纹<br>《针灸经外奇穴图谱》           |
| 4 cun away from the AML horizontally   | below SP15 (Daheng, 大横), on the same vertical level as CV7 (Yinjiao, 阴交)                      | adjusting the function of the intestine and the internal genitalia                                     |                                     |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV6 (Qihai, 气海)  | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system  | Qizhong, 气中<br>《针灸经外奇穴图谱》           |
| 2 cun away from the AML                | 2 cun horizontally away from CV6 (Qihai,  | adjusting the function of the kidney, the urinary  |                                     |

|  |  |   |                                    |
|--|--|---|------------------------------------|
| horizontally                           | 气海)  | bladder, the intestine, and the reproductive system   |                                    |
| 3 cun away from the AML horizontally   | 3 cun horizontally away from CV6 (Qihai, 气海)                               | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system | Jingzhong, 经中<br>《针灸经外奇穴图谱》        |
| 1.5 cun away from the AML horizontally | 1.5 cun horizontally away from CV5 (Shimen, 石门)                            | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system | Siman, 四满 (isonym)<br>《针灸经外奇穴图谱》   |
| 4 cun away from the AML horizontally   | 4 cun horizontally away from CV5 (Shimen, 石门)                              | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system |                                    |
| 1 cun away from the AML horizontally   | 1 cun horizontally away from CV4 (Guanyuan, 关元)                            | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system | Yijing, 遗精<br>《针灸经外奇穴图谱》           |
| 3 cun away from the AML horizontally   | 3 cun horizontally away from CV4 (Guanyuan, 关元)                            | adjusting the function of the kidney, the urinary bladder, the intestine, and the reproductive system | Qimen, 气门<br>《针灸经外奇穴图谱》            |
| 2.5 cun away from the AML horizontally | 2.5 cun horizontally away from CV3 (Zhongji, 中极)                           | adjusting the function of the urinary bladder, intestine, and reproductive system                     | Changyi, 肠遗<br>《针灸经外奇穴图谱》          |
| 3.5 cun away from the AML horizontally | 3.5 cun horizontally away from CV3 (Zhongji, 中极)                           | adjusting the function of the urinary bladder, the intestine, and the reproductive system             | Zichang, 子肠<br>《针灸经外奇穴图谱》          |
| 5 cun away from the AML horizontally   | 5 cun horizontally away from CV3 (Zhongji, 中极)                             | adjusting the function of the urinary bladder, the intestine, and the reproductive system             | Yidao, 遗道<br>《针灸经外奇穴图谱》            |
| 2.5 cun away from the AML horizontally | 2.5 cun horizontally away from CV2 (Qugu, 曲骨)                              | adjusting the function of the urinary bladder, the intestine, and the reproductive system             | Shuidao, 水道 (isonym)<br>《针灸经外奇穴图谱》 |
| 3 cun away from the AML horizontally   | 3 cun horizontally away from CV2 (Qugu, 曲骨)                                | adjusting the function of the urinary bladder, the intestine, and the reproductive system             | Quanyin, 泉阴<br>《针灸经外奇穴图谱》          |
| 2.5 cun away from the AML horizontally | 1 cun below CV2 (Qugu, 曲骨), 2.5 cun horizontally away from the median line | adjusting the function of the urinary bladder, the intestine, and the external genitalia              | Cigong, 慈宫<br>《针灸经外奇穴图谱》           |

We did not predict the locations of the new acupoints on the limb, but their functions can be predicted according to their locations (**Table 3.3.4**). For instance, (Zetian, 泽田) is on the anterior median forearm, 2 cun proximal to the acupoint PC4 (Ximen, 郄门). This acupoint is on the boundary between the representing regions of the heart and the stomach according to our model. Therefore, this acupoint should be effective for diseases of the heart, the stomach, and intercostal neuralgia.

**Table 3.3.4** Comparison of the predicted and the clinical functions of Extra Points on the limbs

| Acupoint name   | location                      | clinic application                         | location in the model  | predicted functions  |
|---|-------------------------------|--|--|--|
| Zetian, 泽田  | 2 cun above PC4 (Ximen, 郄门)   | valvular vitium of the heart, pleurisy     | between heart and stomach  | diseases of the heart, the stomach, and the intercostal nerve  |
| Bishizitou, 臂石子头  | 3 cun above LU9 (Taiyuan, 太渊) | jaundice                                   | stomach and “lung below the heart”, close to liver and gallbladder             | diseases of the lung, the stomach, the liver, and the gallbladder  |
| Neiyangchi, 内阳池   | 1 cun above PC7 (Daling, 大陵)  | hand tinea, stomatitis, heart disorder     | heart, diaphragm, and stomach  | diseases of the heart, the diaphragm, and the stomach  |
| Zetian, 泽田 (isonym)   | 1 cun below LI6 (Pianli, 偏厉)  | pain of lower teeth                        | Frontal Head   | diseases of the mouth, the nose, and teeth   |
| Errenshangma, 二人上马  | posterior to SI3 (Houxi, 后溪)  | hot urination                              | Hind Head, liver, gallbladder, urinary bladder and external genitalia          | diseases of the Hind Head, the liver, the gallbladder, the urinary bladder and the external genitalia          |
| Zuluo, 足罗   | 2 cun above SP10 (Xuehai, 血海) | irregular menstrual cycle                  | urinary bladder, internal and external genitalia                               | diseases of the urinary bladder, the internal and the external genitalia                                       |
| Shenxi, 肾系  | 1 cun below ST32 (Futu, 伏兔)   | wasting thirst (消渴) and frequent urination | stomach, liver, gallbladder, spleen, pancreas, and upper part of the intestine | diseases of the stomach, the liver, gallbladder, the spleen, the pancreas, and the upper part of the intestine |
| The names, anatomical locations, and the clinic application of the acupoints are cited from 《针灸经外奇穴图谱》. |                               |  |  |  |

We should note clearly that some of the predicted acupoint **have not** been tested clinically. More clinic research is still needed for the localization of the acupoints, effectiveness tests, and the technique of needling.

### 3.3.3 Explaining the Traditional Principles on Combination (Selection) of Acupoints

#### 3.3.3.1 Cleft Points (郄穴) and Combination of Yuan Point and Luo Point (原络配穴法)

Yuan Points (原穴), Luo Points (络穴, here except for the Luo Points of the Conception and the Governing Vessels and the Large Luo of the **Spleen**, 脾之大络), and Cleft Points (郄穴, except for ST34 (Liangqiu, 梁丘)) are distal to the elbow joint (or the knee joint) with long-distance effects on the upper (lower) limb (**Table 3.3.5**). We analyze the location of each acupoint in the topographic maps, or the corresponding viscera of these acupoints in our model in the following table (**Table 3.3.5**). As we can see here, the Yuan Point, Luo Point and Cleft Point of the same meridian lie in the similar position of our model (topographic maps), corresponding to the same or similar viscera. For instance, PC7 (Daling, 大陵; Yuan Point), PC6 (Neiguan, 内关; Luo Point), and PC4 (Ximen, 郄门; Cleft Point) all correspond to the heart and the stomach. We think that it explains the principles of the Combination of Yuan Point and Luo Point (原络配穴) in clinical application. Meanwhile, the Cleft Point can be used together with the Yuan Point and Luo Point of the same meridians.

**Table 3.3.5** Yuan Points, Luo Points and Cleft Points of meridians and vessels and the relative locations of these acupoints in the model (topographic maps)

|  | Yuan Point           | viscera  | Luo Point           | viscera   | Cleft Point         | viscera  |
|--|----------------------|--|---------------------|---|---------------------|--|
| Hand's Major Yin Lung Meridian               | LU9 (Taiyuan, 太渊)    | "lung below the heart"                             | LU7 (Lieque, 列缺)    | Frontal Head, "lung below the heart"                              | LU6 (Kongzui, 孔最)   | "lung below the heart"                                 |
| Hand's Yang Supreme Large Intestine Meridian | LI4 (Hegu, 合谷)       | Frontal Head, stomach, intestine, (adrenal gland?) | LI6 (Pianli, 偏历)    | Frontal Head, kidney, urinary bladder                             | LI7 (Wenliu, 温溜)    | Frontal Head, intestine                                |
| Foot's Yang Supreme Stomach Meridian         | ST42 (Chongyang, 冲阳) | Frontal Head, stomach, and (heart?)                | ST40 (Fenglong, 丰隆) | Frontal Head, temporal head, "lung above the heart", and (heart?) | ST34 (Liangqiu, 梁丘) | stomach, intestine                                     |
| Foot's Major Yin Spleen Meridian             | SP3 (Taibai, 太白)     | diaphragm, stomach                                 | SP4 (Gongsun, 公孙)   | Stomach, and (heart?)   | SP8 (Diji, 地机)      | kidney, urinary bladder, intestine, internal genitalia |
| Hand's Minor Yin Heart                       | HT7 (Shenmen, 隐门)    | heart and liver                                    | HT5 (Tongli, 谷井)    | Heart (tongue)  | HT6 (Yinxi, 隐溪)     | heart  |

| Meridian                                     | 神门)                |  | 通里)                  |   | 郄)                 |   |
|--|--------------------|--|----------------------|---|--------------------|---|
| Hand's Major Yang Small Intestine Meridian   | SI4 (Wangu, 腕骨)    | Hind Head, liver, gallbladder, and pancreas  | SI7 (Zhizheng, 支正)   | Hind Head   | SI6 (Yanglao, 养老)  | Hind Head   |
| Foot's Major Yang Urinary Bladder Meridian   | BL64 (Jinggu, 京骨)  | Hind Head  | BL58 (Feiyang, 飞扬)   | Temporal Head and Hind Head   | BL63 (Jinmen, 金门)  | Hind Head   |
| Foot's Minor Yin Kidney Meridian             | KI3 (Taixi, 太溪)    | "lung above the heart", kidney, urinary bladder, and internal genitalia                      | KI4 (Dazhong, 大钟)    | lung above the heart", kidney, urinary bladder, internal and external genitalia | KI5 (Shuiquan, 水泉) | urinary bladder, internal genitalia, and external genitalia |
| Hand's Absolute Yin Heart Protector Meridian | PC7 (Daling, 大陵)   | heart and stomach  | PC6 (Neiguan, 内关)    | heart, diaphragm, and stomach   | PC4 (Ximen, 郄门)    | heart and stomach   |
| Hand's Minor Yang Triple Warmer Meridian     | TE4 (Yangchi, 阳池)  | Temporal Head and pancreas   | TE5 (Waiguan, 外关)    | Temporal Head, liver, and gallbladder   | TE7 (Huizong, 会宗)  | Temporal Head, and Hind Head                                |
| Foot's Minor Yang Gallbladder Meridian       | GB40 (Qiuxu, 丘墟)   | Temporal Head, liver, and gallbladder  | GB37 (Guangming, 光明) | Temporal Head   | GB36 (Waiqiu, 外丘)  | Temporal Head, liver, and gallbladder                       |
| Foot's Absolute Yin Liver Meridian           | LR3 (Taichong, 太冲) | Frontal Head, liver, gallbladder urinary bladder, internal genitalia, and external genitalia | LR5 (Ligou, 翳沟)      | kidney, urinary bladder, internal genitalia, and external genitalia             | LR5 (Zhongdu, 中都)  | intestine, internal genitalia, and external genitalia       |
| Conception Vessel                            |                    |  | CV15 (Jiwei, 鸠尾)     | heart, diaphragm, stomach   |                    |   |

|                             |  |  |                         |  |                        |   |
|-----------------------------|--|--|-------------------------|--|------------------------|---|
| Governing Vessel            |  |  | GV1<br>(Changqiang, 长强) | intestine,<br>internal genitalia               |                        |   |
| the Large Luo of the Spleen |  |  | SP21<br>(Dabao, 大包)     | “lung below the heart”, liver, and gallbladder |                        |   |
| Yin linking vessel          |  |  |                         |  | KI9<br>(Zhubin, 筑宾)    | urinary bladder   |
| Yang linking vessel         |  |  |                         |  | GB35<br>(Yangjiao, 阳交) | Temporal Head, liver, and gallbladder                         |
| Yin Heel Vessel             |  |  |                         |  | KI8<br>(Jiaoxin, 交信)   | kidney, intestine, internal genitalia, and external genitalia |
| Yang Heel Vessel            |  |  |                         |  | BL59<br>(Fuyang, 附阳)   | Hind Head   |

### 3.3.3.2 Combination of the Eight Confluent Acupoints (八脉交会穴配穴法)

The following two passages are cited from *The Great Compendium of Acupuncture and Moxibustion*:

#### **Formula of the Eight Methods and the Eight Confluent Acupoints (八法交会八脉)**

*Paired acupoints SP4 (Gongsun, 公孙), as the father, connected with the Penetrating Vessel (冲脉); Paired acupoints PC6 (Neiguan, 内关), as the mother, connected with Yin linking vessel (阴维脉); Both merging into the heart, the chest, and the stomach.*

*Paired acupoints SI3 (Houxi, 后溪), as the husband, connected with the Governing Vessel (督脉); Paired acupoints BL62 (Shenmai, 申脉), as the wife, connected with the Yang Heel Vessel (阳跷脉). Both converge into the medial canthus, the neck (nape), ears, shoulders, the small intestine, and the urinary bladder.*

*Paired acupoints GB42 (Zulinqi, 足临泣), as the man, connected with the Girdle Vessel (带脉); Paired acupoints TE5 (Waiguan, 外关), as the woman, connected with the Yang linking vessel (阳维脉). Both converge into the lateral canthus, the mastoid region of the temporal bone, the cheek, the neck, and the shoulder.*

*Paired acupoints LU7 (Lieque, 列缺), as the host, connected with the Conception Vessel (任脉); Paired acupoints KI6 (Zhaochai, 照海), as the guest, connected with Yin Heel Vessel (阴跷脉). Both converge into the lung, throat, chest, and diaphragm.*

#### **Formula of the Eight Methods of the Confluent Acupoints (八法交会歌)**

*Acupoint PC6 (Neiguan, 内关) corresponds to the acupoint SP4 (Gongsun, 公孙). Acupoint TE5 (Waiguan, 外关) and the acupoint GB42 (Zulinqi, 足临泣) are always functionally the same. Acupoint LU7 (Lieque, 列缺) connects to the acupoint KI6 (Zhaochai, 照海) indirectly through the (extraordinary) meridians. Acupoint SI3 (Houxi, 后溪) and BL62 (Shenmai, 申脉) are affiliated to each other.*

We explain the Combination of Eight Confluent Acupoints according to the acupoint distribution model (topographic maps) (**Table 3.3.6**), not using the traditional ideas of meridians.

First, the paired acupoints of the Combination of Eight Confluent Acupoints are on the upper and the lower limbs, respectively. Meanwhile, the representing inner organs of each paired acupoints are similar and complementary (occupying neighboring but different locations in the **standard order**). For instance, PC6 (Neiguan, 内关) and SP4 (Gongsun, 公孙) are on the upper and the lower limbs, respectively. The former lies in the overlapping regions corresponding to the heart,

the lung (“**lung below the heartabsent heartlung above the heart**

**Table 3.3.6** the Eight Confluent Acupoints and their relative locations in the model

|  | acupoint            | representing viscera  | relative location in the model   |
|--|---------------------|---|--|
| 1  | PC6 (Neiguan, 内关)   | heart, diaphragm, and stomach   | heart, diaphragm, and stomach  |
|  | SP4 (Gongsun, 公孙)   | stomach and (heart?)  | heart, diaphragm, stomach, and [close to the intestine]  |
| 2  | TE5 (Waiguan, 外关)   | Temporal Head, liver, and gallbladder   | Temporal Head, liver, gallbladder, [close to the pancreas, kidney, urinary bladder, and intestine]     |
|  | GB42 (Zulinqi, 足临泣) | Temporal Head, liver, and gallbladder   | Temporal Head, liver, gallbladder, and [close to the stomach and intestine]                            |
| 3  | LU7 (Lieque, 列缺)    | Frontal Head and lung (“lung below the heart”)                                    | Frontal Head, lung (“lung below the heart”), and [close to the stomach]                                |
|  | KI6 (Zhaochai, 照海)  | lung (“lung above the heart”), (heart?), urinary bladder, and reproductive system | lung (“lung above the heart”), [close to the heart, stomach], urinary bladder, and reproductive system |
| 4  | SI3 (Houxi, 后溪)     | Hind Head, liver, and gallbladder   | Hind Head, liver, gallbladder, and [close to the urinary bladder]                                      |
|  | BL62 (Shenmai, 申脉)  | Hind Head, close to the liver, and gallbladder                                    | Hind Head, liver, and gallbladder  |
| lung (“lung above the heart”), throat and trachea; lung (“lung below the heart”), bronchus; ?, suspicious. |                     |   |  |

The acupoint, TE5 (Waiguan, 外关), on the posterior forearm, corresponds to the Temporal Head, the liver, and the gallbladder, and is close to the representing regions of the pancreas, the kidney, the urinary bladder, and the intestine in our model. The acupoint, GB42 (Zulinqi, 足临泣), is on the dorsum of the foot, matches the Temporal Head, the liver, and the gallbladder, close to the stomach and the intestine in our model. The acupoint, LU7 (Lieque, 列缺), is in the region of the lung (“lung below the heart”), or the lung representing region below the heart, close to the representing region of the stomach. The acupoint, KI6 (Zhaochai, 照海), is in the medial foot, corresponding to the throat (“lung above the heart”). At the same time, due to the overlapping of the representing regions in the medial foot and medial distal crus, KI6 (Zhaochai, 照海) also corresponds to the urinary bladder,

the internal genitalia, and the external genitalia, close to the stomach representing region. The functions of these two acupoints are both similar and complementary. SI3 (Houxi, 后溪) is corresponding to the Hind Head, the liver and the gallbladder while BL62 (Shenmai, 申脉) lies in the Hind Head region, close to the regions of the liver and the gallbladder in our model.

Each group of the four pairs of acupoints are similar and (or) complementary at the same time in our model. We think that it is the reason for the improved effects of the Combination of Eight Confluent Acupoints in clinic.

### 3.3.3.2 Combination of Back-Shu Points and Front-Mu Points (俞募配穴法)

Similarly, the paired Back-Shu Points (背俞穴) and Front-Mu Points (募穴) occupy the similar (or the same) relative positions in our model (the TM - AAPT and the TM - AAAT), corresponding to the same or neighboring inner organs (**Table 3.3.7**). For instance, the Back-Shu Point and the Front-Mu Point of the **spleen** (脾), BL20 (Pishu, 脾俞) and LR13 (Zhangmen, 章门), lie in the same relative location in the topographic maps. The former corresponds to the stomach, the liver, the gallbladder, and the spleen while the latter is corresponding to and the liver, the gallbladder, and the spleen.

**Table 3.3.7** Back-Shu Points and Front-Mu Points and their relative locations in the model

| Zang-Fu (五脏六腑) | Back-Shu Points       | viscera  | Front-Mu Points     | viscera                                    |
|----------------|-----------------------|--|---------------------|--|
| lung           | BL13 (Feishu, 肺俞)     | lung   | LU1 (Zhongfu, 中府)   | lung                                       |
| pericardium    | BL14 (Jueyinshu, 厥阴俞) | lung   | CV17 (Danzhong, 膻中) | lung, heart, and diaphragm                 |
| heart          | BL15 (Xinshu, 心俞)     | lung and heart                                     | CV14 (Juque, 巨阙)    | heart, diaphragm, and stomach              |
| liver          | BL18 (Ganshu, 肝俞)     | stomach, liver, and gallbladder                    | LR14 (Qimen, 期门)    | diaphragm, stomach, liver, and gallbladder |
| gallbladder    | BL19 (Danshu, 胆俞)     | stomach, liver, and gallbladder                    | GB24 (Riyue, 曰月)    | stomach, liver, and gallbladder            |
| spleen         | BL20 (Pishu, 脾俞)      | stomach, liver, gallbladder, spleen, and intestine | LR13 (Zhangmen, 章门) | liver, gallbladder, and spleen             |

|   |                                |  |                            |   |
|---|--------------------------------|--|----------------------------|---|
| <b>stomach</b>  | BL21 (Weishu,<br>胃俞)           | liver,<br>gallbladder,<br>kidney, and<br>intestine           | CV12<br>(Zhongwan, 中<br>脘) | stomach, liver,<br>gallbladder, and<br>intestine  |
| <b>triple warmer</b>  | BL22<br>(Sanjiaoshu, 三<br>焦俞)  | gallbladder,<br>kidney, and<br>intestine                     | CV5 (Shimen,<br>石门)        | kidney, intestine,<br>and reproductive<br>system  |
| <b>kidney</b>   | BL23 (Shenshu,<br>肾俞)          | adrenal gland,<br>kidney, and<br>urinary bladder             | GB25 (Jingmen,<br>京门)      | liver, gallbladder,<br>and kidney   |
| <b>large intestine*</b>   | BL25<br>(Dachangshu,<br>大肠俞)   | urinary bladder<br>and intestine                             | ST25 (Tianshu,<br>天枢)      | spleen, intestine,<br>and internal<br>genitalia   |
| <b>small intestine*</b>   | BL27<br>(Xiaochangshu,<br>小肠俞) | urinary bladder,<br>intestine, and<br>external<br>genitalia  | CV4 (Guanyuan,<br>关元)      | adrenal gland,<br>kidney, urinary<br>bladder,<br>intestine, and<br>reproductive<br>system |
| <b>urinary bladder</b>  | BL28<br>(Pangguangshu,<br>膀胱俞) | urinary bladder,<br>intestine, and<br>reproductive<br>system | CV3 (Zhongji, 中<br>极)      | kidney, urinary<br>bladder,<br>intestine, and<br>reproductive<br>system                   |
| Back-Shu Points are aligned from the top to the bottom; but the small intestine (*) should be located below the large intestine (*) according to our model. |                                |  |                            |   |

### 3.3.4 The Construction of Acupoint Distribution Pattern during the Early Development (hypothesized based on the early embryogenesis without experimental data)

We should state clearly that we do not talk about the **fundamental question about the biological material basis of the acupoints** in this book before introducing the developmental construction of the acupoint distribution pattern. Acupoints or their precursors are simply abstracted and regarded as small areas with specific functions on the surface of the body.

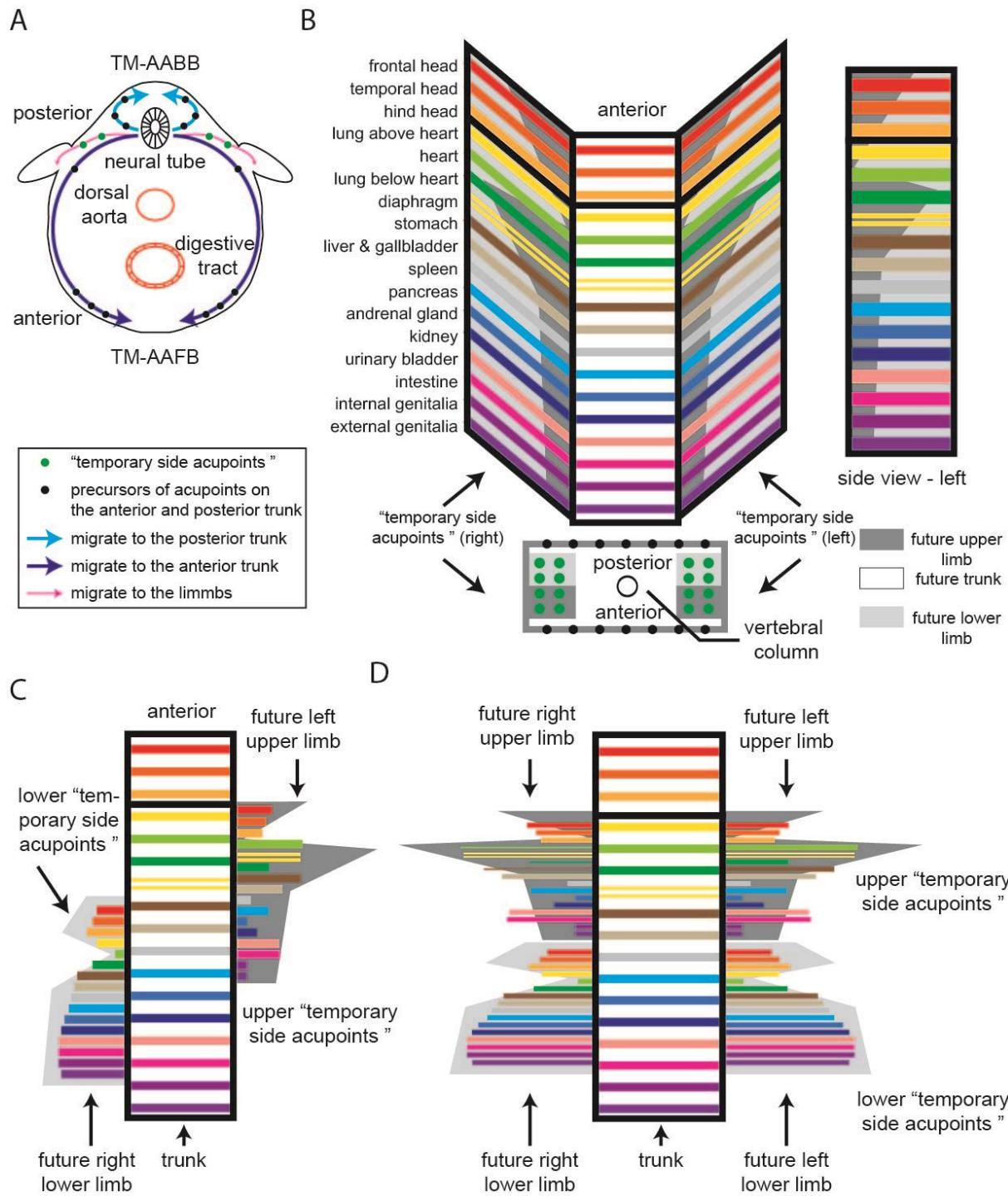
Here the “acupoints or their precursors” are simply addressed as “acupoints” in short in our discussion.

“Acupoints” form in the regions of the embryo’s future head and the neural tube of the embryo’s trunk initially before the formation of the limb bud (precursors of the limbs). These “acupoints” migrate to both sides of the neural tube, aligned along the somites (in the **standard order**). Just like the anterior and the posterior rami of spinal nerves, these acupoints migrate from both sides of the neural tube through the sides of the trunk along the dorsal (like the posterior rami) and the ventral (like the anterior rami) pathways to the dorsal and the ventral sides of the trunk, forming the MT - AAPT and the MT - AAAT, respectively.

With the development and the formation of limbs, some of the acupoints staying on sides of the neural tube migrate ventrally into the limb bud maintaining the alignment in the **standard order**. These acupoints migrate and slide along the limb bud distally and rotate around the limb bud in specific orders (3-dimension helix). Meanwhile, new acupoints with the same functions are probably formed deriving from the migrating acupoints. In terms of biology, this hypothesis (the newborn acupoints) may reflect the process of cell migration, differentiation, and the formation of new tissues in the developing limbs. But we **do not** have enough evidence to support this hypothesis. Finally, the acupoints show the topographic maps introduced above.

#### 3.3.4.1 Upper and Lower “Temporary Side Acupoints”

After the formation of the MT - AAPT and the MT - AAAT, some of the acupoints from the neural tube will further migrate into the limb bud after staying on both sides of the ventral neural tube. Here we call them the “Temporary Side Acupoints (TSAs)” (**Figure 3.3.5**). Due to the symmetric distribution of the acupoints (except for the acupoints in the trunk median lines), only changes and migration of the “TSAs” on the left side are discussed here. The “TSAs” are then separated into two groups. They migrate into the upper and the lower limbs later and because of that we call them the upper and the lower “TSAs”, respectively (**Figure 3.3.5**).



**Figure 3.3.5 the “temporary side acupoints (TSAs)” migrate into the limb bud in the standard order (a hypothesized model).** (A) The migration procedure of the embryo acupoints shown in the transverse section of an embryo in the early development. The acupoint precursors formed in the neural tube and then migrate to the dorsal and the ventral sides (via the cyan and the blue pathways, respectively). After the formation of the dorsal and ventral distribution patterns, part of the acupoints (in green) near the neural tube, the “TSAs”, are divided into the upper (dark gray) and the lower (light gray) groups, migrating into the upper and the lower limbs later, respectively. (B) The “TSAs” are separated by a polyline in the sagittal plane into the upper (dark gray) and the lower (light gray) groups, and they migrate into the upper and the lower limbs later, respectively. The boundary between the upper and the lower “TSAs” is close to the lower “TSAs” in the rostral region and it approaches the upper “TSAs” along the rostro-caudal axis. Near the heart representing region, there is a peak of the polyline pointing from the upper

“TSAs” towards the lower “TSAs” in the shape of “>”. Then the polyline boundary approaches the upper “TSAs” constantly. (C) The upper and the lower “TSAs” migrate into the upper and the lower limb, respectively. Only the “TSAs” of the future left upper limb and the right lower limb are shown here. (D) The density of the “TSAs” in the limbs decreases with the development and growth of the limbs.

Here we hypothesize that the “TSAs” are separated by a polyline in the sagittal plane into two asymmetric groups (an anterior and a posterior group; since the corresponding relationship of the anterior and the posterior groups to the upper and the lower “TSAs” is unclear, we name these two groups with their final migrating destinations).

The boundary between the upper and the lower “TSAs” have the following features:

- 1) The boundary in the region of Frontal Head, the Temporal Head, and the Hind Head intersect with the midline of this region the “TSAs”. More specifically, the initial point of the boundary is closer to the lower “TSAs” and then the boundary approaches the upper “TSAs” from the top to the bottom (in the rostro-caudal direction), closest to the lower “TSAs” in the representing regions of the Hind Head and the lung (**“lung above the heart”**) (**Figure 3.3.5**). The upper and the lower “TSAs” will enter the upper and the lower limbs, respectively. Therefore, most of acupoints corresponding to the Frontal Head are on the upper limb while the acupoints representing the Hind Head and the lung (**“lung above the heart”**) are mainly on the lower limb in the future.
- 2) There is a peak (in the shape of “>”) orientating from the region of the upper “TSAs” towards that of the lower “TSAs” in the representing region of the heart, making the representing regions of the heart and the lung (**“lung below the heart”**) mainly on the upper limb (**Figure 3.3.5**).
- 3) The peak drops dramatically in the regions of the stomach, the liver, and the gallbladder, and the boundary approaches the upper “TSAs” continuously. Consequently, the acupoints related with the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia are mainly distributed on the lower limb (**Figure 3.3.5**).

The hypothesized polyline reflects essentially that the “TSAs” are separated into two groups:

- 1) each group keeps aligned in the **standard order**; 2) each group includes acupoints corresponding to the head regions and all the viscera, but the numbers of the acupoints corresponding to each region (representing head regions and viscera) are not equal and are complementary in these two groups.

### 3.3.4.2 Upper “Temporary Side Acupoints” Migrate to the Upper Limb

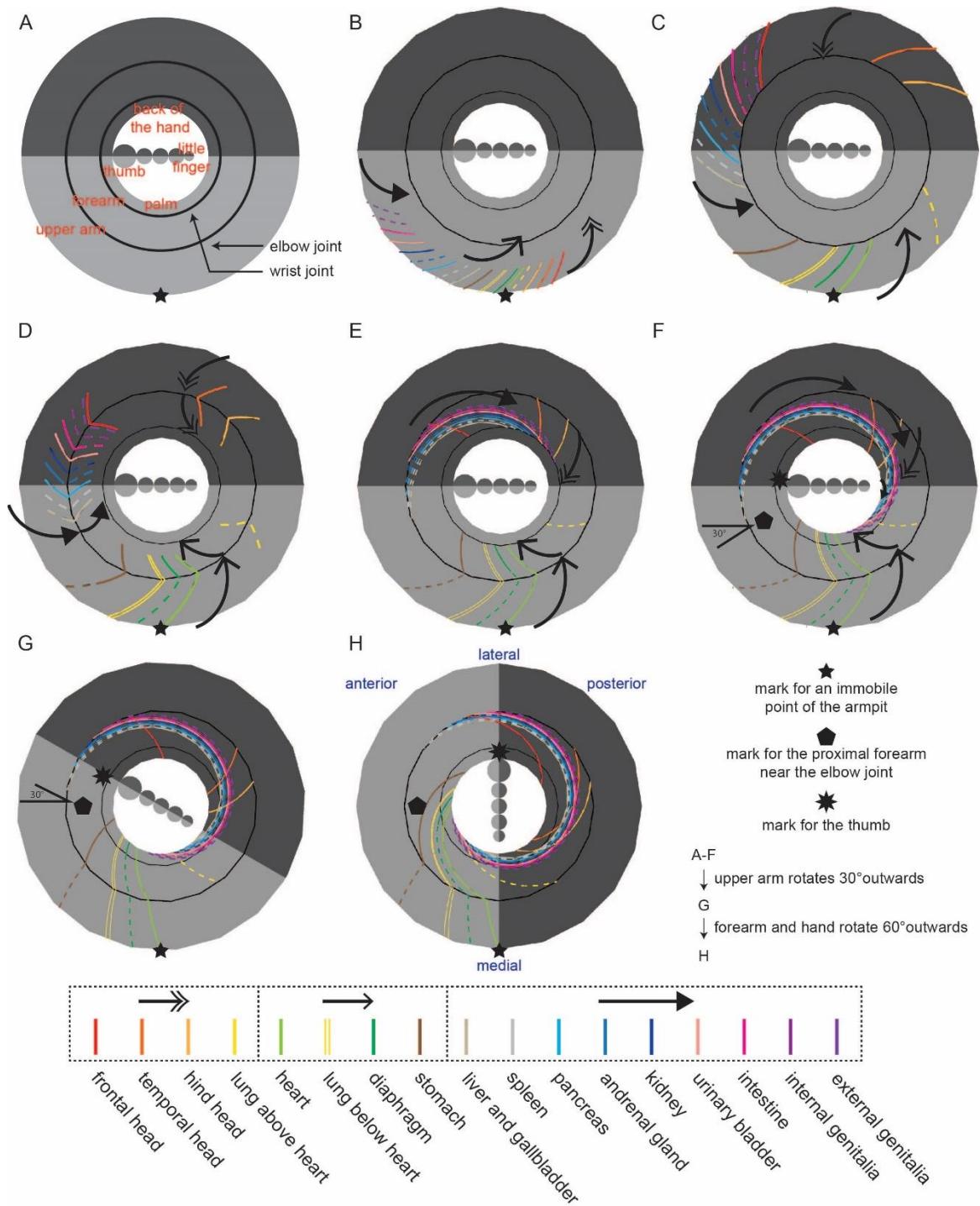
The upper “TSAs” migrate into the upper limb and form the topographic map (TM - AAUL) through the following 6 steps (**Figure 3.3.6**).

- 1) The upper “TSAs”, aligned in the **standard order**, migrate into the proximal end of the upper limb bud. Afterwards, these “acupoints” extend and migrate (In the discussion of Chapter 3.3.4, “migrate” refers to migrating or movement of a single acupoints while “extend” refers to extending of the distribution area of the whole or partial of an acupoint group corresponding to the same inner organ or head region) towards the distal end of the limb bud with a small rotating angle. The rotating direction is from the anterior lateral side to the anterior medial side, from the posterior medial side to the posterior lateral side of the upper limb.
- 2) The upper “TSAs” continue extending (migrating) towards the distal end of the limb bud with the small rotating angle based on the alignment of **standard order** until reaching the future elbow joint. Meanwhile, these acupoints rotate (different from the small angle rotation) together to enfold the future upper limb. In this process, 1) the upper “TSAs” in the representing areas of the heart, the lung (“**lung below the heart**”), the diaphragm, and the stomach keep still during the enfolder process; 2) the upper “TSAs” corresponding to the Frontal Head, the Temporal Head, and the Hind Head rotate around 180° from the anterior side through the anterior medial side to the posterior side of the future upper limb; 3) the upper “TSAs” corresponding to the liver, the gallbladder and other following viscera in the **standard order** rotate about 90° in the opposite direction, from the anterior side through the anterior lateral side to the posterior side of the future upper limb.
- 3) The upper “TSAs” continue extending (migrating) from the distal end of the future upper arm (the future elbow joint) towards the distal end of the limb bud with the small rotating angle. But starting from the future elbow joint, the rotating direction of the small angle rotation turns into from the anterior medial side to the anterior lateral side, from the posterior lateral side to the posterior medial side of the upper limb. Meanwhile, ① acupoints corresponding to the heart, the lung (“**lung below the heart**”), and the stomach keep extending (migrating) with the acupoints at the proximal end connected to the future upper arm; ② acupoints corresponding to the diaphragm detach themselves from the future upper arm proximal end and migrate along the former three (in ①) towards the distal end; ③ the upper “TSAs” corresponding to the liver, the gallbladder and other following viscera in the **standard order** migrate entirely towards the distal end,

acupoints in the proximal end detaching the future upper arm proximal end.

- 4) The rotating angle of the upper “TSAs” corresponding to the liver, the gallbladder, and other following viscera in the **standard order** increases when these acupoints reach the middle part of the forearm. These acupoints rotate about 180° around the forearm from the elbow joint to the wrist joint.
- 5) The upper “TSAs” continue extending (migrating) towards the distal end of the limb bud and enter the hand via the wrist joint. Meanwhile, the acupoints corresponding to the head region keep migrating with the proximal acupoints connected to the proximal end of the future forearm while the upper “TSAs” corresponding to the liver, the gallbladder, and other following viscera in the **standard order** migrate entirely, with the majority of acupoints at the proximal end of the forearm (the future elbow joint) migrating to the location below the future elbow joint.
- 6) Until now, the upper “TSAs” finish the migration. The upper limb of human embryo rotates about 90° outwards (**Figure 3.3.6**, we hypothesize that the upper arm rotates 30° outwards together with the forearm and the hand while the forearm and the hand rotate together 60° outwards further, in total 90°) on the 8th week after fertilization.

The upper “TSAs” corresponding to the liver, the gallbladder, and other following viscera in the **standard order** mix with those corresponding to the head region on the posterior forearm and the back of the hand. The former acupoints enter the deeper layer while the latter acupoints remain in the shallow layer during the migration and the mixing (**Figure 3.3.2**).



**Figure 3.3.6 the development process of the TM - AAUL.** Here we take the left upper limb long-distance acupoints as an example. All panels show the upper limb projection plot projected from the distal end (fingertips) to the proximal end (shoulder joint). The outer and the inner circles in the projection plot represent the proximal and the distal ends of the upper limb. Here we simplify the size and shape change of the upper limb and only keep the outward-rotation process during the development. The upper limb grows and differentiates from the proximal end towards the distal end. In the (B)-(F), the most distal ends of the lines representing the acupoint distribution areas are on the same distal level as the distal end of the developing upper limb in the proximal-distal axis. For visualization, the lines are simplified. In fact, they represent distribution areas with certain width. Besides, neighboring regions often share overlapping areas. The representing regions of the Frontal Head, the Temporal Head, the Hind Head, and viscera are indicated with different colors. The dashed lines indicate that the representing areas

Not been found clinically. Meanwhile, the representing areas of these inner organs will be in the dashed line areas if they exist. (A) The projection plot shows each part of the left upper limb. The small and the large dark rings represent the wrist joint and the elbow joint. The five circles in the small ring are the five fingertips. (B) - (H) the process in which the upper limb acupoints migrate distally and rotate around the upper limb in the early development. (B) Acupoints corresponding to the head regions and the viscera are aligned in the **standard order** and migrate to the upper arm (between the shoulder joint and the elbow joint) via the future shoulder joint, maintaining the original alignment. (C) Acupoints rotate, migrate, and extend distally to the elbow joint, occupying the entire upper arm. The rotation direction is from the posterior medial side to the posterior lateral side, the anterior lateral side to the anterior medial side of the future upper limb. Meanwhile, some of the acupoints corresponding to the head regions and viscera migrate around the upper limb and wrap it based on the alignment in the **standard order**. The upper "TSAs" in the representing areas of the heart, the lung ("lung below the heart"), the diaphragm, and the stomach keep still during the enfolder process; 2) the upper "TSAs" corresponding to the head regions migrate to the future posterior upper limb via the future medial posterior medial upper limb. The upper "TSAs" corresponding to the liver, the gallbladder and other following viscera in the **standard order** migrate to the future posterior lateral upper limb through the future lateral upper limb. (D) Acupoints corresponding to the heart, the lung ("lung below the heart"), and the stomach keep extending (migrating) distally and the acupoints near the distal end rotate towards the future anterior upper limb with a small angle; acupoints corresponding to the head regions migrate distally as a whole and rotate towards the future posterior medial upper limb with a small angle; the upper "TSAs" corresponding to the liver, the gallbladder and other following viscera in the **standard order** migrate entirely towards the distal end and rotate towards the future posterior upper limb with a small angle. (E) The extension, migration, and rotation directions of the acupoints are nearly the same as those in (D). The distal acupoints reach the wrist joint. The rotation angles of acupoints corresponding to the liver, the gallbladder, and other following viscera in the **standard order** increase. The distal end of these acupoints reaches the anterior forearm proximal to the wrist crease. (F) The extension, migration, and rotation directions of the acupoints are nearly the same as those in (E). The distal acupoints reach the palm and the back of the hand. The acupoints corresponding to the liver, the gallbladder, and other following viscera in the **standard order** mix with those corresponding to head regions on the posterior forearm and the back of the hand. The distal end of the former reaches the anterior future palm. All the developmental processes occur before the upper limb outward rotation (human embryo in the 8th week post-fertilization, 90°). (G) The upper arm is hypothesized to rotate 30° outwards together with the forearm (pentagon) and the hand (octagram). (H) We hypothesize that the forearm (proximal stationary point, pentagon) and the hand (octagram) rotate together 60° outwards. The arrows in the figures represent the directions of the extension, migration, and rotation of the acupoints. The black pentagram, pentagon, and octagram label a stationary point of the armpit, a point on the proximal forearm rotating 30° around the shoulder joint, and a point on the thumb rotating 60° around the elbow joint, respectively. The light and the dark gray areas represent the anterior and the posterior future upper limb, respectively. In the early development stages in (B)-(F), to simplify the drawings, the coloring of the anterior and the posterior future upper limb is consistent with that after upper limb outward rotation.

### 3.3.4.3 Lower “Temporary Side Acupoints” Migrate to the Lower Limb

The lower “TSAs” migrate into the lower limb and form the topographic maps through the following 6 steps (**Figure 3.3.7**).

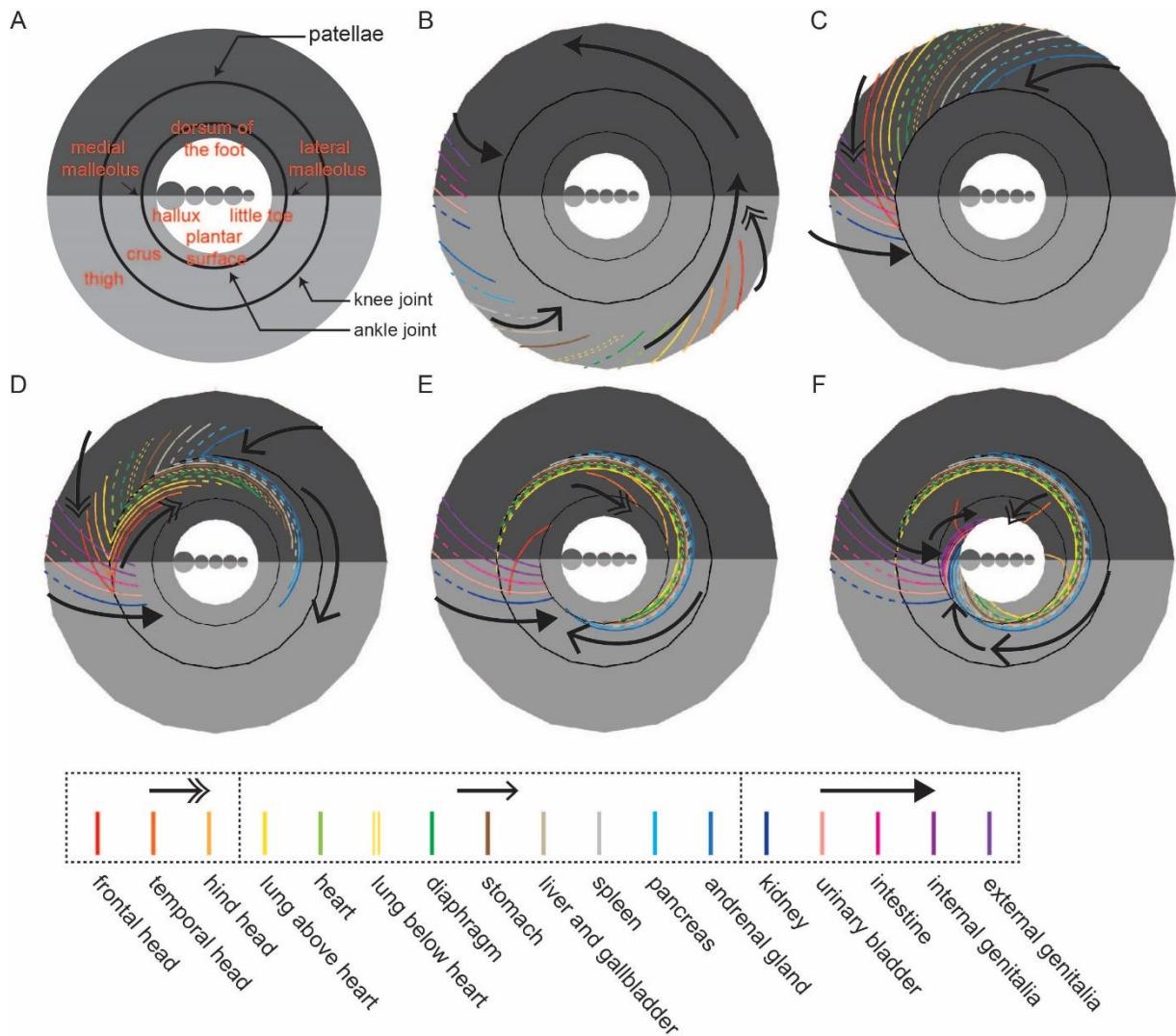
- 1) The lower “TSAs”, aligned in the **standard order**, migrate into the proximal end of the lower limb bud. Afterwards, these “acupoints” extend (migrate) towards the distal end of the limb bud with a small rotating angle. The rotating direction is from the lateral anterior side to the medial anterior side, from the medial posterior side to the lateral posterior side of the lower limb. Meanwhile, these acupoints rotate together to enfold the future lower limb. During this process, 1) the lower “TSAs” corresponding to the kidney and other following viscera in the **standard order** keep still during the enfolder 2) the lower “TSAs” corresponding to the Frontal Head, the Temporal Head and till the adrenal gland in the **standard order** rotate around 180° from the posterior side through the lateral anterior side to the anterior side (close to the lateral anterior side) of the future lower limb (In fact, the lower “TSAs” corresponding to the kidney and the intestine also rotate. But their rotating regions are just two small branches).
- 2) The lower “TSAs” continue extending (migrating) towards the distal end of the limb bud with the small rotating angle based on the alignment in the **standard order** until reaching the future knee joint.
- 3) Starting from the future knee joint, the rotating direction of the lower “TSAs” corresponding to the Frontal Head, the Temporal Head and the inner organs (from the **“lung above the heart”** to the adrenal gland in the **standard order**) turns into from the medial anterior side to the lateral anterior side, from the lateral posterior side to the medial posterior side of the lower limb. Meanwhile, the rotating angle of these acupoints increases dramatically. The acupoints migrate and extend distally as a whole, with the proximal acupoints detached from the proximal thigh. However, the lower “TSAs” corresponding to the kidney and other inner organs after the kidney in the **standard order** keep their original rotating direction and angle and the proximal lower “TSAs” still lie on the thigh (the lower “TSAs” corresponding to the kidney and the intestine migrate distally as a whole and the proximal lower “TSAs” detach from the thigh; the migrating mode of these lower “TSAs” are comparable to that of the upper “TSAs” corresponding to the diaphragm).
- 4) The pioneers of the lower “TSAs” migrate to the ankle joint. From the knee joint to the ankle joint, the lower “TSAs” corresponding to the viscera from the lung (**“lung above the heart”**) migrate to the distal end of the lower limb.

heart") to the adrenal gland in the **standard order** rotate about 180° around the crus while those corresponding to the head regions only rotate about 90°.

- 5) The lower "TSAs" continue migrating and extending towards the distal end of the limb bud and enter the foot region via the ankle joint. The rotating direction of the lower "TSAs" corresponding to the head regions turns into from the anterior lateral side to the anterior medial side. Besides, the rotating angle decreases. The lower "TSAs" corresponding to the head regions and those corresponding to the viscera from the lung ("lung above the heart") to the adrenal gland migrate distally entirely. The proximal end of the former ends near the 1/2 distal end of the anterior lateral crus while the latter ends near the knee joint. The lower "TSAs" corresponding to other viscera migrate and extend distally, with an increased rotating angle.
- 6) Until now, the lower "TSAs" finish the migration. The lower limb of human embryo rotates about 90° inwards in the 8th week after fertilization (**Figure 3.3.7**).

The lower "TSAs" corresponding to the lung ("lung above the heart") and other following viscera in the **standard order** mix with those corresponding to the head region on the distal crus and the dorsum of the foot. The former acupoints enter the deeper layer while the latter stays in the shallow layer during the migration and the mixing (**Figure 3.3.2**).

With the discussion about the construction of the limb acupoint topographic maps during early embryo development, we think that the medio-lateral axis of a perpendicular axis of the AAAT or AAPT (we define an axis perpendicular to an axis of acupoints (e.g., AAAT, the Axis of Acupoint on the Anterior Trunk) as a perpendicular axis of the axis of acupoints, PAAA) corresponds to the disto-proximal axis of a perpendicular axis of the AAUL or AALL. For instance, acupoints, ST19 (Burong, 不容), KI21(Youmen, 幽門), and CV14 (Juque, 巨阙), aligned latero-medially on the anterior trunk are corresponding to acupoints, PC3 (Quze, 曲泽), PC4 (Ximen, 部門), PC6 (Neiguan, 内关), and LI4 (Hegu, 合谷), aligned along the proximo-distal axis on the upper limb regarding the relative locations. However, we **do not have** enough evidence for this hypothesis.



**Figure 3.3.7 the development process of the TM - AALL.** Here we take the left lower limb long-distance acupoints as an example. All panels show the upper limb projection plot projected from the distal end (tips of toes) to the proximal end (hip joint). The inner and the outer circles in the projection plot represent the distal and the proximal ends of the lower limb. Here we simplify the size and shape change of the lower limb, but only keep the inward-rotation process during the development. The lower limb grows and differentiates from the proximal end towards the distal end. In the (B) - (F), the most distal ends of the lines representing the acupoint distribution areas are on the same distal level as the distal end of the developing lower limb in the proximal-distal axis. For visualization, the lines are simplified. In fact, they represent distribution areas with certain width. Besides, neighboring regions often share overlapping areas. The representing regions of the Frontal Head, the Temporal Head, the Hind Head, and viscera are indicated with different colors. The dashed lines indicate that the representing areas of these inner organs have not been found clinically. Meanwhile, the representing areas of these inner organs will be in the dashed line areas if they exist. (A) The projection plot shows each part of the left lower limb. The small and the large dark rings represent the ankle joint and the knee joint. The five circles in the small ring are the five tips of toes. (B) - (H) The process in which the lower limb acupoints migrate distally and rotate around the lower limb in the early development. (B) Acupoints corresponding to the head regions and the viscera are aligned in the **standard order** and migrate to the thigh (between the hip joint and the knee joint) via the future hip joint. The acupoints rotate in the direction from the medial side to the posterior side of the future thigh with a small rotating angle while migrating. Meanwhile, these acupoints wrap the future thigh as a whole via migration. In this process, acupoints corresponding to the adrenal gland and the kidney in the

**standard order** are the demarcation point. The acupoints corresponding to the head and inner organs before the adrenal gland in the **standard order** migrate and wrap the future thigh as a whole while acupoints corresponding to inner organs behind the adrenal gland in the **standard order** keep still without wrapping. (C) The acupoints migrate and extend distally to the knee joint while rotating. The rotating direction is almost the same as the one in (B). (D) Acupoints corresponding to the kidney, the urinary bladder, the intestine, the internal and the external genitalia extend distally (acupoints corresponding to the kidney and the intestine migrate distally as a whole, the proximal end detaching the thigh later) and maintain the small angle rotation. Similarly, acupoints corresponding to the Frontal Head, the Temporal Head, the Hind Head and other viscera till to the adrenal gland in the **standard order** extend distally and rotate as a whole. However, the rotating direction is opposite to the one in (C) and the rotating angle increases. (E) The acupoints migrate and extend distally to the ankle joint. The acupoints corresponding to the head region rotate about  $90^\circ$  while those corresponding to the viscera in the **standard order** from the lung ("lung above the heart") to the adrenal gland rotate about  $180^\circ$ . (F) The acupoints migrate, rotate and extend distally to the foot. The acupoints corresponding to the head region change their rotating direction. The new direction is from the lateral anterior side to the medial anterior side of the future leg. The rotating direction of the acupoints corresponding to the kidney, the urinary bladder, the intestine, and the internal and the external genitalia increases.

### 3.4 Principles on Combination of Acupoints

Many principles on combination of acupoints, including the commonly used **Five-Shu Points Combination (五输配穴法)**, **Combination of Yuan Point and Luo Point (原络配穴)**, **Combination of Back-Shu Points and Front-Mu Points (俞募配穴)**, and **Combination of Eight Confluent Acupoints (八脉交会配穴)**, have been summarized by the ancient Chinese. We are going to introduce the new principles on combination of acupoints based on the acupoint distribution model (topographic map of acupoints) in this book. When readers perform acupuncture, please **ensure** to consult professional TCM practitioners since our principles on combination of acupoints **have not** been proved clinically.

The causes of the disease must be clear before a practitioner selects the acupoints. Furthermore, acupuncture is **not recommended** as the main treatment method for patients with organic diseases. For instance, a patient is likely primarily diagnosed with digestive disorders when he or she suffers from indigestion and loss of appetite. The practitioner should learn more about the symptoms and make clear the causes of the symptoms with diagnose methods, like imaging, electrorheology and biochemistry tests.

#### 3.4.1 Main Principle - Combination of Host and Guest Acupoints (主辅配穴)

The acupoints which are related with the causes of the diseases directly are selected as the host acupoints (主穴) when the patient does not have severe diseases or it is not in an emergency. Meanwhile, additional assistant acupoints (guest acupoint, 辅穴) can be selected according to the symptoms of the patient.

For instance, a patient suffers from palpitations, pains in the heart or arrhythmia, but without organic diseases or significant abnormality in the biochemistry tests. At the same time, the patient reports to suffer from mental pressure and to be overwrought before the occurrence of the symptoms. In this case, the acupoints corresponding to the adrenal gland in our model (topographic map of acupoints), like CV4 (Guanyuan, 关元), CV6 (Qihai, 气海), GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), BL24 (Qihaisu, 气海俞), SP6 (Sanyinjiao, 三阴交), and ST36 (Zusanli, 足三里) are selected as the host acupoints to relieve the mental pressure and recover from the effects of overworking on the body. Acupoints corresponding to the Hind Head in the model, GV20 (Baihui, 百会), GV17 (Naohu, 脑户), BL10 (Tianzhu, 天柱), SI3 (Houxi, 后溪), BL62 (Shenmai, 申脉), and BL64 (Jinggu, 京骨), serve as the guest acupoints to further relieve the mental pressure while acupoints corresponding to the heart in our model like BL15 (Xinshu, 心俞), GV11 (Shendao, 神道), CV17

(Danzhong, 脘中), CV14 (Juque, 巨阙), PC6 (Neiguan, 内关), HT7 (Shenmen, 神门), and SP4 (Gongsun, 公孙), are also selected as guest acupoints to relieve uncomfortable feeling in the heart.

On the contrary, if the patient shows the symptoms (palpitations, pains in the heart or arrhythmia) of the heart first and then the patient feels nervous and suffers from mental pressure and even shows other symptoms. During the treatment, acupoints corresponding to the heart serve as the host acupoints to relieve the heart symptoms while acupoints corresponding to the Hind Head and the adrenal gland in our model are selected as guest acupoints.

During the treatment, we recommend selecting some of the acupoints above and using them in combination. We strongly suggest selecting the guest and host acupoints correctly according to the causes of the symptoms (**Note**: we only discuss the combination of acupoints but not the needling techniques in this book.).

### 3.4.2 Principles in Detail

#### 3.4.2.1 Combination of Isofunct-Isotop-Acupoints (同功同位配穴法)

Acupoints are distributed on the head, the trunk, and limbs, and acupoints in the same relative location (corresponding to the same head or viscera representing area) of our model (topographic maps of acupoints) share the same or similar functions. Isofunct-Isotop-Acupoints refer to acupoints which possess the same relative location in our model and are in the same physical region of the body (the head, the trunk, or limbs). For instance, PC2 (Tianquan, 天泉), HT2 (Qingling, 青灵), HT3 (Shaohai, 少海), PC3 (Quze, 曲泽), PC4 (Ximen, 部门), PC5 (Jianshi, 间使), PC6 (Neiguan, 内关), PC7 (Daling, 大陵), HT4 (Lingdao, 灵道), HT5 (Tongli, 通里), HT6 (Yinxi, 阴郄), HT7 (Shenmen, 神门), PC8 (Laogong, 劳宫), and HT8 (Shaofu, 少府), all these acupoints are effective for heart problems (Isofunct, same function) and all on the upper limb (Isotop, same location; the “heart region of the TM - AAUL”). Therefore, they can be regarded as a group of Isofunct-Isotop-Acupoints.

The Combination of Isofunct-Isotop-Acupoints is remarkably easy (**Tables 3.2.1 – 3.2.6**). Acupoints on either one side or both (symmetric) sides can be selected. But this method is only applicable to simple symptoms.

### 3.4.2.2 Combination of Isofunct-Allotop-Acupoints (同功异位配穴法)

We define acupoints with the same relative locations (corresponding to the same viscera or head region, with the same or similar functions) in our model (topographic maps of acupoints), but distributed in different physical locations (the head, the trunk, or limbs) as Isofunct-Allotop-Acupoints. For instance, acupoints BL17 (Geshu, 脾俞), CV16 (Zhongting, 中庭), PC6 (Neiguan, 内关), and SP3 (Taibai, 太白) are effective for singulation. They correspond to the diaphragm (“the location of the diaphragm” in the topographic maps of acupoints), between the heart, the lung and the stomach representing regions in our model and are physically located on the posterior trunk, the anterior trunk, the upper limb, and the lower limb, respectively. Therefore, they are a group of Isofunct-Allotop-Acupoints (**Table 3.4.1**). Acupuncture using the Combination of Isofunct-Allotop-Acupoints method can enlarge the area of needling stimulation and has even better clinical effects.

**Table 3.4.1** Examples of Combination of Isofunct-Allotop-Acupoints

| body region     | posterior trunk<br>(head) acupoints        | anterior trunk<br>acupoints | upper limb<br>acupoints                  | lower limb<br>acupoints                |
|-----------------|--|-----------------------------|--|--|
| Frontal Head    | GV24 (Shenting, 神庭), ST8 (Touwei, 头维)      |                             | LI4 (Hegu, 合谷), LI5 (Yangxi, 阳溪)         | ST44 (Neiting, 内庭), ST41 (Jiexi, 解溪)   |
| Temporal Head   | GB4 (Hanyan, 额厌), GB8 (Shuaigu, 率谷)        |                             | TE5 (Waiguan, 外关), TE10 (Tianjing, 天井)   | GB41 (Zulinqi, 足临泣), GB38 (Yangfu, 阳辅) |
| Hind Head       | BL10 (Tianzhu, 天柱), GV19 (Houding, 后顶)     |                             | SI4 (Wangu, 腕骨), SI3 (Houxi, 后溪)         | BL62 (Shenmai, 申脉), BL64 (Jinggu, 京骨)  |
| lateral canthus | GB1 (Tongziliao, 瞳子髎) GB5 (Xuanlu, 悬颅)     |                             | TE5 (Waiguan, 外关), TE2 (Yemen, 液门)       | GB43 (Xiaxi, 侠溪), GB38 (Yangfu, 阳辅)    |
| medial canthus  | BL1 (Jingming, 睛明), BL3 (Meichong, 眉冲)     |                             | LI11 (Quchi, 曲池), SI6 (Yanglao, 养老)      | LR3 (Taichong, 太冲), BL58 (Feiyang, 飞扬) |
| ears            | SI19 (Tinggong, 听宫), TE17 (Yifeng, 翳风)     |                             | TE5 (Waiguan, 外关), TE8 (Sanyangluo, 三阳络) | GB43 (Xiaxi, 侠溪), GB42 (Diwuhui, 地五会)  |
| nose            | LI20 (Yingxiang, 迎香), GV23 (Shangxing, 上星) |                             | LI4 (Hegu, 合谷), LI2 (Erjian, 二间)         | ST45 (Lidui, 厉兑), ST44 (Neiting, 内庭)   |
| mouth           | ST4 (Dicang, 地仓), SI18                     |                             | LI4 (Hegu, 合谷), LI5 (Yangxi, 阳溪)         | ST44 (Neiting, 内庭), ST41 (Jiexi, 解溪)   |

|   |  |  |   |   |
|---|--|--|---|---|
|   | (Quanliao, 颧髎)                             |  | 阳溪)                                     | 解溪)   |
| throat                                      | CV23 (Lianquan, 廉泉), SI17 (Tianrong, 天容)   |  | LU10 (Yuji, 鱼际), LU7 (Lieque, 列缺)       | KI6 (Zhaochai, 照海), KI4 (Dazhong, 大钟)                               |
| nape  | BL10 (Tianzhu, 天柱), GV14 (Dazhui, 大椎)      |  | SI3 (Houxi, 后溪), SI7 (Zhizheng, 支正)     | BL65 (Shugu, 束骨), BL60 (Kunlun, 昆仑)                                 |
| thorax                                      | BL13 (Feishu, 肺俞), B4 (Juqueshu, 巨阙俞)      | LU1 (Zhongfu, 中府), CV17 (Danzhong, 胸中)   | LU4 (Xiabai, 侠白), LU9 (Taiyuan, 太渊)     | KI4 (Dazhong, 大钟), ST40 (Fenglong, 丰隆)                              |
| hypochondrium (above the xiphoid process)   | BL18 (Ganshu, 肝俞), BL47 (Hunmen, 魂门)       | GB23 (Zhejin, 辍筋), SP21 (Dabao, 大包), LR14 (Qimen, 期门), ST19 (Burong, 不容)       | TE6 (Zhigou, 支沟), TE5 (Waiguan, 外关)     | GB38 (Yangfu, 阳辅), GB36 (Waiqiu, 外丘), and GB34 (Yanglingquan, 阳陵泉)  |
| hypochondrium (below the xiphoid process) ) | BL19 (Danshu, 胆俞), BL49 (Yishe, 意舍)        | GB25 (Jingmen, 京门), LR13 (Zhangmen, 章门), ST20 (Chengman, 承满), GB24 (Riyue, 日月) | SI4 (Wangu, 腕骨), SI3 (Houxi, 后溪)        | LR3 (Taichong, 太冲), LR4 (Zhongfeng, 中封), and SP9 (Yinlingquan, 阴陵泉) |
| lower back                                  | BL23 (Shenshu, 肾俞), GV3 (Yaoyangguan, 腰阳关) | CV4 (Guanyuan, 关元), CV6 (Qihai, 气海)  | SI3 (Houxi, 后溪), UE7 (Yaotongdian, 腰痛点) | BL40 (Weizhong, 委中), BL57 (Chengshan, 承山)                           |
| “lung above the heart”                      | GV13 (Taodao, 陶道), BL11 (Dazhu, 大杼)        | KI27 (Shufu, 俞府), CV21 (Xuanji, 璇玑)  |   | KI6 (Zhaochai, 照海), KI3 (Taixi, 太溪)                                 |
| heart                                       | GV11 (Shendao, 神道), BL15 (Xinshu, 心俞)      | CV17 (Danzhong, 胸中), PC1 (Tianchi, 天池)   | HT6 (Yinxi, 阴郄), PC6 (Neiguan, 内关)      | SP4 (Gongsun, 公孙)   |
| “lung below the heart”                      | GV12 (Shenzhu, 身柱), BL13 (Feishu, 肺俞)      | CV16 (Zhongting, 中庭), KI22 (Bulamng, 步廊)                                       | LU6 (Kongzui, 孔最), LU9 (Taiyuan, 太渊)    |   |
| diaphragm                                   | GV9 (Zhiyang, 至阳), BL17 (Geshu,            | CV15 (Jiwei, 鸠尾), LR14   | PC6 (Neiguan, 内关)                       | SP3 (Taibai, 太白)  |

|                       |   |   |  |   |
|-----------------------|---|---|--|---|
|                       | 膈俞)   | (Qimen, 期门)                               |  |   |
| stomach               | BL17 (Geshu, 脐俞), GV8 (Jinsuo, 筋缩)  | CV12 (Zhongwan, 中脘), KI20 (Futonggu, 腹通谷) | PC7 (Daling, 大陵), PC6 (Neiguan, 内关)      | <b>ST36 (Zusanli, 足三里)</b> , SP5 (Shangqiu, 商丘), ST42 (Chongyang, 冲阳) |
| liver and gallbladder | BL18 (Ganshu, 肝俞), BL19 (Danshu, 胆俞)  | LR14 (Qimen, 期门), GB24 (Riyue, 日月)        | SI3 (Houxi, 后溪), HT7 (Shenmen, 神门)       | LR3 (Taichong, 太冲), LR4 (Zhongfeng, 中封)                               |
| spleen                | BL51(Huangmen, 育门), BL20 (Pishu, 脾俞)  | LR13 (Zhangmen, 章门), ST25 (Tianshu, 天枢)   | LI11 (Quchi, 曲池)                         | SP1 (Yinbai, 隐白), SP10 (Xuehai, 血海)                                   |
| pancreas              | B3 (Weiwanxiashu, 胃腕下俞)   | ST23 (Taiyi, 太乙), CA (Weishang, 胃上)       | TE4 (Yangchi, 阳池), SI4 (Wangu, 腕骨)       |   |
| adrenal gland         | GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞)   | CV4 (Guanyuan, 关元), CV6 (Qihai, 气海)       | <b>LI4 (Hegu, 合谷) (Appendix 6)</b>       | SP6 (Sanyinjiao, 三阴交), <b>ST36 (Zusanli, 足三里)</b>                     |
| kidney                | BL23 (Shenshu, 肾俞), BL52 (Zhishi, 志室)   | CV5 (Shimen, 石门), GB25 (Jingmen, 京门)      | LI6 (Pianli, 偏历), TE9 (Sidu, 四渎)         | KI8 (Jiaoxin, 交信), SP8 (Diji, 地机)                                     |
| urinary bladder       | B5 (Xiajizhu, 下极俞), BL28 (Pangguangshu, 膀胱俞)  | ST28 (Shuidao, 水道), CV3 (Zhongji, 中极)     | LI8 (Xialian, 下廉), SI2 (Qiangu, 前谷)      | LR9 (Yinbao, 阴包), LR5 (Ligou, 蠕沟)                                     |
| intestine             | BL25 (Dachangshu, 大肠俞), BL27 (Xiaochangshu, 小肠俞)  | SP16 (Fu'ai, 腹哀), KI14 (Siman, 四满)        | LI7 (Wenliu, 温溜), LI10 (Shousanli, 手三里), | ST39 (Xiajuxu, 下巨虚), ST37 (Shangjuxu, 上巨虚)                            |
| internal genitalia    | BL24 (Qihaishu, 气海俞), BL31 (Shangliao, 上髎), BL32 (Ciliao, 次髎), BL33 (Zhongliao, 中髎), BL34 (Xialiao, 下髎) | CV4 (Guanyuan, 关元), CV6 (Qihai, 气海)       | LI4 (Hegu, 合谷)?                          | SP1 (Yinbai, 隐白), LR5 (Zhongdu, 中都)                                   |

|  |  |                                       |                         |   |
|--|--|---------------------------------------|-------------------------|---|
|  | 髎)   |                                       |                         |   |
| external genitalia   | GV3<br>(Yaoyangguan, 腰阳关), BL31<br>(Shangliao, 上髎),<br>BL32 (Ciliao, 次髎), BL33<br>(Zhongliao, 中髎),<br>BL34 (Xialiao, 下髎) | CV2 (Qugu, 曲骨), CV4<br>(Guanyuan, 关元) | <b>HT8 (Shaofu, 少府)</b> | LR5 (Zhongdu, 中都), LR4<br>(Zhongfeng, 中封) |
| ?, suspicious;<br><br>For the limb acupoints, the <u>underscore</u> ones should be inserted into the <b>shallow layer</b> (the shallow layer of the distal posterior upper limb and the anterior and lateral lower limb corresponds to the head regions); the <b>bold</b> ones should be inserted into the <b>middle layer</b> and the others into the deep layer. |  |                                       |                         |   |

### 3.4.2.3 Combination of Similar and Complementary Acupoints (相似互补配穴法)

The principle of Combination of Similar and Complementary Acupoints (相似互补配穴法) is to select two groups of acupoints corresponding to the same relative locations or viscera simultaneously in our model (topographic maps of acupoints), with the relative location of some (or single) acupoints corresponding to the more rostral region (head region) and the that of others to the more causal region (reproductive system) in our model.

Acupoint from either the same or different physical locations (the head, the trunk, or limbs) can be selected according to the Combination of Similar and Complementary Acupoints. For instance, CV13 (Shangwan, 上腕), CV12 (Zhongwan, 中腕), ST21 (Liangmen, 梁门), CV10 (Xiawan, 下腕) can be selected for stomachache. These four acupoints are all in the upper abdomen region, corresponding to the stomach in our model. But CV13 (Shangwan, 上腕) is adjacent with the representing region of the heart in our model (TM - AAAT). Both CV12 (Zhongwan, 中腕) and ST21 (Liangmen, 梁门) are in the “middle stomach region” of the TM - AAAT. Furthermore, CV10 (Xiawan, 下腕) is overlapping with the regions of the liver, the gallbladder, and the intestine in the model (TM - AAAT). In another example, LU6 (Kongzui, 孔最), LU9 (Taiyuan, 太渊), BL13 (Feishu, 肺俞), GV11 (Shendao, 神道), CV17 (Danzhong, 膻中), and KI24 (Lingxu, 灵墟) are corresponding to the lung (“lung below the heart”), while KI3 (Taixi, 太溪), KI6 (Zhaohai, 照海), BL11 (Dazhu, 大杼), GV13(Taodao, 陶道), LU1 (Zhongfu, 中府), CV20 (Huagai, 华盖) correspond to the lung (“lung above the heart”) in our model. These two groups of acupoints can be selected together based on the principle of the Combination of Similar and Complementary Acupoints to cure diseases of the lung.

Some acupoint combination examples selected with the principle of the Combination of Similar and Complementary Acupoints are listed in the table below (**Table 3.4.2**). Acupoints from the group 1 and the group 2 are complementary to each other and should be used together in combination during treatment.

**Table 3.4.2** Example acupoints with the principle of the Combination of Similar and Complementary Acupoints

| body region | posterior trunk (head) acupoints           | anterior trunk acupoints               | upper limb acupoints                  | lower limb acupoints                       | group   |
|-------------|--|--|---------------------------------------|--|---------|
| nape        | GV18 (Qiangjian, 强间), BL9 (Yuzhen, 玉枕)     |  | TE5 (Waiguan, 外关), TE12 (Xiaoluo, 消泺) | GB40 (Qiuxu, 丘墟), GB39 (Xuanzhong, 悬钟)     | group 1 |
|             | GV14 (Dazhui, 大椎), BL10 (Tianzhu, 天柱)      |  | SI7 (Zhizheng, 支正), SI3 (Houxi, 后溪)   | BL66 (Zutonggu, 足通谷), BL62 (Shenmai, 申脉)   | group 2 |
| eyes        | BL1 (Jingming, 睛明), BL3 (Meichong, 眉冲)     |  | PC3 (Quze, 曲泽), LI4 (Hegu, 合谷)        | LR2 (Xingjian, 行间), LR3 (Taichong, 太冲)     | group 1 |
|             | GB16 (Muchuang, 目窗), GB5 (Xuanlu, 悬颅)      |  | SI6 (Yanglao, 养老), TE2 (Yemen, 涣门)    | GB41 (Zulingqi, 足临泣), BL66 (Zutonggu, 足通谷) | group 2 |
| ears        | GB7 (Qubin, 曲鬓), SI19 (Tinggong, 听宫)       |  | TE5 (Waiguan, 外关), TE9 (Sidu, 四渎)     | GB43 (Xiaxi, 僻溪), GB42 (Diwuhui, 地五会)      | group 1 |
|             | GB11 (Touqiaoying, 头窍阴), TE18 (Chimai, 瘰脉) |  | SI3 (Houxi, 后溪), SI2 (Qianggu, 前谷)    |  | group 2 |
| lung        | GV11 (Shendao, 神道), BL13 (Feishu, 肺俞)      | CV17 (Danzhong, 膻中), KI24 (Lingxu, 灵墟) | LU6 (Kongzui, 孔最), LU7 (Lieque, 列缺)   |  | group 1 |
|             | GV13 (Taodao, 陶道), BL11 (Dazhu, 大杼)        | LU1 (Zhongfu, 中府), CV20 (Huagai, 华盖)   |                                       | KI6 (Zhaohai, 照海), KI3 (Taixi, 太溪)         | group 2 |
| heart       | B4 (Juqueshu, 巨阙俞), BL15 (Xinshu, 心俞)      | CV17 (Danzhong, 膻中), PC1 (Tianchi, 天池) | HT4 (Lingdao, 灵道), HT6 (Yinxi, 阴郄)    |  | group 1 |

|  |  |  |   |   |         |
|--|--|--|---|---|---------|
|  | GV9 (Zhiyang, 至阳), BL45 (Yixi, 谭譚),        | CV15 (Jiuwei, 鸠尾), and CV14 (Juque, 巨阙)  | PC6 (Neiguan, 内关), LU9 (Taiyuan, 太渊)      | SP4 (Gongsun, 公孙)                                 | group 2 |
| stomach  | BL16 (Dushu, 督俞), BL46 (Geguan, 脐关)        | ST19 (Burong, 不容), CV13 (Shangwan, 上腕)   | PC6 (Neiguan, 内关), PC4 (Ximen, 部门)        | SP4 (Gongsun, 公孙), SP5 (Shangqiu, 商丘)             | group 1 |
|  | BL20 (Pishu, 脾俞), BL48 (Yanggang, 阳纲)      | CV10 (Xiawan, 下腕), ST24 (Huaroumen, 滑肉门) | LU5 (Chize, 尺泽), LI2 (Sanjian, 三间)        | ST44 (Neiting, 内庭), <b>ST36 (Zusanli, 足三里)</b>    | group 2 |
| liver & gallbladder  | BL18 (Ganshu, 肝俞), BL47 (Hunmen, 魂门)       | SP21 (Dabao, 大包), LR14 (Qimen, 期门)       | <b>TE5 (Waiguan, 外关), SI3 (Houxi, 后溪)</b> | ST43 (Xiangu, 陷谷), GB34 (Yanglingquan, 阳陵泉)       | group 1 |
|  | BL49 (Yishe, 意舍), BL19 (Danshu, 胆俞)        | GB24 (Riyue, 日月), LR13 (Zhangmen, 章门)    | SI4 (Wangu, 腕骨), TE6 (Zhigou, 支沟)         | <b>SP9 (Yinlingquan, 阴陵泉), LR3 (Taichong, 太冲)</b> | group 2 |
| intestine  | GV5 (Xuanshu, 悬枢), BL21 (Weishu, 胃俞),      | SP15 (Daheng, 大横), ST24 (Huaroumen, 滑肉门) | LI10 (Shousanli, 手三里), LI8 (Xialian, 下廉), | ST44 (Neiting, 内庭), ST37 (Shangjuxu, 上巨虚)         | group 1 |
|  | B5 (Xiajizhu, 下极俞), BL25 (Dachangshu, 大肠俞) | KI14 (Siman, 四满), CV4 (Guanyuan, 关元)     | LI4 (Hegu, 合谷) ( <b>Appendix 6</b> )      | LR5 (Ligou, 蠕沟) SP8 (Diji, 地机)                    | group 2 |
| ?, suspicious;   |  |  |   |   |         |
| For the limb acupoints, the <u>underscore</u> ones should be inserted into the <u>shallow layer</u> (the shallow layer of the distal posterior upper limb and the anterior and lateral lower limb corresponds to the head regions); the <b>bold</b> ones should be inserted into the <b>middle layer</b> and the others into the deep layer. |  |  |   |   |         |

#### 3.4.2.4 Synergic Combination of Acupoints (协同配穴法)

The Synergic Combination of Acupoints (协同配穴法) is only applicable to some diseases.

The main principle of this method is to select the synergic assistant points (协同穴), which can assist the host acupoints during the treatment, but are not related with the symptoms directly. The assistant (or guest) acupoints (辅穴) in the Combination of Host and Guest Acupoints (主辅配穴法) is related with the diseases directly. For instance, for the abnormality of the blood sugar caused by disorders of the pancreas, acupoints corresponding to the pancreas in the model like B3

(Weiwanxiashu, 胃脘下俞), LR13 (Zhangmen, 章门), ST25 (Tianshu, 天枢), LI11 (Quchi, 曲池), and TE4 (Yangchi, 阳池) can be selected as the host acupoints. Meanwhile, the acupoints corresponding to the adrenal gland like CV6 (Qihai, 气海), CV4 (Guanyuan, 关元), GV4 (Mingmen, 命门), BL23 (Shenshu, 肾俞), and ST36 (Zusanli, 足三里) can be used as the synergic assistant acupoints based on the facts that the adrenal gland can adjust the blood sugar via the permissive action and the functions of the catecholamine (**Table 3.4.3**). Of course, guest acupoints (辅穴) can be chosen to relieve other symptoms such as polyphagia (BL21 (Weishu, 胃俞), BL20 (Pishu, 脾俞), CV12 (Zhongwan, 中脘), and PC6 (Neiguan, 内关)), dry mouth (CV23(Lianquan, 廉泉) and KI6 (Zhaohai, 照海)), and polyuria ((CV9 (Shuifen, 水分), CV3 (Zhongji, 中极), BL28 (Pangguangshu, 膀胱俞), and KI3 (Taixi, 太溪)) in this case.

**Table 3.4.3 Example of Synergic Combination of Acupoints**

| regions       | synergic assistant points   | effector organ  |
|---------------|---|---|
| head          | GV22 (Xinhui, 囊会),<br>GV20 (Baihui, 百会)   | The respiratory, circulatory, digestive, metabolism, reproductive, urinary, skeletal, nervous system, and metabolism. |
| nape          | HN15 (Jingbailao, 颈百劳),<br>GV14 (Dazhui, 大椎)  | The respiratory, circulatory, digestive, metabolism, reproductive, urinary, skeletal, nervous system, and metabolism. |
| heart         | GV11 (Shendao, 神道),<br>BL15 (Xinshu, 心俞),<br>CV15 (Jiwei, 鸠尾),<br>CV14 (Juque, 巨阙),<br>PC6 (Neiguan, 内关)                              | The reproductive, urinary, and nervous system   |
| adrenal gland | SP6 (Sanyinjiao, 三阴交),<br>ST36 (Zusanli, 足三里),<br>CV6 (Qihai, 气海),<br>CV4 (Guanyuan, 关元),<br>GV4 (Mingmen, 命门),<br>BL23 (Shenshu, 肾俞) | The respiratory, circulatory, digestive, metabolism, reproductive, urinary, skeletal, nervous system, and metabolism. |

### 3.5 The Acupoint Distribution Model is applicable for the TTM, TMM and TZM acupuncture

#### 3.5.1 The TTM acupoints

##### 3.5.1.1 The TTM Acupoints on the Trunk

Along the Axis of Acupoints on the Anterior Trunk (AAAT) and the Axis of Acupoints on the Posterior Trunk (AAPT), the TTM acupoints functionally correspond to the lung (“**lung above the heart**”), the heart, the lung (“**lung below the heart**”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (**Table 3.5.1**, **Table 3.5.2** and **Figure 3.5.1**). Therefore, the TTM trunk acupoints are functionally aligned in the **standard order** along the AAAT and the AAPT, showing topographic maps (the TP - AAAT and the TP - AAPT, **Figure 3.5.1**).

**Table 3.5.1** classification of the TTM anterior trunk acupoints related with the viscera

| viscera                 | acupoints with functions related with the inner organ   | note        |
|-------------------------|---|-------------|
| lung above the heart *  | AT1 (颈穴), AT3 (锁骨端穴), AT4 (锁骨窝穴), AT6 (心肺合穴), and AT7 (鸽子穴)                                     |             |
| heart                   | AT2 (天突穴), AT6 (心肺合穴), AT8 (渡鸦眼穴), AT12 (膻中上穴), AT13 (肺嘎穴), AT14 (膻中穴), and AT15 (心大穴)          |             |
| lung below the heart ** | AT9 (中肺穴), AT10 (下肺穴), AT11 (头凯穴), and AT19 (剑突尖穴)  |             |
| diaphragm               | AT20 (剑突穴)  |             |
| stomach                 | AT15 (心大穴), AT18 (剑突上穴), AT19 (剑突尖穴), AT20 (剑突穴), AT23 (痞瘤穴), AT24 (伴火穴), and AT25 (剑突下四寸穴)     |             |
| liver and gallbladder   | AT23 (痞瘤穴), AT24 (伴火穴), AT22L (长肋左穴), AT22 (长肋右穴), and AT21R (肝侧穴)                              |             |
| spleen                  | AT21L (脾侧穴)   |             |
| pancreas                | AT25 (剑突下四寸穴)   |             |
| adrenal gland           |   | AT27 (神阙穴)? |
| kidney                  | AT26 (剑突下五寸穴), AT33 (脐下四寸穴), and AT35 (腹股沟长纹穴)  |             |
| urinary bladder         | AT31 (小肠下穴), AT32 (膀胱穴), and AT34 (阴毛上际穴)   |             |
| intestine               | AT26 (剑突下五寸穴), AT27 (神阙穴), AT28 (大肠侧穴), AT29 (大肠端穴), AT30 (小肠上穴), AT31 (小肠下穴), and AT34 (阴毛上际穴) |             |

|   |  |  |
|---|--|--|
| internal genitalia                                  | AT26 (剑突下五寸穴), AT31 (小肠下穴), AT32 (膀胱穴), and AT34 (阴毛上际穴) |  |
| external genitalia                                  | AT31 (小肠下穴), AT32 (膀胱穴), AT33 (脐下四寸穴), and AT35 (腹股沟长纹穴) |  |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |  |

**Table 3.5.2** classification of the TTM posterior trunk acupoints related with the viscera

| viscera   | acupoints with functions related with the inner organ   | note           |
|---|---|----------------|
| lung above the heart *                              | PT5 (培根穴), PT6 (母肺穴), and PT7 (子肺穴)   |                |
| heart   | PT8 (命脉穴), and PT9 (心穴)   |                |
| lung below the heart **                             |   | absent?        |
| diaphragm   | PT10 (膈穴)   |                |
| stomach   | PT12 (胆穴), PT13 (脾穴), and PT14 (胃穴)   |                |
| liver and gallbladder                               | PT10 (膈穴), PT11 (肝穴), and PT12 (胆穴)   |                |
| spleen  | PT13 (脾穴)   |                |
| pancreas  |   | PT13 (脾穴)      |
| adrenal gland                                       |   | PT15 ("三木塞"穴)? |
| kidney  | PT16 (肾穴), and PT25 (髓眼穴)   |                |
| urinary bladder                                     | PT18 (大肠穴), PT19 (小肠穴), PT20 (膀胱穴), and PT24 (寒症总穴)   |                |
| intestine   | PT18 (大肠穴), PT19 (小肠穴), PT20 (膀胱穴), PT21 (固精穴), PT22 (下泄隆门穴), PT23 (肛门穴), PT24 (寒症总穴), and PT26 (马眼穴) |                |
| internal genitalia                                  | PT15 ("三木塞"穴), PT16 (肾穴), PT17 (脏腑总穴), PT21 (固精穴), and PT22 (下泄隆门穴)                                   |                |
| external genitalia                                  | PT16 (肾穴), PT17 (脏腑总穴), PT18 (大肠穴), PT19 (小肠穴), PT20 (膀胱穴), PT21 (固精穴), PT22 (下泄隆门穴), and PT24 (寒症总穴) |                |
| *, throat and trachea; **, bronchus; ?, suspicious. |   |                |

### 3.5.1.2 The TTM Acupoints on the Limbs

Since the number of the TTM limb acupoints is relatively small, no topographic maps like those of the TCM (upper and lower) limb acupoints are formed. Here we simply test whether these TTM limb acupoints match the topographic maps of the TCM limb acupoints by analyzing their locations and functions.

The acupoints AUL6 (手腕上穴) and AUL7 (腕筋间穴) (similar to the in the TCM PC5 (Jianshi, 间使) and PC6 (Neiguan, 内关)) are located between “the heart and stomach regions” of the model, the former regulating the functions of the heart and the latter corresponding to the heart and stomach functionally. The acupoint PUL10 (合谷穴) shares the same name and location as the TCM acupoint LI4 (Hegu, 合谷) and corresponds to the Frontal Head functionally. The acupoint PUL8 (桡骨茎突穴) lies in “the Frontal Head region” of the model, effective to headache and eye diseases. The acupoint PUL12 (无名指中关节穴) is in the region among “the stomach, the liver, the gallbladder and the urinary bladder regions” of the model (deep layer), corresponding to the spleen functionally (**Figure 3.5.1**).

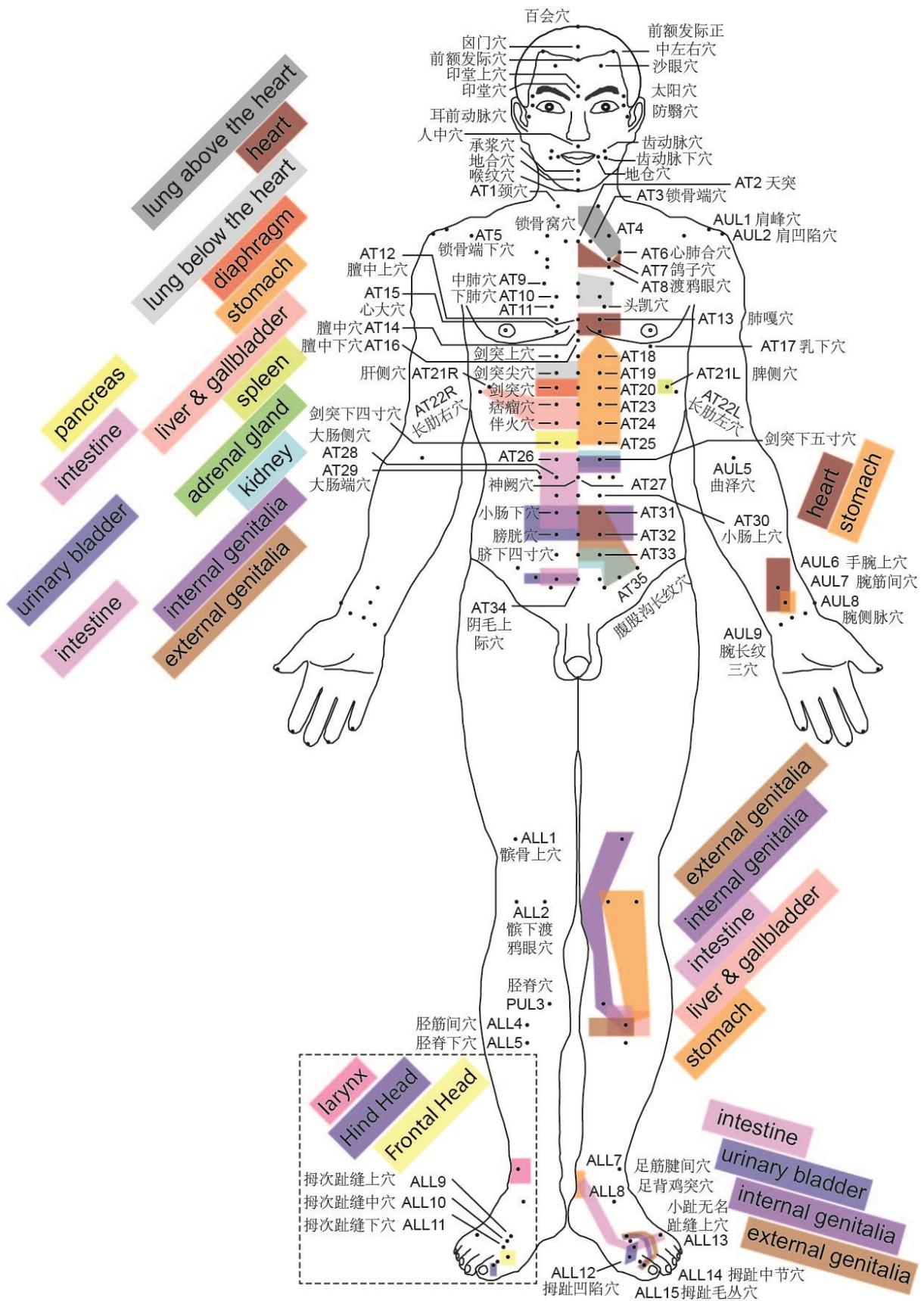
The acupoints ALL1 (髌骨上穴) and ALL3 (胫脊穴) are in “the internal genitalia region” of the model and their functions match the model. The acupoint ALL4 (胫筋间穴) lies in “the intestine region” of the model, however, its functions corresponding to the stomach, the liver, the gallbladder, the intestine and the internal and external genitalia. Regarding the functions, the acupoint ALL4 (胫筋间穴) is comparable to the TCM acupoint ST36 (Zusanli, 足三里), but its location is lower than the latter. The acupoint ALL2 (髌骨下渡鴟眼穴) is located in nearby of “the stomach, the liver and the gallbladder regions” of the model, corresponding to the stomach functionally. The acupoints ALL9 (拇次趾缝上穴) and ALL14 (拇趾毛丛穴) are located in “the urinary bladder, the intestine and the internal and external genitalia regions” of the model with their functions matching the internal and external genitalia. The acupoint ALL12 (拇趾凹陷穴) is also in “the urinary bladder, the intestine and the internal and external genitalia regions” of the model with functions corresponding to the urinary bladder. The acupoint ALL11 (拇次趾缝下穴) lies in “the stomach, the urinary bladder, the intestine and the internal and external genitalia regions” of the model with functions corresponding to the urinary bladder and intestine. The acupoint ALL13 (小趾无名趾缝上穴) is in “the liver and the gallbladder regions” of the model but corresponding to the intestine functionally (**Figure 3.5.1.2**).

The acupoint PLL6 (腘下穴) lies in “the intestine and the internal and external genitalia regions” of the model with functions corresponding to the spleen and the intestine. The acupoint PLL10 (跟腱脉动穴) lies in “the Hind Head region” (shallow layer), close to “the lung (“lung above

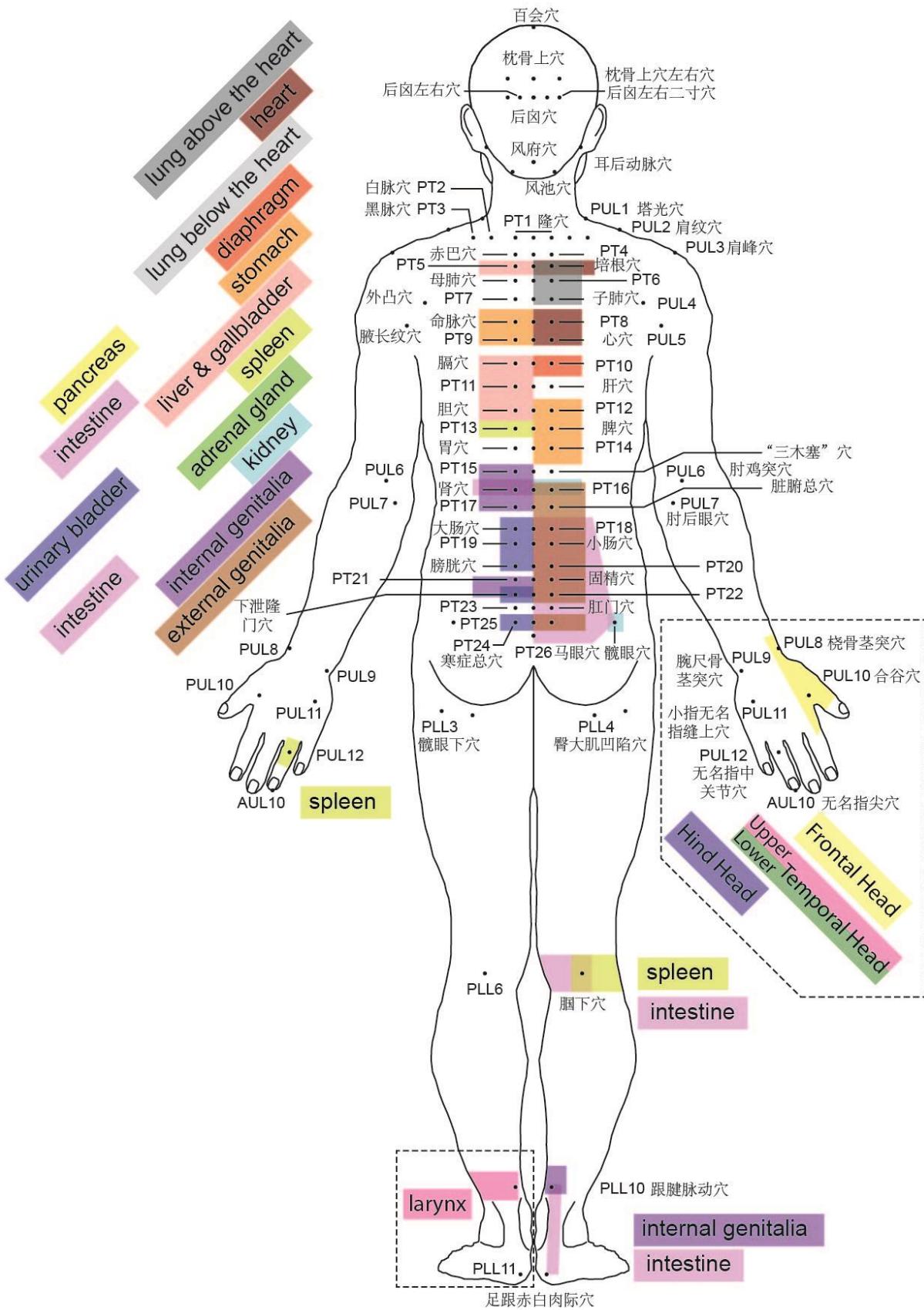
“the heart”) region” of the model with functions corresponding to the larynx. Meanwhile, it is close to “the kidney, the urinary bladder and the internal and external genitalia regions” of the model (deep layer), corresponding to the intestine and the internal genitalia functionally (**Figure 3.5.1.2**).

The acupoint ALL6 (内踝窝动脉穴) lies in “the lung, the stomach, the liver, the gallbladder, the kidney and the internal genitalia regions”, close to “the urinary bladder and the external genitalia regions” of the model with functions corresponding to the stomach and the intestine. The acupoints PLL8 (外踝上一突日穴) and PLL9 (外踝上穴) lies in “the Hind Head region”, close to “the lung (“lung above the heart”) region” in the model, functionally corresponding to the larynx (**Figure 3.5.1.3**).

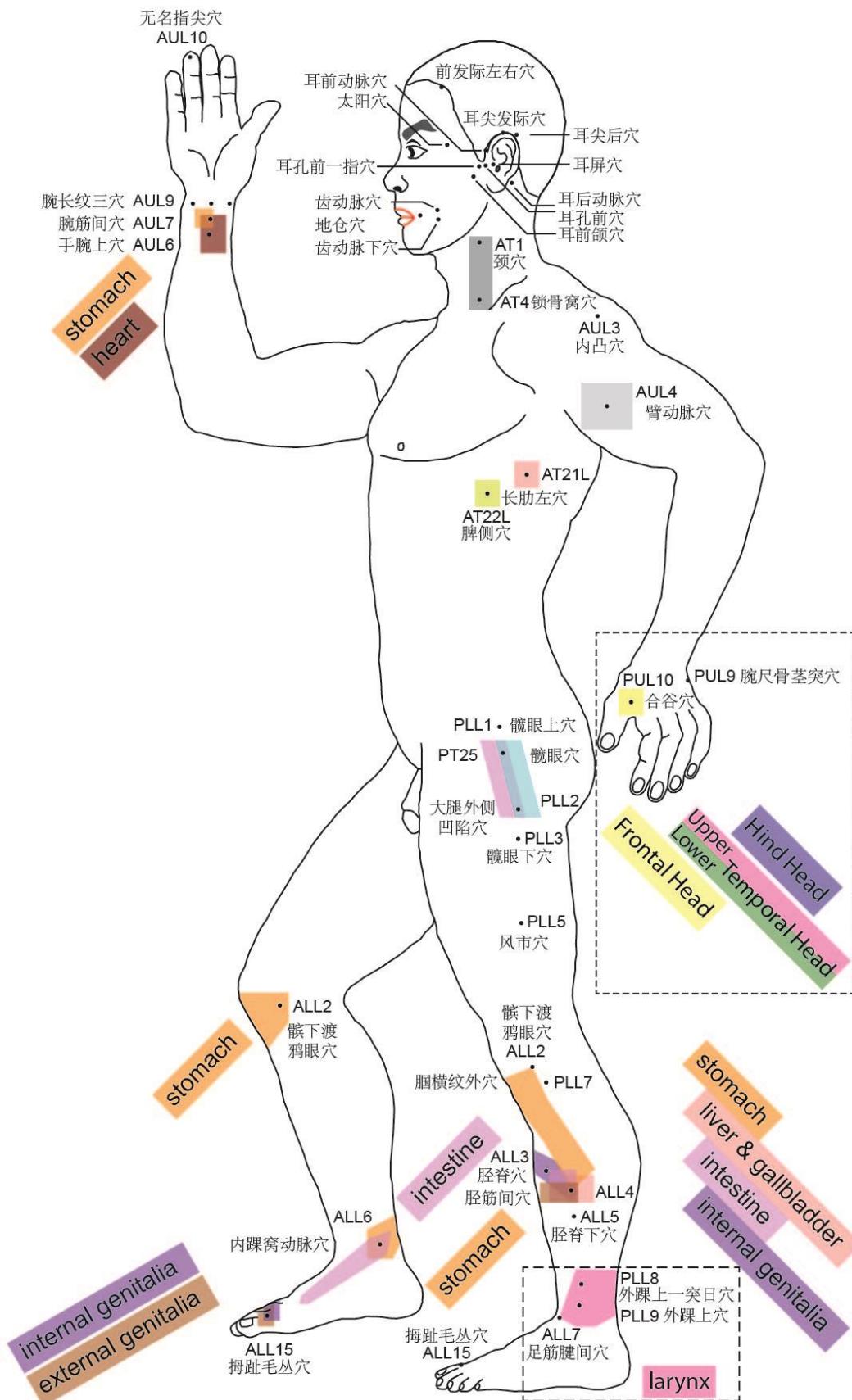
From the analysis above, we see that the locations and functions of the TTM limb acupoints match the topographic maps of TCM limb acupoints overall except for some exceptions (ALL4, 胫筋间穴; ALL13, 小趾无名趾缝上穴).



**Figure 3.5.1.1 the classification of the TTM anterior acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.



**Figure 3.5.1.2 the classification of the TTM posterior acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.



**Figure 3.5.1.3 the classification of the TTM acupoints (side view).** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.

### 3.5.2 The TMM acupoints

#### 3.5.2.1 The TMM Acupoints on the Trunk

Along the Axis of Acupoints on the Anterior Trunk (AAAT) and the Axis of Acupoints on the Posterior Trunk (AAPT), the TMM acupoints functionally correspond to the lung (“**lung above the heart**”), the heart, the lung (“**lung below the heart**”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (**Table 3.5.3, Table 3.5.4** and **Figure 3.5.2**). Therefore, the TMM trunk acupoints are functionally aligned in the **standard order** along the AAAT and the AAPT, showing topographic maps (the TP - AAAT and the TP - AAPT, **Figure 3.5.2**).

**Table 3.5.3** classification of the TMM anterior trunk acupoints related with the viscera

| viscera   | acupoints with functions related with the inner organ  | note        |
|---|--|-------------|
| lung above the heart *                              | AT1 (锁骨下凹穴), AT2 (嗓子穴), AT3 (嗓子下穴), AT4a (肺前第四穴), AT5 (乌鸦眼穴), AT6 (大基穴), and AT7 (小基穴)                     |             |
| heart   | AT2 (嗓子穴), AT5 (乌鸦眼穴), AT6 (大基穴), AT7 (小基穴), AT8 (心源穴), AT10 (心旁穴), AT11 (癫痫穴), AT12 (心尖穴), and AT9 (黑白际穴) |             |
| lung below the heart **                             | AT4 (肺前穴), AT5 (乌鸦眼穴), AT6 (大基穴), AT7 (小基穴), and AT13 (肺旁穴)  |             |
| diaphragm   | AT15 (膈间穴)   |             |
| stomach   | AT14 (胃腹穴), AT16 (巴达干腹穴), AT17 (剑突穴), AT18Ra (肝上穴), AT18La (脾上穴), AT19 (痞穴), and AT21 (火衰穴)                |             |
| liver and gallbladder                               | AT16 (巴达干腹穴), AT18Ra (肝上穴), AT18Rb (肝中穴), AT18Rc (肝下穴), and AT20 (穿透穴)                                     |             |
| spleen  | AT18La (脾上穴), AT18Lb (脾中穴), AT18Lc (脾下穴), and AT20 (穿透穴)   |             |
| pancreas  |  | absent?     |
| adrenal gland                                       |  | AT22 (脐窝穴)? |
| kidney  | AT28 (子宫前穴)  |             |
| urinary bladder                                     | AT27 (膀胱前穴), AT29 (耻骨穴), and AT30 (股内侧穴)   |             |
| intestine   | AT22 (脐窝穴), AT23 (回肠穴), AT24 (盲肠穴), AT25 (小肠上穴), AT26 (小肠下穴), and AT30 (股内侧穴)                              |             |
| internal genitalia                                  | AT22 (脐窝穴), AT28 (子宫前穴), and AT29 (耻骨穴)  |             |
| external genitalia                                  | AT27 (膀胱前穴), and AT28 (子宫前穴)   |             |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |             |

**Table 3.5.4** classification of the TMM posterior trunk acupoints related with the viscera

| viscera   | acupoints with functions related with the inner organ  | note       |
|---|--|------------|
| lung above the heart *                              | PT3 (巴达干穴), PT4 (母肺穴), and PT5 (子肺穴)   |            |
| heart   | PT6 (命脉穴), and PT8 (心穴)  |            |
| lung below the heart **                             | PT7 (肺中穴)  |            |
| diaphragm   | PT9 (膈穴), and PT10 (肝穴)  |            |
| stomach   | PT11 (胆穴), PT12 (脾穴), and PT13 (胃穴)  |            |
| liver and gallbladder                               | PT9 (膈穴), PT10 (肝穴), and PT11 (胆穴)   |            |
| spleen  | PT12 (脾穴)  |            |
| pancreas  |  | PT12 (脾穴)? |
| adrenal gland                                       | PT19 (脏腑总穴)  |            |
| kidney  | PT15 (肾穴), PT16 (肾黑脉穴), PT17 (肾精子穴), PT18 (肾脂肪穴), and PT19 (脏腑总穴)  |            |
| urinary bladder                                     | PT20 (大肠穴), PT21 (小肠穴), PT22 (膀胱穴), PT24 (下清赫依穴), and PT26 (第 22 椎穴)   |            |
| intestine   | PT14 (精府穴), PT15 (肾穴), PT20 (大肠穴), PT21 (小肠穴), PT22 (膀胱穴), PT23 (精穴), PT24 (下清赫依穴), PT25 (第 21 椎穴), PT26 (第 22 椎穴), and PT27 (第 23 椎穴) |            |
| internal genitalia                                  | PT14 (精府穴), PT15 (肾穴), PT19 (脏腑总穴), PT23 (精穴), and PT24 (下清赫依穴)  |            |
| external genitalia                                  | PT15 (肾穴), PT19 (脏腑总穴), PT21 (小肠穴), PT22 (膀胱穴), PT23 (精穴), PT24 (下清赫依穴), and PT26 (第 22 椎穴)  |            |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |            |

### 3.5.2.2 The TMM Acupoints on the Limbs

Since the number of the TMM limb acupoints is relatively small, no topographic maps like those of the TCM (upper and lower) limb acupoints are formed. Here we simply test whether these TTM limb acupoints match the topographic maps of the TCM limb acupoints by analyzing their locations and functions.

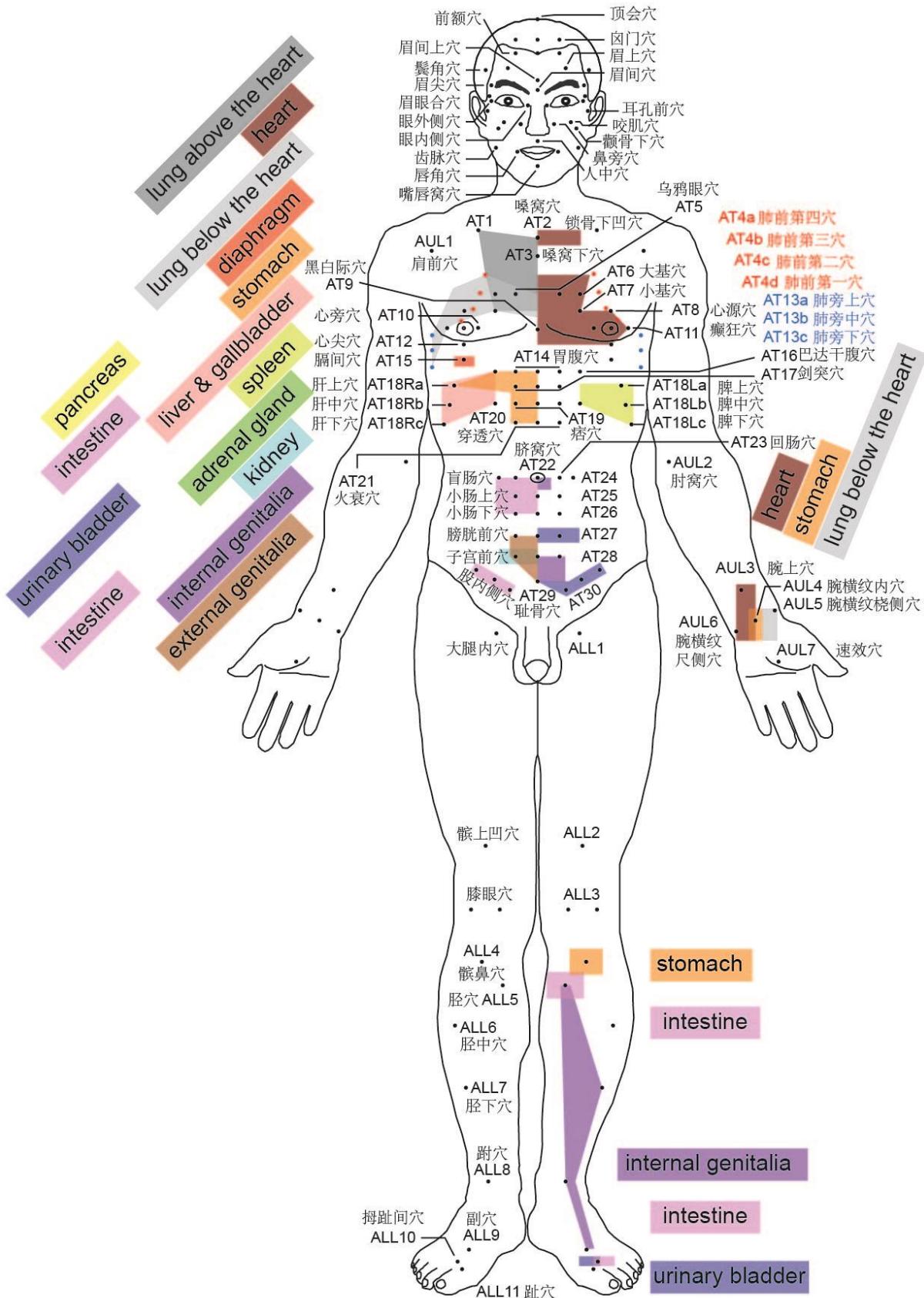
The acupoints AUL3 (腕上穴) and AUL4 (腕横纹内穴) (similar to the in the TCM PC5 (Jianshi, 间使) and PC7 (Daling, 大陵)) are located between “the heart and the stomach” in the model, the former regulating the functions of the heart and the latter corresponding to the heart and the stomach functionally. The acupoint AUL5 (腕横纹桡侧穴) lies in “the lung (“lung below the heart”) region” of the model, regulating the functions of the lung according to the TMM. The acupoint (拇指指合穴) is similar to the TCM acupoint LI4 (Hegu, 合谷) and corresponds to the Frontal Head functionally. The acupoint PUL7 (腕横纹背穴) is in “the Temporal Head region” of the model, effective to headache and deafness. The acupoint PUL9 (手掌旁穴) lies in “the Hind Head region”, effective to pain of the nape and shoulder (**Figure 3.5.2**).

The acupoint ALL4 (髌鼻穴) is in “the intersection regions of the stomach, the liver, the gallbladder, the spleen, the adrenal gland and the intestine” of the model, effective to stomach ache. The acupoint ALL5 (胫穴) is located in “the intersection region of the liver, the gallbladder, the urinary bladder, the intestine and the internal and external genitalia” in the model, corresponding to the intestine and the internal and external genitalia functionally. The acupoint ALL6 (胫下穴) is located in “the lung and the intestine regions” of the model, but corresponding to the internal genitalia functionally. The acupoint ALL8 (跗穴) lies in “the stomach ache and the intestine regions”, close to “the internal and external genitalia regions” of the model, with its functions corresponding to the internal genitalia. The acupoint ALL9 (副穴) lies in “the stomach, the liver, the gallbladder, and the internal and external genitalia regions” of the model with functions corresponding to the internal genitalia. The acupoint ALL10 (拇指间穴) lies in “the stomach, the urinary bladder, and the internal and external genitalia regions” of the model with functions corresponding to the urinary bladder and the intestine (**Figure 3.5.2.1**).

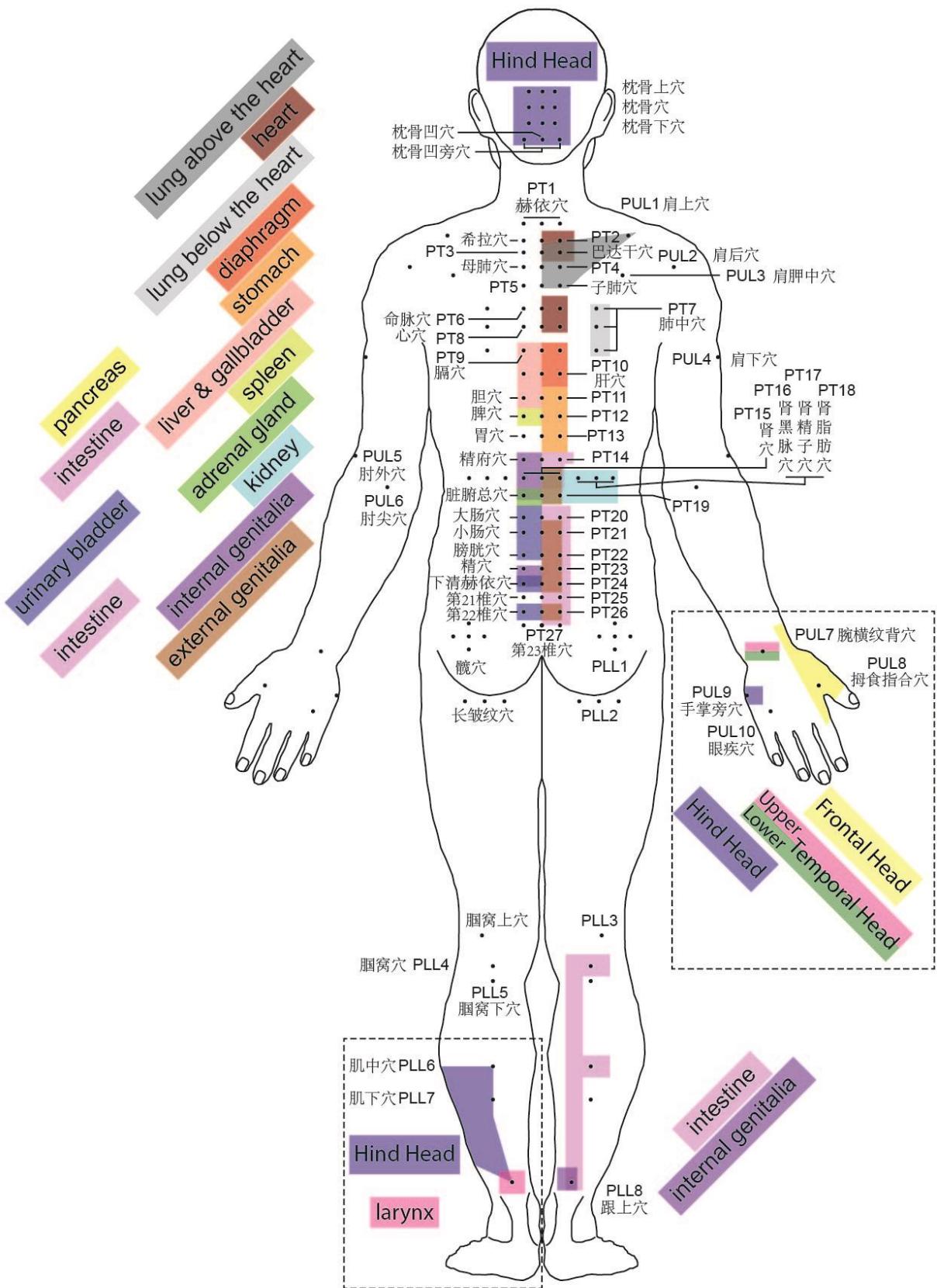
The acupoints PLL4 (腘窝穴)and PLL6 (肌中穴) lie in “the intestine region” of the model with their functions corresponding to the intestine. Meanwhile, the three acupoints PLL6 (肌中穴), PLL7 (肌下穴), and PLL8 (跟上穴) correspond to the Hind Head region functionally, matching the model as well. In addition, the acupoint PLL8 (跟上穴) is close to the “lung above the heart” in the model, functionally corresponding to the larynx in the TMM. However, the acupoint PLL8 (跟上穴) is

effective to diseases of the intestine and the internal genitalia, which is not included in our topographic map of acupoints (**Figure 3.5.2.2**).

From the analysis above, we see that the locations and functions of the TMM limb acupoints match the topographic maps of TCM limb acupoints overall except for some exceptions (ALL7, 胫下穴).



**Figure 3.5.2.1 the classification of the TMM anterior acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.

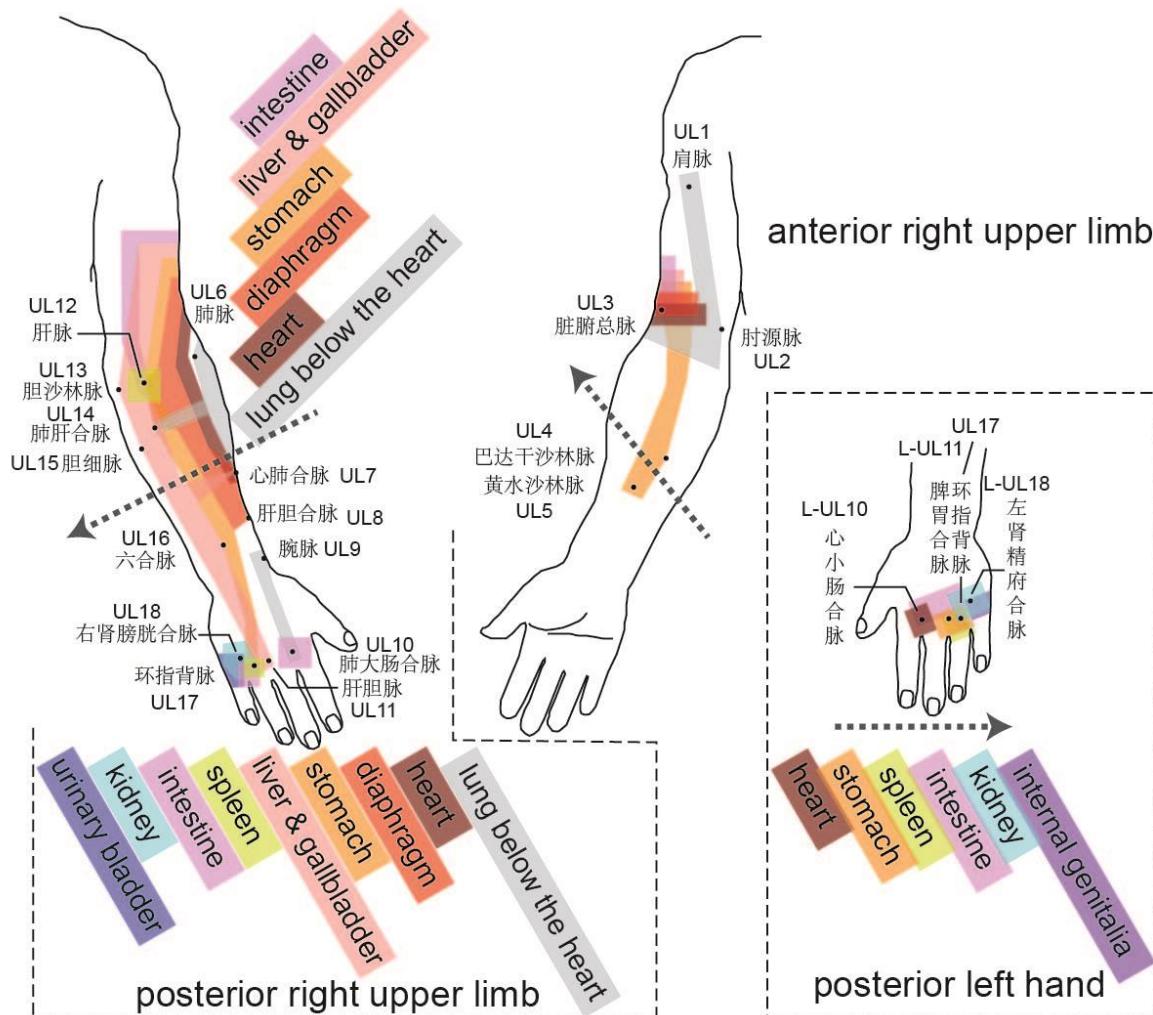


**Figure 3.5.2.2 the classification of the TMM posterior acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera.

### 3.5.2.3 The TMM Bloodletting Therapy (on Limbs)

The TMM bloodletting therapy is a medical method to prevent or cure diseases via bloodletting on specific body sites or acupoints. There are 21 commonly used bloodletting sites on the head and neck, 34 sites on the upper limbs, 18 sites on the lower limbs and 4 sites on the trunk (left-right symmetrical sites on the body counted separately, regarded as two sites).

Here we test whether the distribution of bloodletting sites on the limbs matches the topographic map of the limb acupoints with the method above (analyzing the distribution pattern of acupoints in Chapter 3 Section 2). The bloodletting sites corresponding to the same inner organ are classified in the same group. For instance, the bloodletting sites UL3 (脏腑总脉), UL8 (肝胆合脉), UL12 (肝脉), and UL14 (肺肝合脉), which can influence the function of the diaphragm, are classified in one group corresponding to the diaphragm. The detailed classification result is listed below (**Figure 3.5.3.1** and **Table 3.5.5**).



**Figure 3.5.3.1 the classification of the TMM upper limb bloodletting sites.** Black dots represent bloodletting sites. The colored regions indicate the bloodletting site groups corresponding to the viscera. The arrows indicate the Axis of Upper Limb Bloodletting Sites.

Here we introduce a new definition, the Axis of Upper Limb Bloodletting Sites (the AULBS, largely parallel to the APAUL): from the anterior median forearm along the anterior upper limb to the lateral forearm, continuously along the posterior forearm to the median forearm. Overall, along the AULBB, the bloodletting sites correspond to the lung (“**lung above the heart**”, **absent**), the heart, the lung (“**lung below the heart**”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas (**absent**), the adrenal gland (**absent**), the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia (**absent**) functionally, respectively. Therefore, the upper limb bloodletting sites are functionally aligned in the **standard order** along the AULBS, showing a topographic map (the Topographic Map of the AULBB, or the TP - AULBS, **Figure 3.5.3.1** and **Table 3.5.5**).

**Table 3.5.5** classification of the TMM upper limb bloodletting sites related with the viscera

| viscera                 | Bloodletting sites with functions related with the inner organ  | note    |
|-------------------------|---|---------|
| lung above the heart *  |   | absent? |
| heart                   | UL3 (脏腑总脉), UL7(心肺合脉), and L - UL10 (/心小肠合脉)  |         |
| lung below the heart ** | UL1 (肩脉), UL2 (肘源脉), UL3 (脏腑总脉), UL6 (肺脉), UL14 (肺肝合脉), UL9 (腕脉), and UL10 (肺大肠合脉)                          |         |
| diaphragm               | UL3 (脏腑总脉), UL14 (肺肝合脉), UL12 (肝脉), and UL8 (肝胆合脉)  |         |
| stomach                 | UL3 (脏腑总脉), UL14 (肺肝合脉), UL12 (肝脉), UL16 (六合脉), UL17 (环指背脉), L - UL11 (脾胃合脉), UL4 (巴达干沙林脉), and UL5 (黄水沙林脉) |         |
| liver and gallbladder   | UL3 (脏腑总脉), UL7 (心肺合脉), UL14 (肺肝合脉), UL12 (肝脉), UL13 (胆沙林脉), UL15 (胆细脉), UL16 (六合脉), and UL11 (肝胆脉)         |         |
| spleen                  | UL12 (肝脉), and UL17(环指背脉)   |         |
| pancreas                |   | absent? |
| adrenal gland           |   | absent? |
| kidney                  | UL17 (环指背脉), L - UL18 (左肾膀胱合脉), and UL18 (右肾精府合脉)   |         |
| urinary bladder         | L - UL18 (左肾膀胱合脉)   |         |
| intestine               | UL3 (脏腑总脉), UL12 (肝脉), UL17 (环指背脉), L - UL10 (/心小肠合脉), and UL10 (肺大肠合脉)                                     |         |
| internal genitalia      | UL18 (右肾精府合脉)   |         |
| external genitalia      |   | absent? |

\*, throat and trachea; \*\*, bronchus; ?, suspicious.

六合脉的命名、位置和功效引用参考文献【14】；与参考文献【13】中的“蓉堆脉”位置和功效相同；但参考文献【13】中的文字叙述与图片不符，故而未采用。

Here we need to discuss another three points: ① some of the left-right symmetrically distributed TMM upper limb bloodletting sites on the posterior hands have different names and functions, like the L - UL18 (左肾膀胱合脉) and the UL18 (右肾精府合脉); we think the paired symmetrically distributed bloodletting sites should share the same functions though we **do not have enough** evidences. ② the nomenclature of some bloodletting sites is influenced by the traditional visceral theory (脏腑学说), like the UL10 (肺大肠合脉) and the L - UL10 (心小肠合脉); we think that the UL10 (肺大肠合脉) and the L - UL10 (心小肠合脉) correspond to the lung, the heart and the stomach (largely referring to the TCM **Upper Warmer**, 上焦) while the L - UL11 (脾胃合脉) and the UL11 (肝胆脉) to the stomach, the spleen, the liver, the gallbladder and the pancreas (the TCM **Middle Warmer**, 中焦); the L - UL18 (左肾膀胱合脉) and the UL18 (右肾精府合脉) to the kidney, the urinary bladder, the intestine and the reproductive system (the TCM **Bottom Warmer**, 下焦). ③ the UL3 (脏腑总脉) near the elbow joint lies in the convergent area of the deoxygenated blood from several bloodletting sites on the posterior hand, which explains so many functions of this bloodletting site on some level.

The TP - AULBS and the TP - AAUL are quite similar, but not totally overlapping with each other. The former lies mainly on the posterior upper limb, lacking of bloodletting sites functionally corresponding to the head regions (**Figure 3.5.3.1**).

Though the number of TMM bloodletting sites on the lower limb is quite small, the bloodletting sites functionally correspond to the lung (“**lung above the heart**”, **absent**), the heart, the lung (“**lung below the heart**”, **absent**), the diaphragm (**absent**), the stomach, the liver, the gallbladder, the spleen, the pancreas (**absent**), the adrenal gland (**absent**), the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively, along the Axis of Lower Limb Bloodletting Sites (the ALLBS, from the midpoint of the posterior crus to the 1/4 proximal lateral crus via the median and anterior crus; largely parallel to the APALL). Therefore, the lower limb bloodletting sites are functionally aligned in the **standard order** along the ALLBS, showing a topographic map (the Topographic Map of the ALLBS, or the TP - ALLBS, **Figure 3.5.3.2** and **Table 3.5.6**).

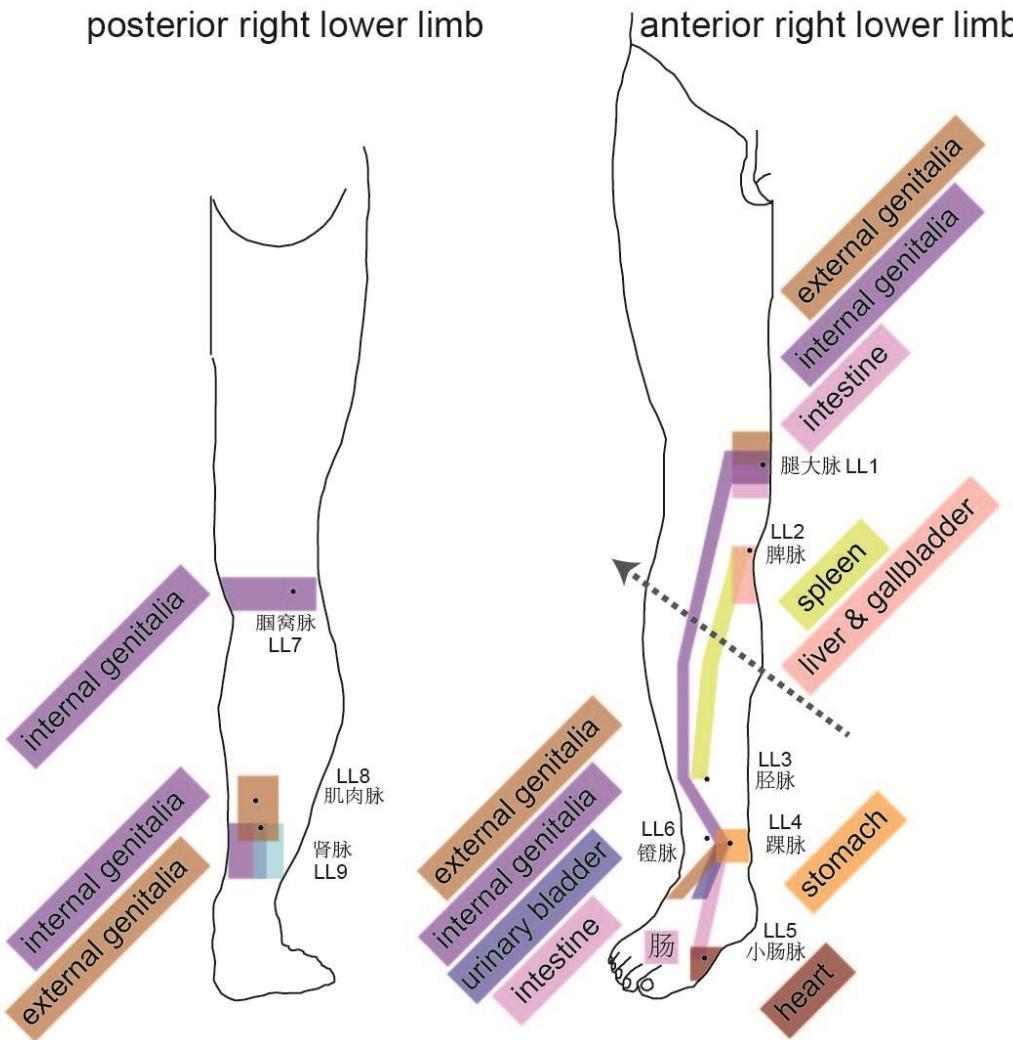
Similarly, the TP - ALLBS and the TP - AALL are quite similar r, but not totally overlapping with each other. The former lies mainly on the anterior and median lower limb, lacking of bloodletting sites functionally corresponding to the head regions (**Figure 3.5.3.2**).

From the analysis above, we find: ① the distributions of both the upper and lower limb bloodletting sites show incomplete topographic maps; the numbers of bloodletting sites corresponding to the viscera on the upper and the lower limbs are complementary to each other (but

the complementary relationship is not as significant as the distribution of the upper and the lower limb TCM acupoints, **Figure 3.2.7**). ② more bloodletting sites may exist on the limbs and their functions can be predicted according to their locations in the topographic maps (the TP - AULBS and the TP - ALLBS) (note, **no** clinical evidences).

**Table 3.5.6** classification of the TMM lower limb bloodletting sites related with the viscera

| viscera   | Bloodletting sites with functions related with the inner organ | note    |
|---|--|---------|
| lung above the heart *                              |  | absent? |
| heart   | LL5 (小肠脉)  |         |
| lung below the heart **                             |  | absent? |
| diaphragm   |  | absent? |
| stomach   | LL4 (踝脉)   |         |
| liver and gallbladder                               | LL2(脾脉)  |         |
| spleen  | LL2(脾脉) and LL3 (胫脉)   |         |
| pancreas  |  | absent? |
| adrenal gland                                       |  | absent? |
| kidney  | LL9 (肾脉)   |         |
| urinary bladder                                     | LL4 (踝脉)   |         |
| intestine   | LL1(腿大脉), LL4 (踝脉), LL5 (/小肠脉)                                 |         |
| internal genitalia                                  | LL1(腿大脉), LL4 (踝脉), LL7(腘窝脉) and LL8 (肌肉脉)                     |         |
| external genitalia                                  | LL1(腿大脉), LL4 (踝脉), and LL9 (肾脉)                               |         |
| *, throat and trachea; **, bronchus; ?, suspicious. |  |         |



**Figure 3.5.3.2 the classification of the TMM lower limb bloodletting sites.** Black dots represent bloodletting sites. The colored regions indicate the bloodletting site groups corresponding to the viscera. The arrow indicates the Axis of Lower Limb Bloodletting Sites.

### 3.5.3 The TZM acupoints

Some of the TZM acupoints share the same locations and names as the TCM acupoints, and with the same or similar clinical effects as the counterparts in the TCM. These acupoints are not discussed in this book.

#### 3.5.3.1 The TZM Acupoints on the Trunk

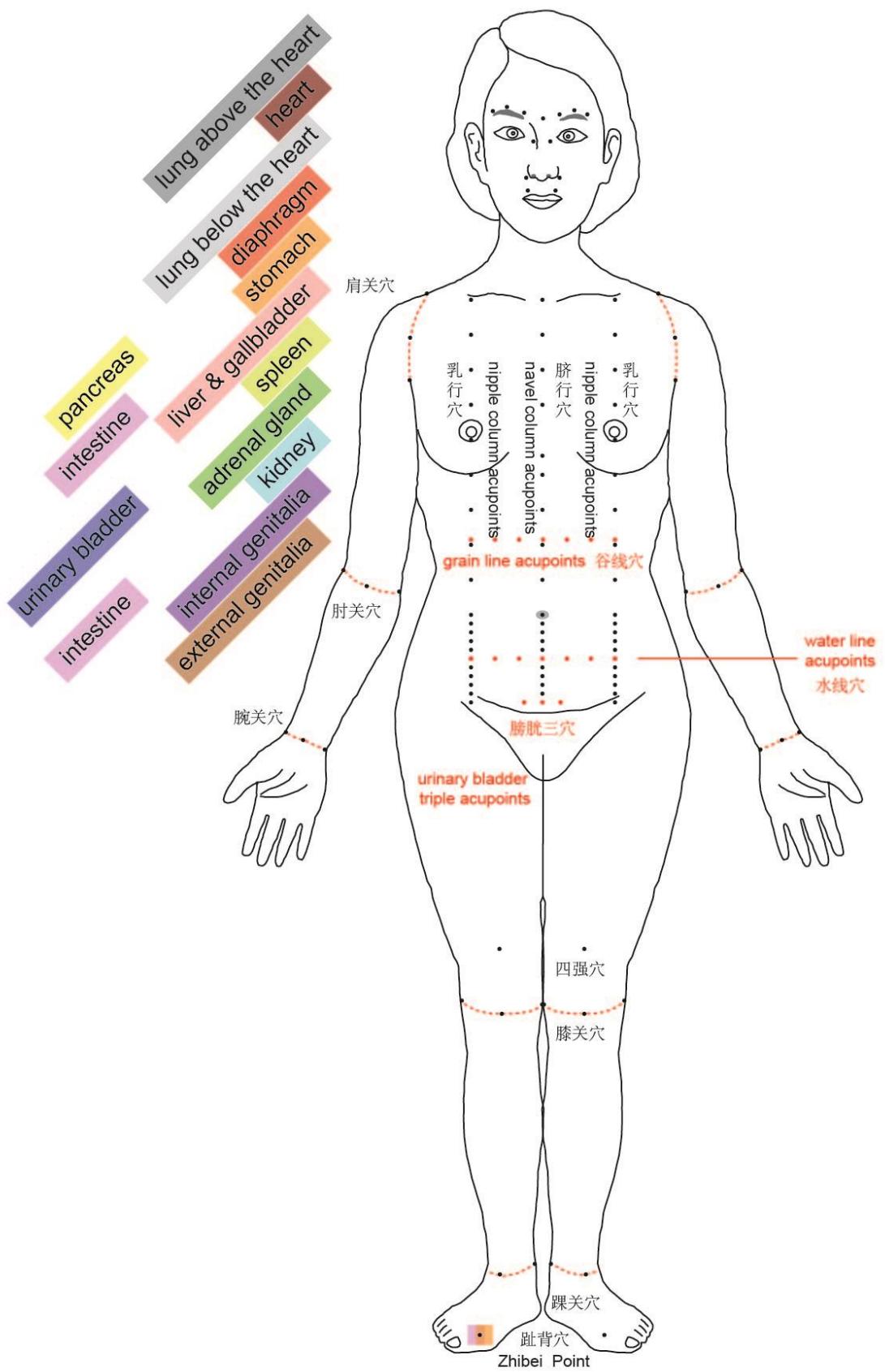
The TZM trunk acupoints consist of the navel column acupoints (脐行穴), nipple column acupoints (乳行穴), grain line acupoints (谷线穴), water line acupoints (水线穴) and the urinary bladder triple acupoints (膀胱三穴) on the anterior trunk (navel ring acupoints (脐环穴) **do not** match our model and **are not** discussed here) and the Longji acupoints (龙脊穴), Jinjiaji acupoints (近夹脊穴), and Yuanjiaji acupoints (远夹脊穴) on the posterior trunk. Overall, the distribution of these acupoints matches the TP - AAAT and TP - AAPT (**Figure 3.5.4, we do not correlate the trunk acupoints to the inner organs since the detailed functions of each navel column acupoint (脐行穴), nipple column acupoint (乳行穴), Longji acupoint (龙脊穴), Jinjiaji acupoint (近夹脊穴), and Yuanjiaji acupoint (远夹脊穴) are not listed in our main reference [15]; acupoints above the navel are mainly effective to pain on the chest, hypochondriac pain, vomiting, stomachache, and diarrhea while acupoints below the navel are clinically used for bellyache, diarrhea, enuresis, infertility, impotence and sexual dysfunction).**

#### 3.5.3.2 The TZM Acupoints on the Limbs

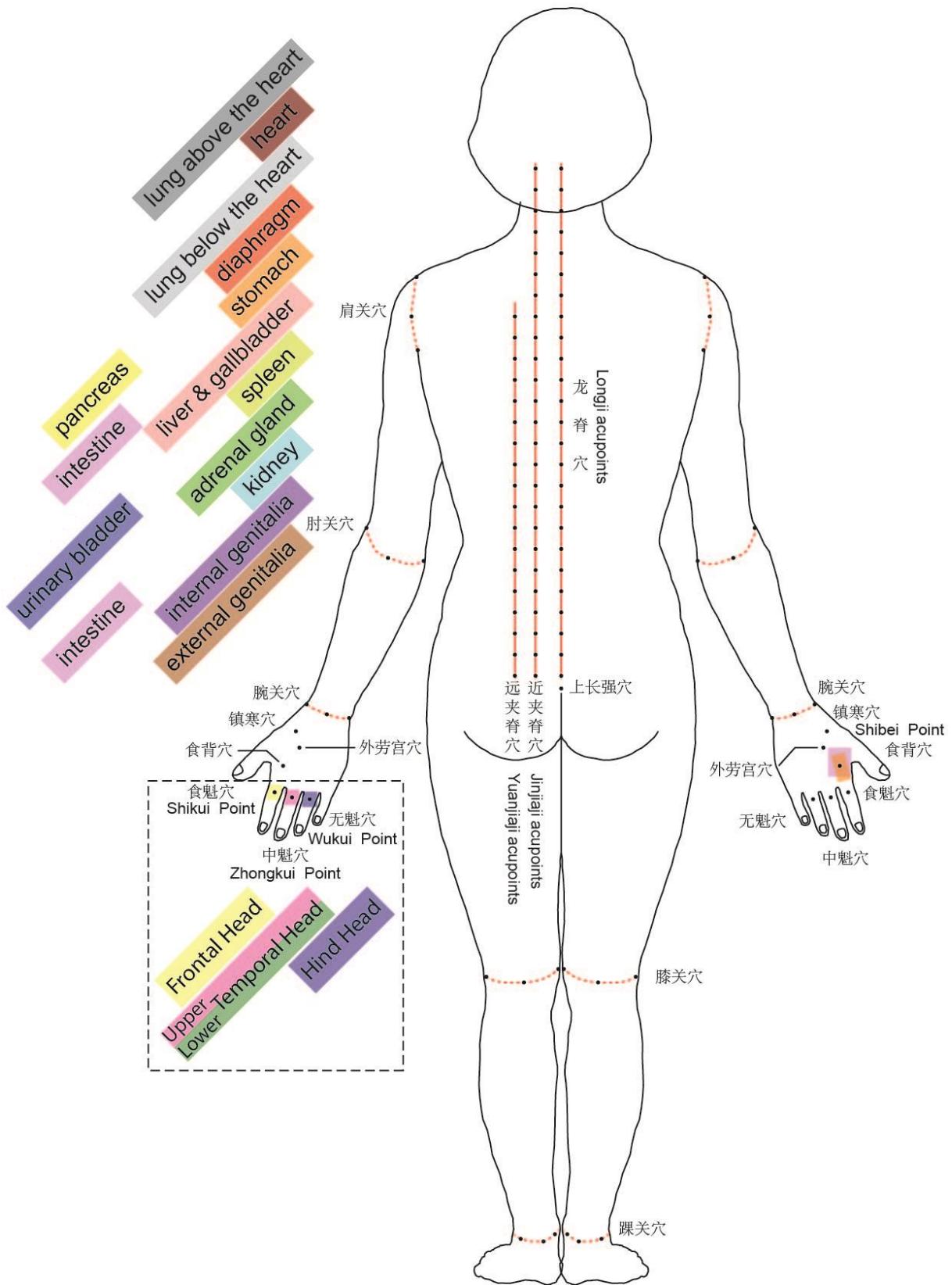
Most of the TZM limb acupoints share the same or similar locations and clinical functions as the TCM acupoints. Therefore, here we only talk about a few unique TZM acupoints.

The acupoints Shikui (食魁), Zhongkui (中魁, exists in the TCM as well), and Wukui (无魁) lie on the posterior index finger, middle finger and ring finger, corresponding to the Frontal Head, Temporal Head (**strictly speaking, the top of the head, or the intersection of the Frontal Head, the Temporal Head, and the Hind Head**) and Hind Head functionally, respectively (**Figure 3.5.4**).

The acupoint Shibei (食背穴) is located on the posterior midpoint of the index finger metacarpophalangeal joint, “the stomach and the intestine regions” of the TP - AAUL, corresponding to the stomach and the intestine functionally. Similarly, the acupoint Zhibei (趾背穴) lies on the posterior midpoint of the first toe metatarsophalangeal joint, “the stomach, the intestine and the reproductive system regions” of the TP - AALL, corresponding to the stomach and the intestine functionally (**Figure 3.5.4**).



**Figure 3.5.4.1 the classification of the TZM acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. The trunk acupoint groups are not labelled since the detailed functions of the navel column acupoints (脐行穴) and nipple column acupoints (乳行穴) are not listed in our main reference.



**Figure 3.5.4.2 the classification of the TZM acupoints.** Black dots represent acupoints. The colored regions indicate the acupoint groups corresponding to the viscera. The trunk acupoint groups are not labelled since the detailed functions of the Longji acupoints (龙脊穴), Jinjiaji acupoints (近夹脊穴), and Yuanjiaji acupoints (远夹脊穴) are not listed in our main reference.

### 3.5 Discussion --- Acupoint Distribution Model

#### 3.5.1 Advantages of the Model

- 1) The model is constructed totally according to the clinic functions of each acupoint and the data for constructing the model include most of the human acupoints. Therefore, this new model has trustable clinic references and an abundant database.
- 2) The model is not only applicable to the TCM acupuncture, but also to traditional medicine of other ethnic minorities in China, such as the TTM, the TMM and the TZM acupuncture.
- 3) The distribution pattern of human acupoints matches the pattern of the somites, on which the early development of vertebrates is based in biology, in our model. The model should be a universal pattern among vertebrates.
- 4) The acupoint distribution axes defined by the distribution pattern of acupoints, including the Axis of Acupoints on the Anterior Trunk (AAAT), the Axis of Acupoints on the Posterior Trunk (AAPT), the Acupoint Axis of the Upper Limb (AAUL), the Acupoint Axis of the Lower Limb (AALL), and the Acupoint Drifting Axis of the Lower Limb (ADALL), are almost orthogonal to the distribution pattern of the dermatome. In another word, the distribution pattern of the acupoints corresponding to each inner organ is nearly parallel to the dermatome on the trunk, the upper limb, and the lower limb (**please compare Figure 3.1.1, Figure 2.4.5, and Figures 3.2.2-3.2.5**).
- 5) The model is quite simple, consisting of the TM - AAAT, the TM - AAPT, the TM - AAUL, and the TM - AALL. But it covers all the acupoints on the head, the trunk, and limb long-distance acupoints.
- 6) This new model can be used to predict the locations and functions of new acupoints.
- 7) The model can be used to explain many principles of combination of the TCM acupoints, like the Combination of Yuan Point and Luo Point (原络配穴法) and the Combination of Eight Confluent Acupoints (八脉交会配穴法). This model can be used to instruct the combination of acupoints in clinic.

#### 3.5.2 Disadvantages of the Model

- 1) Acupoints related with dermatosis, mastopathy (breast disorders), (lower) backache, and mental disorders (Shenzhibing, 神志病, **Appendix 1**), and most acupoints at the tip of the limbs were not included when we constructed the acupoint distribution model.

- 2) We cannot explain the acupoint distribution pattern from the perspective of the cutaneous branch of the spinal nerves though the topographic map of the acupoints corresponding to each inner organ is almost parallel to the cutaneous branch of the spinal nerve in the corresponding regions. For instance, the sympathetic nerve and parasympathetic nerves innervating the abdominal viscera are from the segments ranging from the thoracic nerve T5 to the lumbar nerves and the III, VII, IX, and X cranial nerves and sacral nerves. But many acupoints corresponding to the abdominal viscera are in the regions innervated by the cervical nerves C6 - C8, not the regions projected by the autonomous nerves on the upper limb. Or more specifically, the upper limb acupoints corresponding to the intestine (the “intestine region of the TM - AAUL”) are mainly in the regions innervated by the cervical nerve C6 while the superior mesenteric ganglion and the parasympathetic nerve from the brain, which can adjust the activities of the intestine, have no neural projections to the upper limb.
- 3) Some of the acupoints on the posterior upper limb and lateral anterior lower limb (and the dorsum of the foot) correspond to both viscera and the head region simultaneously. We think the representing regions of the head are in the shallow layer while the deeper layer is representing the viscera for these acupoints. But we **do not** have enough clinic evidence to support this conclusion; **neither** can we explain it from the perspective of biology.
- 4) Our model **does not** explain how the acupoints are connected to the viscera (and the connection between the limb long-distance acupoints and the head region) (**Appendix 8**).
- 5) Our model cannot explain the differences of the acupoints which are in the same region (corresponding to the same inner organ) of the acupointotopy (topographic map of acupoints) and aligned orthogonally to the corresponding acupoint axis. Here we define an axis perpendicular to the acupoint axis as the Perpendicular Axis of Topographic Map of acupoints (PA - TM). For instance, GV11 (Shendao, 神道), BL15 (Xinshu, 心俞), and BL44 (Shentang, 神堂) are all in the “heart region of the TM - AAPT”, aligned along an PA - TM of the TM - AAPT, effective to hear problems. But we cannot explain the differences of the three acupoints with our model.
- 6) We **have not** found any biological structure matching this model perfectly. Therefore, we cannot discuss the essential question about the material basis or structure of acupoints.

### 3.6 Reference and Recommended Books in This Chapter

- [1] 《组织学与胚胎学》（第 3 版），唐军民、张雷，北京大学医学出版社，2013 年 12 月，ISBN: 9787565906879。
- [2] 《发育生物学》（第 4 版），张红卫，高等教育出版社，2018 年 8 月，ISBN: 9787040501520。
- [3] 《针灸学》，梁繁荣、王华，中国中医药出版社，2016 年 8 月，ISBN: 9787513233934。
- [4] 《实用针灸学》，吴旭、盛灿若，人民军医出版社，2001 年 1 月，ISBN: 7801571010。
- [5] 《蓝琉璃》，毛继祖、卡洛、毛韶玲（译校），上海科技出版社，2012 年 1 月，ISBN: 9787547808832。
- [6] 《动物生理学》，陈守良，北京大学出版社，2005 年 4 月，ISBN: 9787301088203。
- [7] 《生理学》（第 8 版），朱大年，人民卫生出版社，ISBN: 9787117171298。
- [8] 《针灸大成》，明·杨继洲、靳贤、黄龙祥，人民卫生出版社，2017 年 9 月，ISBN: 9787117247054。
- [9] 《合谷穴针刺深浅与疗效关系的探讨》，潘友灿、付丹丹、许能贵，《中国中医基础医学杂志》，2018 年 3 月第 24 卷第 3 期，367-369 页。
- [10] 《中国针灸学》（第四版），程莘农，人民卫生出版社，2000 年 10 月，ISBN: 9787117033138。
- [11] 《针灸穴位挂图》（第 5 版），靳士英，人民卫生出版社，2013 年 7 月，ISBN: 9787117172875。
- [12] 《实用藏医灸法穴位挂图》，马崇乾、星全章，青海民族出版社，2009 年 4 月，ISBN: 9787542014092。
- [13] 《蒙医学针法刺法》，赛音朝克图，清华大学出版社，2019 年 6 月，ISBN: 9787302526537。
- [14] 《蒙古族传统疗法》，郭·道布清，图门巴雅尔，辽宁民族出版社，2005 年 12 月，ISBN: 9787807221067。
- [15] 《壮医针灸学》，黄瑾明、宋宁、黄凯、苏曲之，中国中医药出版社，2017 年 9 月，ISBN: 9787513237321。

[16] Shenbin Liu et al., Somatotopic organization and intensity dependence in driving distinct npy-expressing sympathetic pathways by electroacupuncture. *Neuron*. 2020 Nov 11;108(3):436-450.e7.

## Notes of Figures and Tables

| <b>Figures or Tables</b>              | source (referring books or websites)   |
|---------------------------------------|--|
| <b>Figure 3.1.1</b>                   | designed by the author; human body outline is adapted from reference [11].   |
| <b>Figure 3.2.1</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.2</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.3</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.4</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.5</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.6</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.2.7</b>                   | designed by the author   |
| <b>Figure 3.3.1</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.3.2</b>                   | designed by the author   |
| <b>Figure 3.3.3</b>                   | designed by the author   |
| <b>Figure 3.3.4</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [11].                                      |
| <b>Figure 3.3.5</b>                   | designed by the author   |
| <b>Figure 3.3.6</b>                   | designed by the author   |
| <b>Figure 3.3.7</b>                   | designed by the author   |
| <b>Figure 3.5.1</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [12].                                      |
| <b>Figure 3.5.2</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [12] and [13], respectively.               |
| <b>Figure 3.5.3</b>                   | designed by the author; human body outline is adapted from reference [12]; bloodletting sites are referred to the reference [13] and [14]. |
| <b>Figure 3.5.4</b>                   | designed by the author; human body outline and acupoint localization are adapted from reference [15].                                      |
| all the <b>Tables</b>                 | designed by the author   |
| <b>functions of TCM acupoints</b>     | references [3], [4], [10], and [11]  |
| <b>functions of TTM acupoints</b>     | references [5], and [12]   |
| <b>functions of TMM acupoints and</b> | references [13], and [14]  |

|                                   |                |
|-----------------------------------|----------------|
| <b>bloodletting sites</b>         |                |
| <b>functions of TZM acupoints</b> | reference [15] |

## Chapter 4 - Distribution Pattern of Animal Acupoints

The evolutionary biology is an important sub-filed of the modern biology. Creatures, which appear dramatically different, still show similarities from the perspective of comparative anatomy, comparative embryology, and molecular biology though some conclusions of evolutionary biology are still controversial. We have known that vertebrates develop through the embryonic stage of somitogenesis in the early embryogenesis). Afterwards, tissues and organs form and develop in the alignment of the somites. In Chapter 3, we have analyzed the distribution pattern of human acupoints. If other animals (vertebrates) also have acupoints, do the acupoints show a similar distribution pattern to that of human acupoints?

In fact, ancient Chinese have found and summarized many acupoints from both poultry and livestock independently from the modern biology (**Figure 4.1.1, Bole's Classics on Veterinary Acupuncture**). These poultry and livestock can be used as model animals of the non-primate mammals and birds to analyze the distribution patterns of animal acupoints.

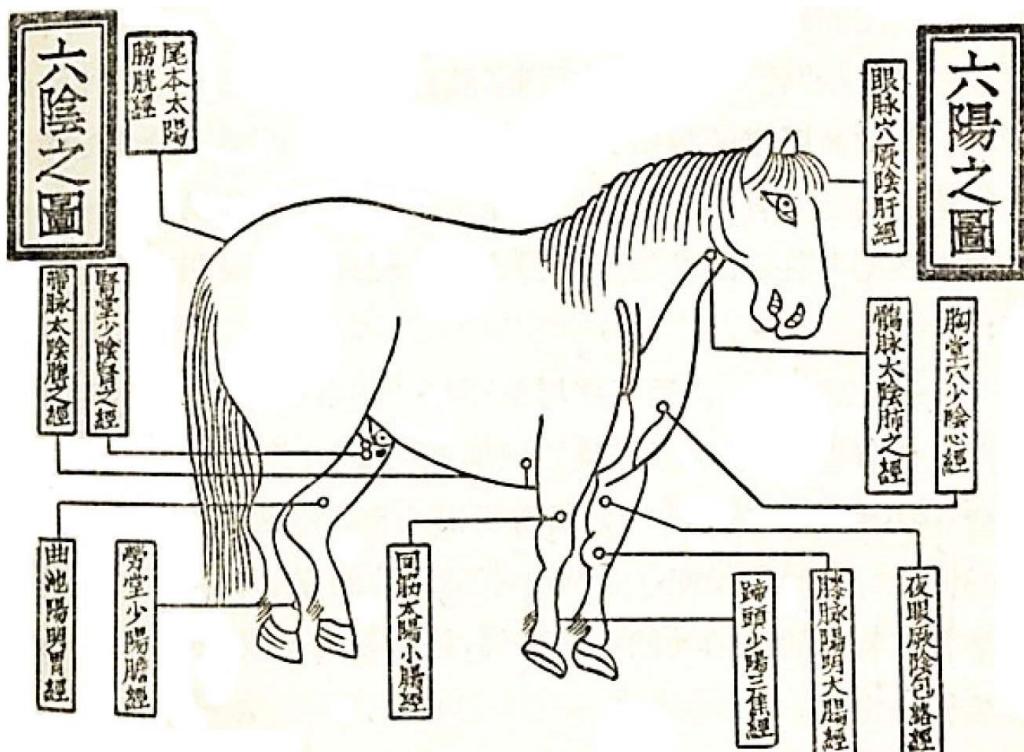
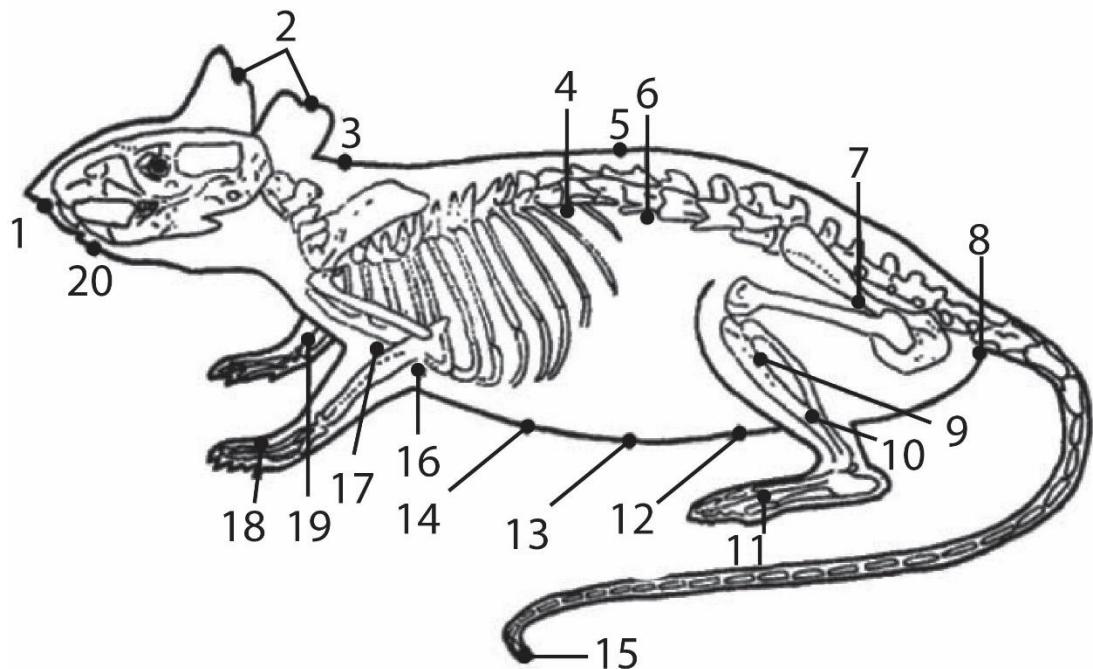


Figure 4.1.1 Equine Six-Yin and Six-Yang Meridians

The references of the acupoints from horses, cattle, pigs, and camels are abundant with a relatively long history. We are not sure whether these acupoints were compared to the distribution and functions of human acupoints during the discovery by the ancient Chinese. But we have enough evidence to show that the localization of the acupoints from mice, rats, cats, dogs, and the rabbits are based on the comparison with human acupoints (**Figure 4.1.2**). Therefore, the distribution

patterns of these pets are not discussed in our research. Meanwhile, we only briefly introduce the poultry acupoints since the references of the bird acupoints are quite limited and lack of systematic research.



|    |           |    |            |    |          |    |            |
|----|-----------|----|------------|----|----------|----|------------|
| 1  | 水沟        | 2  | 耳尖         | 3  | 大椎       | 4  | 胃俞         |
|    | Shuigou   |    | Erjian     |    | Dazhui   |    | Weishu     |
| 5  | 命门        | 6  | 肾俞         | 7  | 环跳       | 8  | 后海         |
|    | Mingmen   |    | Shenshu    |    | Huantiao |    | Houhai     |
| 9  | 后三里       | 10 | 三阴交        | 11 | 涌泉       | 12 | 关元         |
|    | Housanli  |    | Sanyinjiao |    | Yongquan |    | Guanyuan   |
| 13 | 神阙        | 14 | 中脘         | 15 | 尾尖       | 16 | 膻中         |
|    | Shenque   |    | Zhongwan   |    | Weijian  |    | Danzhong   |
| 17 | 前三里       | 18 | 合谷         | 19 | 内关       | 20 | 承浆         |
|    | Qiansanli |    | Hegu       |    | Neiguan  |    | Chengjiang |

**Figure 4.1.2 commonly used acupoints of mice**

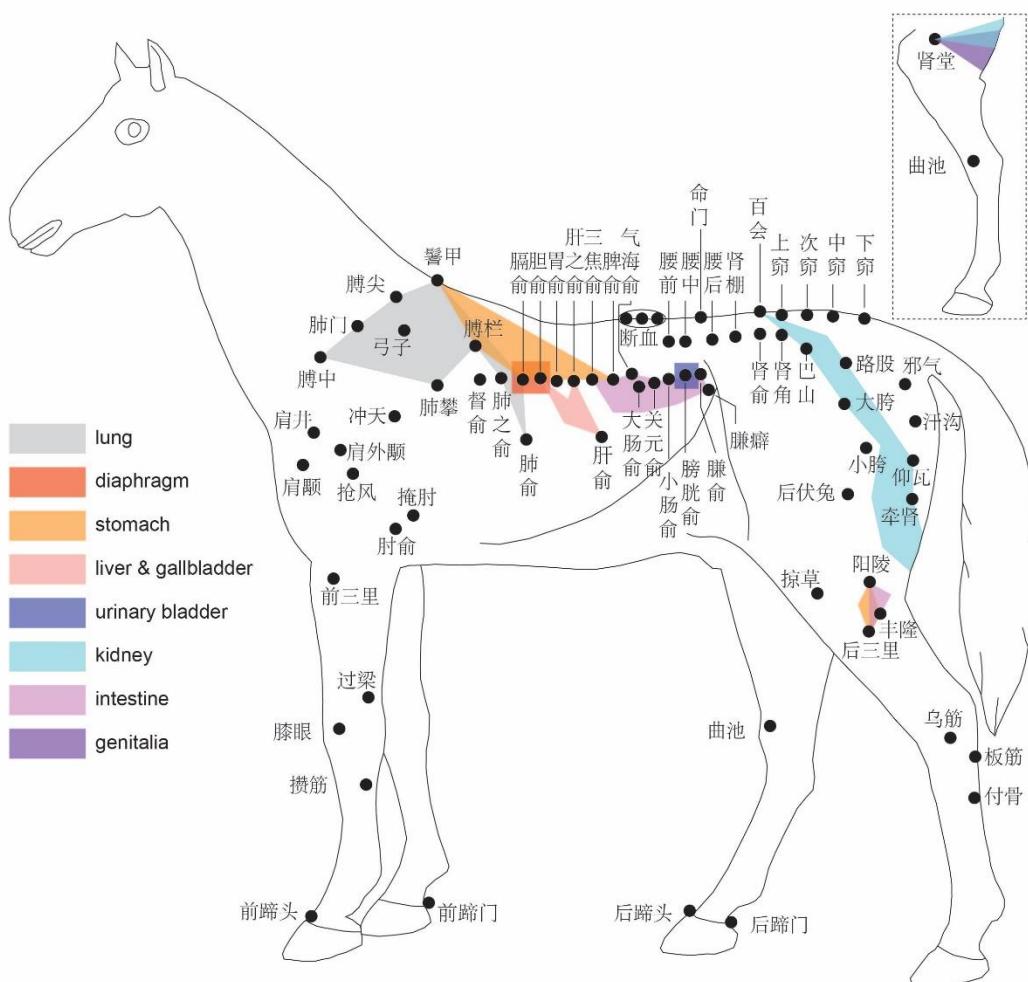
Among the livestock, horses, cattle, pigs and camels, references of the horse acupoints are the most abundant and with the longest history. Apart from that, a systematic meridian theory was proposed for the equine acupoints by the ancient Chinese (**Figure 4.1.1, Bole's Classics on Veterinary Acupuncture**). Therefore, the horse is chosen as the main model animal in this chapter. However, the equine acupoints on the ventral side are not abundant for a systematic comparative analysis [reference 3]. Therefore, pigs which have more acupoints on the ventral side are also chosen as the model animal here.

Additionally, most of the acupoints on the limbs of these domestic animals are local acupoints, only a few acupoints having long-distant effects on viscera. Therefore, we pay more attention to the acupoints on the dorsal and ventral sides of the trunk when performing the

distribution pattern analysis. Based on the evidence of the similarity in the body structure and early development of birds and mammals from the comparative anatomy and embryology, we infer that the distribution patterns of these animals' acupoints are similar to that of human acupoints: the acupoints are aligned along the rostral-caudal axis on both the dorsal and the ventral sides of the animals, and functions of the acupoints are corresponding to the lung ("lung above the heart"), the heart, the lung ("lung below the heart"), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia in this direction, respectively.

## 4.1 Distribution Pattern of Equine Acupoints

According to the main references which we use here [reference 3], the horses have 167 different acupoint names. Surely more acupoints are discovered recently through the comparison with human acupoints. But here we mainly use the acupoints from the old references as the research subjects [reference 3]. Meanwhile, horses do not have many acupoints on the ventral side and most of the acupoints related with the viscera are on the back (**Figure 4.1.3**). Therefore, we mainly analyze the acupoints on the back and a few acupoints on the hind legs.



### **Figure 4.1.3 commonly used equine acupoints**

Most acupoints on the back are on both sides of and near the midline, comparable roughly to the human Urinary Bladder Meridian. The nomenclature of these acupoints is like that of the acupoints from the human Urinary Bladder Meridian and names of this acupoints contain the corresponding names of inner organs. We found acupoints corresponding to the lung, the diaphragm, the stomach, the liver, the gallbladder, the intestine, the kidney, the urinary bladder, and the reproductive system (the acupoints are close to the genitalia and hind legs) along the rostral-caudal axis (**Figure 4.1.3** and **Table 4.1.3**).

#### **Point 4.4.1,**

Acupoints are aligned along the rostro-caudal axis (the Topographic Map of the Axis of Acupoints on Dorsal Body (TM - AADB)) on the back according to their functions. Although acupoints corresponding to some viscera, like the spleen and the adrenal gland, do not appear, we can predict the locations and functions of these absent acupoints based on the distribution pattern of the acupoints.

#### **Point 4.4.2,**

Acupoints corresponding to the kidney are distributed from the lumbar vertebra on the back to the hind legs. Acupoints corresponding to the stomach and the intestine are adjacent to this region and are spreading towards the hind leg like the distribution pattern of human lower limb acupoints despite of the small number of these viscera representing acupoints. But we do not know whether acupoints corresponding to the head or thoracic viscera also exist on the hind legs due to the limited data points.

#### **Point 4.4.3,**

Acupoints corresponding to the viscera on the ventral body and on the forelimb are very few. If more unknown acupoints are discovered, we predict they also show a segmental distribution pattern (topographic map of acupoints).

**Table 4.1.1** the correspondence of commonly used equine acupoints (on the back and hind legs) to the viscera

| viscera             | acupoints on the back  | acupoints on hind legs                           |
|---------------------|--|--|
| lung                | 肺中 (Bozhong), 肺门 (Feimen), 肺尖 (Bojian), 弓子 (Gongzi), 肺攀 (Feipan), 肺栏 (Bolan), 骨甲 (Jijia)、肺之俞 (Feizishu), and 肺俞 (Feishu) |  |
| heart               |  |  |
| diaphragm           |  |  |
| stomach             | 骨甲 (Jijia), 肺栏 (Bolan), 脐俞 (Geshu), 胆俞 (Danshu), 胃俞 (Weishu), 肝之俞 (Ganzhishu), 三焦俞 (Sanjiaoshu), and 脾俞 (Pishu)          | 阳陵 (Yangling), 丰隆 (Fenglong), and 后三里 (Housanli) |
| liver & gallbladder | 胆俞 (Danshu), 肝之俞 (Ganzhishu), and 肝俞 (Ganshu)  |  |
| spleen              |  |  |
| pancreas            |  |  |
| adrenal gland       | 断血 (Duanxie)? (Bleeding after castration, haematuria, hematochezia.)   |  |
| kidney              | 百会 (Baihui), 巴山 (Bashan), 路股 (Lugu), 大膀 (Dakua),   |  |

|                 |  |  |
|-----------------|--|--|
|                 | 仰瓦 (Yangwa), 牵肾 (Qianshen), and 肾堂 (Shentang)  |  |
| urinary bladder | 膀胱俞 (Pangguangshu)   |  |
| intestine       | 三焦俞 (Sanjiaoshu), 脾俞 (Pishu), 气海俞 (Qihaishu), 大肠俞 (Dachangshu), 关元俞 (Guanyuanshu), 小肠俞 (Xiaochangshu), 膀胱俞 (Pangguangshu), 蕲薢 (Qianpi), and 肾俞 (Qianshu) | 阳陵 (Yangling), 丰隆 (Fenglong), and 后三里 (Housanli) |
| genitalia       | 肾堂 (Shentang)  |  |

## 4.2 Distribution Pattern of Pig Acupoints

About 67 pig acupoint names are known so far [reference 3]. Of course, acupoints which are symmetrical to the midsagittal plane and synonymous acupoints are not counted separately. For instance, two acupoints (Ganshu, 肝俞) are symmetrically on either side of the back. The acupoint (Duanxue, 断血) refers to three different acupoints aligned rostro-caudally in the midline of the back.

Below we analyzed the distribution pattern of the pig acupoints.

First, let us focus on the acupoints on the animal back. These acupoints are mainly in the midline or the regions on both sides of the midline. We found acupoints corresponding to the lung, the stomach, the liver, the gallbladder, the kidney, the urinary bladder, the intestine, and the reproductive system. The acupoints (Liumai, 六脉) and (Pishu, 脾俞), responding to the stomach, are more caudally located than expected, considering that acupoints corresponding to the stomach are generally more rostral than those corresponding to the liver.

But given adjacent viscera often share some common acupoints and the two acupoints above likely correspond to the pancreas, we think the conclusion that acupoints are aligned along the rostro-caudal axis and correspond to the viscera is true. Ventral acupoints are not abundant and acupoints corresponding to some viscera are not found, either. But the distribution pattern of these existing acupoints is consistent with the **standard order**, showing an incomplete topographic map (**Figure 4.2.1** and **Table 4.2.1**).

Limb acupoints corresponding to viscera are even fewer. Here we only mention one acupoint, (Housanli, 后三里). It is on the lateral side of the hindlimb with the function to adjust the digestive process of the stomach and intestine.

Of course, we can predict the locations and the functions of acupoints on the dorsal and body of animals. For instance, the predicted acupoints in the line between the (Lingtai, 灵台) and (Duanxue, 断血) are aligned with the vertebrae, functionally corresponding to the lung, the diaphragm, the stomach, the liver, and the gallbladder, respectively. But we skip the details here.

**Table 4.1.1** the correspondence of commonly used pig acupoints (on the back and hind legs) to the viscera

| viscera             | acupoints on the back  | acupoints on the ventral side   |
|---------------------|--|---|
| lung                | 大椎 (Dazhui), 身柱 (Shenzhu), 脊尖 (Bojian), 脊栏 (Bolan), 肺俞 (Feishu), and 苏气 (Suqi) | 肺门 (Feimen), 肺攀 (Feipan), 带脉 (Daimai), 膽中 (Danzhong), 巨阙 (Juque), 上腕 (Shangwan), 中腕 (Zhongwan), and 下腕 (Xiawan) |
| heart               |  |   |
| diaphragm           |  |   |
| stomach             | 六脉 (Liumai), 和脾俞 (Pishu)   | 带脉 (Daimai), 巨阙 ( Juque), 上腕 ( Shangwan), 中腕 ( Zhongwan), 下腕 ( Xiawan), 肚口 (Dukou)                              |
| liver & gallbladder | 肝俞 (Ganshu)  |   |
| spleen              |  |   |
| pancreas            |  |   |
| adrenal gland       | 断血 (Duanxie)?  |   |
| kidney              | 肾门 (Shenmen) and 六眼 (Liuyan)   |   |
| urinary bladder     | 阳明 (Yangming)  | 海门 (Haimen)   |
| intestine           | 百会 (Baihui), 尾根 (Weigen), 尾节 (Weijie), and 尾干 (Weigan)                         | 肚口 (Dukou)  |
| genitalia           | 百会 ( Baihui), 尾节 ( Weijie), 尾干 (Weigan)  | 阳明 (Yangming)   |

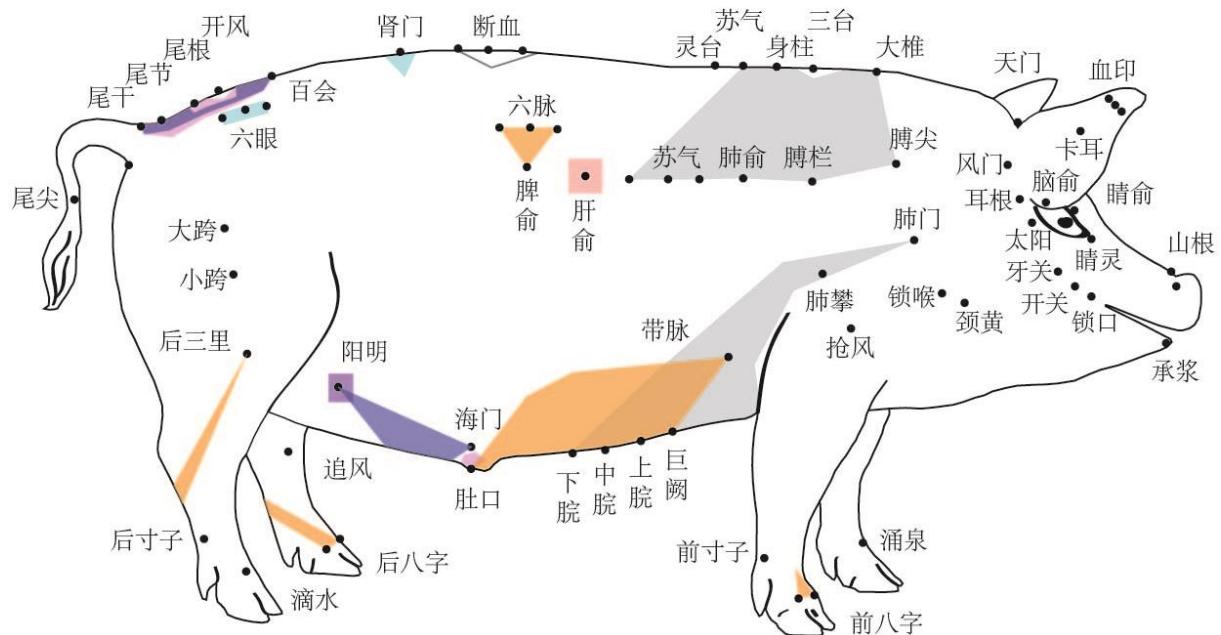
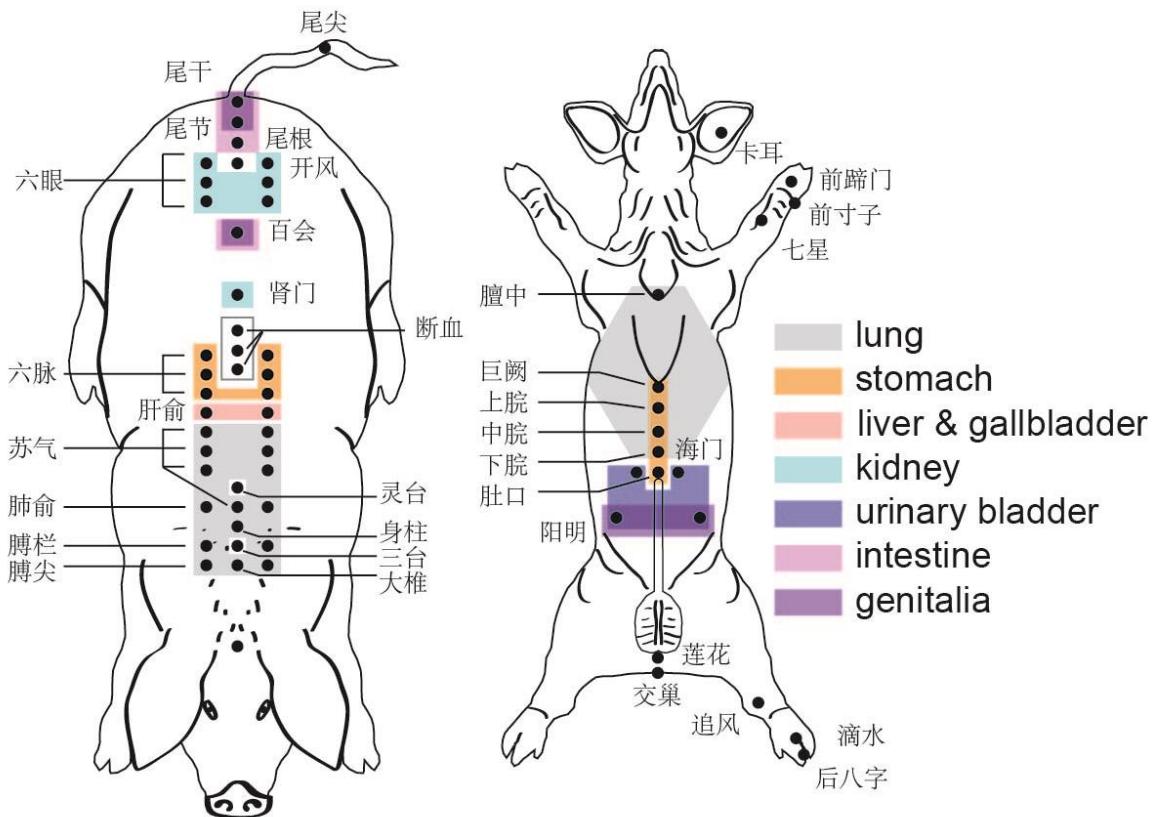
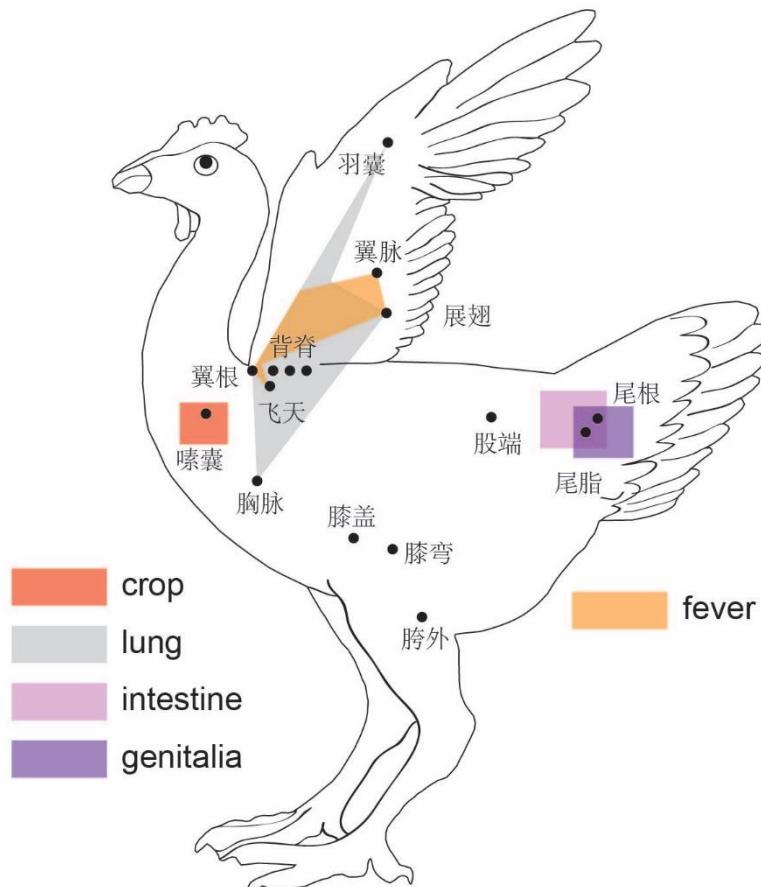


Figure 4.2.1 commonly used pig acupoints

### 4.3 Distribution Pattern of Chicken Acupoints

References for the poultry acupoints are very few. In this section we briefly analyze the distribution pattern of acupoints on the chicken back. We find that along the vertebral column rostro-caudally acupoints correspond to the crop, the lung, the intestine and the reproductive system, respectively. The crop is an expanded portion of the caudal esophagus for the storage of food prior to digestion. Its anatomical location is relatively more rostral than the lung (**Figure 4.3.1**).



**Figure 4.3.1 commonly used chicken acupoints**

#### Summary

We find that the alignment of acupoint shows topographic maps along the rostro-caudal axis which is likely a common pattern for higher vertebrates (birds and mammals) through the comparative analyses of acupoint distribution patterns from the horse, the pig, and the chicken.

#### 4.4 Reference and Recommended Books in This Chapter

- [1] 《动物针灸学》，钟秀会，中国农业科技出版社，2006年2月，ISBN：9787801678560。
- [2] 《小鼠常用针灸穴位》，李辞荣、华兴邦、宋大鲁、周浩良、胡元亮，《实验动物与动物实验》，1992年第2期，85-87页。
- [3] 《中兽医针灸学》，中国农业科学院中兽医研究所编，农业出版社，1959年9月。

#### Notes of Figures and Tables

| Figures or Tables                     | source (referring books or websites)   |
|---------------------------------------|--|
| <b>Figure 4.1.1</b>                   | adapted from reference [3]   |
| <b>Figure 4.1.2</b>                   | adapted from reference [2]   |
| <b>Figure 4.1.3</b>                   | adapted from reference [3]   |
| <b>Figure 4.2.1</b>                   | adapted from: reference [3] and<br><a href="http://www.pwsannong.com/c/2016-04-13/555146.shtml">http://www.pwsannong.com/c/2016-04-13/555146.shtml</a> |
| <b>Figure 4.3.1</b>                   | adapted from: <a href="http://www.bchongw.com/news/17458.html">http://www.bchongw.com/news/17458.html</a>  |
| <hr/>                                 |  |
| <b>all the Tables</b>                 | designed by the author   |
| <hr/>                                 |  |
| <b>functions of horse acupoints</b>   | reference [3]  |
| <b>functions of pig acupoints</b>     | reference [3]  |
| <b>functions of chicken acupoints</b> | <a href="http://www.bchongw.com/news/17458.html">http://www.bchongw.com/news/17458.html</a>  |

## 5 Appendix

### 5.1 Appendix 1 --- Some Diseases not Discussed in the Main Body of the Book

#### 5.1.1 Shenzhibing (Mental Disorders, 神志病)

Shenzhibing (mental disorders, 神志病) refers to generally psychiatric disorders, like insomnia, mania, delirium, and unconsciousness. Here we mainly analyze the distribution patterns of acupoints used to cure to the Shenzhibing clinically instead the symptoms and the causes of Shenzhibing.

Acupoints to cure the Shenzhibing are mainly distributed in the following 8 regions: 1) the Hind Head, including acupoints, GV20 (Baihui, 百会), GB18 (Chengling, 承灵), BL8 (Luoque, 络却), and GV19 (Houding, 后顶); 2) on the thoracic and lumbar segments of the posterior median line; 3) the breast region around the 4th rib on the anterior trunk; 4) around the 5th vertebra on the posterior trunk; 5) the medial posterior hand and forearm; 6) the medial posterior upper limb and the median (between the radial and the ulnar bones) upper limb distal to the elbow joint; 7) from the lateral dorsum of the foot to the 1/4 distal lateral crus; 8) from the distal medial end of the 1st metatarsal bone to the medial ankle.

We summary the distribution patterns of these acupoints as following:

According to our model: region 1), the “Hind Head region of the MT - AAPT”; region 2), above the vertebrae, as a special case here; region 3), the “heart region of the MT - AAAT”; region 4), the “heart region of the MT - AAPT”; region 5), the “Hind Head region of the MT - AAUL”; 6), the “heart region of the MT - AAUL”; region 7), the “Hind Head region of the MT - AALL”; 8), the “heart region of the MT - AALL”.

Summary: acupoints to cure the Shenzhibing are mainly distributed in the regions of the “Hind Head and heart regions of the topographic maps of acupoint” and the thoracic and lumbar segment of the spinal column.

### 5.1.2 Yingbing (瘿病)

Yingbing (瘿病) is a name of the diseases defined by the TCM. The main clinic symptom is the swelling enlarged thyroid gland, such simple goiter, hyperthyroidism, and thyroiditis.

The TCM does not have the anatomical structure of the thyroid gland or the description of its function. The thyroid gland derives from and lies in the neck region according to the development biology and anatomy. Therefore, according to the acupoint distribution model in this book, the thyroid gland is between the “Hind Head” and “the lung (“lung above the heart”) region” of the topographic map of the acupoints. Based on that, we propose the following selection of acupoints for disorders of the thyroid gland (**note**: the suggested methods **have not** been tested clinically).

The host acupoints are selected from the four regions below: 1) the neck region, including the whole neck region around the cervical vertebra C4 - C7 and thoracic T1, the anterior and posterior region of the scapular area, and the proximal posterior upper arm (local acupoints); 2) the distal medial posterior upper limb (the “Hind Head region of the MT - AAUL”); 3) from the lateral dorsum of the foot to the 1/4 distal lateral crus (the “Hind Head region of the MT - AALL”); 4) starting from below the medial ankle, extending upward backwards, rotating around the Achilles tendon, extending upward anteriorly to the midpoint of the lateral crus (the “lung (“**lung above the heart**”) region of the MT - AALL”).

The assistant acupoints are selected according to the symptoms of the patients. For instance, GV11 (Shendao, 神道), BL15 (Xinshu, 心俞), CV17 (Danzhong, 膽中), CV14 (Juque, 巨阙), PC6 (Neiguan, 内关), HT7 (Shenmen, 神门), SP4 (Gongsun, 公孙) can be selected when the patients suffer from palpitations, tachyarrhythmia, or bradycardia; Acupoints in the “stomach, pancreas and intestine regions of the topographic map of acupoints” can be used for symptoms, such as hyperanakinesia, anorexia, or abdominal bloating.

## 5.2 Appendix 2 --- Regions of the Head

In Chapter 3, acupoints on the head are classified into three regions, the Frontal Head, the Temporal Head, and the Hind Head. In fact, the Temporal Head region can be further divided into the Upper Temporal Head region and the Lower Temporal Head region.

The Upper Temporal and the Lower Temporal Head regions are divided by a line across acupoints, GB2 (Tinghui, 听会) and GB10 (Fubai, 浮白), the former and the latter regions above and below the boundary, respectively. Acupoints in the Upper Temporal Head region are effective to migraine and diseases of the ears while acupoints in the Lower Temporal Head region are against ear diseases and pains of neck. Meanwhile, some acupoint from these two regions are effective to eye diseases and toothache.

As a matter of fact, the region division of head acupoints above is only recommended clinically. In theory, we do not really recommend dividing the head into three regions, the Frontal Head, the Temporal Head, and the Hind Head. Instead, we suggest dividing the head into the Frontal Head and the Hind Head, with the Upper Temporal and the Lower Temporal Head regions belonging to the Frontal Head and the Hind Head, respectively. Below are two reasons to support this new division.

1) The Frontal Head region and the Upper Temporal Head region are mainly innervated by the cranial nerves while the Hind Head and the Lower Temporal Head regions are projected by the spinal nerves. More specifically, this latter two regions are innervated by the posterior (C1 - C3) and anterior (C2 - C3) branches of cervical nerves.

2) The bones of the Frontal Head region and the Upper Temporal Head region derived from the neural crest cells while the bones of Hind Head and the Lower Temporal Head regions developed from the mesoderm.

In fact, the innervation of skin and muscles in the region of the ear is extremely complicated, which is involved in the trigeminal nerve, facial nerve, and the anterior and posterior branches of the cervical nerves. Meanwhile, the regions innervated by these nerves share some overlapping regions.

### 5.3 Appendix 3 --- Acupoints Related with the Head Region on the Distal Regions of the Posterior Upper Limb and the Lateral Anterior Lower Limb

In Chapter 3, acupoints corresponding to the head on the distal end of the posterior upper and the lateral anterior lower limbs are classified into three regions, the Frontal Head, the Temporal Head, and the Hind Head. In fact, the Temporal Head region can be further divided into the Upper Temporal Head region and the Lower Temporal Head region.

The Upper Temporal and the Lower Temporal Head regions of the upper limb are divided by a line across acupoints, TE7 (Huizong, 会宗) and LI8 (Xialian, 下廉), the former and the latter regions above and below the boundary, respectively. Acupoints in the Upper Temporal Head region are effective to migraine and diseases of the ears (also pain of the lateral canthus) while acupoints in the Lower Temporal Head region are against ear diseases and pains of neck. Meanwhile, some acupoint from these two regions are effective to eye diseases and toothache.

As a matter of fact, the region division of head acupoints above is only recommended clinically. In theory, we do not really recommend dividing the head into three regions, the Frontal Head, the Temporal Head, and the Hind Head. Instead, we suggest dividing the head into the Frontal Head and the Hind Head, with the Upper Temporal and the Lower Temporal Head regions belonging to the Frontal Head and the Hind Head, respectively, consistent with the division of the head region in **Appendix 2**.

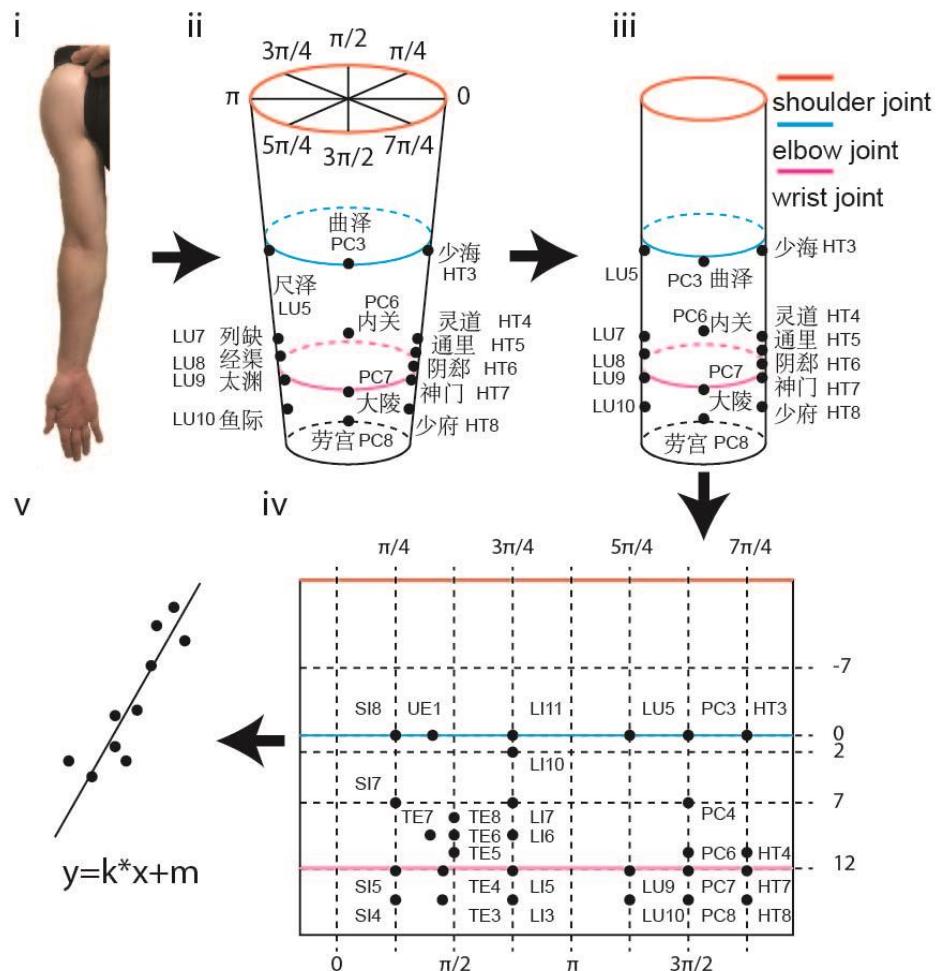
## 5.4 Appendix 4 --- The Corresponding Relationship of Viscera and Diseases in the Acupoint Classification

| viscera                 | diseases and symptoms  | notice   |
|-------------------------|--|--|
| lung above the heart *  | sore throat, dry throat, cold, cough, fever, headache, asthma, hemoptysis, chest tightness   |  |
| heart                   | cardiodynia, vexation, palpitation, arrhythmia, chest tightness, chest pain  | Shengzhiving,<br><b>Appendix 1</b>                     |
| lung below the heart ** | cough, asthma, hemoptysis, chest tightness, bronchitis   |  |
| diaphragm               | emesia, singultation, asthma   |  |
| stomach                 | stomachache, emesia, anorexia, acid regurgitation, dysphagic, abdominal bloating, diarrhea, dysentery, constipation  |  |
| liver & gallbladder     | abdominal bloating, diarrhea, bitter taste in mouth, hypochondriac pain, jaundice, edema   |  |
| spleen                  | chronic hemorrhage, hepatosplenomegaly, (anemia? Malaria?) mass in abdomen (痞块),   |  |
| pancreas                | diabetes and wasting thirst (消渴)   |  |
| adrenal gland           | fatigue syndrome, erectile dysfunction, spermatorrhea, impotence, irregular menstrual cycle, dysmenorrhea, amenorrhea, protracted labor  | related with the hormones release by the adrenal gland |
| kidney                  | nephritis, edema, hematuria, urodynia,   |  |
| urinary bladder         | retention of urine, enuresis, urinary incontinence, hematuria, urodynia, frequent urination  |  |
| intestine               | borborygmus, abdominal pain, diarrhea, constipation, dysentery, hematochezia, rectal prolapse  |  |
| internal genitalia      | spermatorrhea, testosterone, erectile dysfunction, impotence, irregular menstrual cycle, metrorrhagia, abnormal vaginal discharge, uterine prolapse, infertility, and protracted labor | related with the hormones release by the genital gland |
| external genitalia      | retention of urine, enuresis, urodynia, frequent urination, phallalgia, pruritus scroti and pruritus vulvae  | reproductive system except for the genital gland       |

\*, throat and trachea; \*\*, bronchus; ?, suspicious.

## 5.5 Appendix 5 --- Fitting of the Acupoint Distribution Pattern

Here we try to quantify and prove the topographic maps of the acupoints on the limbs using mathematic methods. In another word, we try to prove that the distribution patterns of acupoints show topographic maps through rotating around the limbs in a specific order (Chapter 3, section 2).



**Figure 5.1 the distribution pattern of limb long-distance acupoints analyzed with dimension reduction method.** The right upper limb is abstracted into a conical frustum (ii), which is further simplified as a cylinder (iii). The simplified 3-D cylinder is further unfolded into a 2-dimensional plane (iv). The X axis in the 2-dimensional plane indicates the azimuth angle of acupoints in the cylinder. The Y axis represents the length values in the Z axis of the 3-dimensional cylinder. The Y value of the elbow joint is 0. The distal direction has positive values, the proximal direction negative values. The length unit is cun in the TCM acupuncture. Some of the acupoints are used to fit linear functions (v). Since the shape of limbs are irregular, here we use estimated X values for these acupoints.

First, we abstract the upper limb into a conical frustum, which is further simplified into a cylinder. The simplified 3-D cylinder is further unfolded into a 2-dimensional plane (Dimensionality reduction). Then we project the limb acupoints onto this 2-dimensional plane and fit the acupoints correlated with the same inner organ or head region using one linear equation (**Figure 5.1**).

Meanwhile, because of the following two reasons: 1) acupoints corresponding to some inner organs are so few that they are not enough for linear fitting; 2) the distribution patterns of some acupoints corresponding to inner organs extend proximo-distally along the limbs but the distribution patterns do not rotate around the limbs. Therefore, we only fit the lower limb acupoints corresponding to the lung (“lung above the heart”), the stomach, and the liver (and the gallbladder). For the same reasons above, we do not fit the upper limb acupoints.

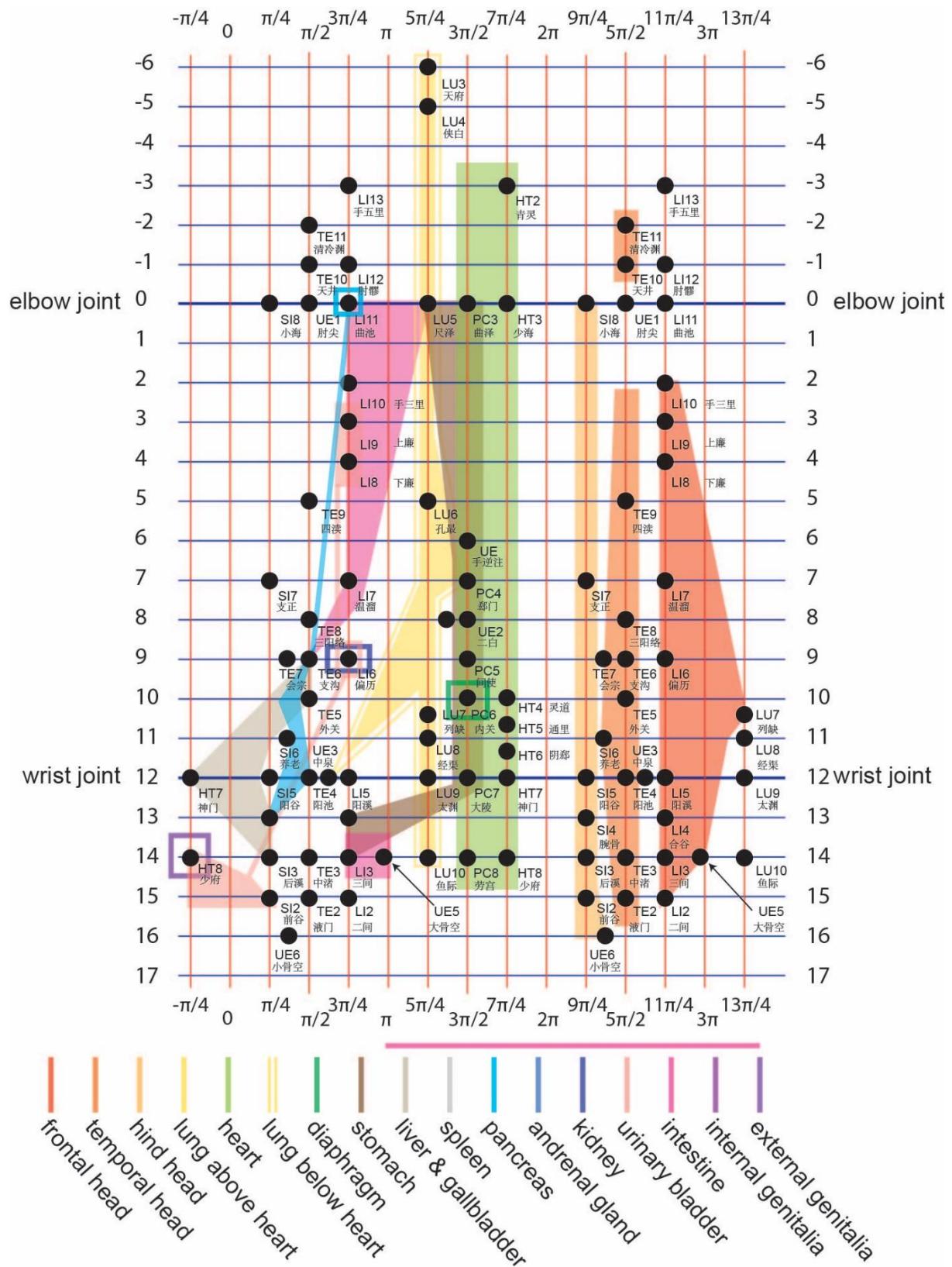
From the acupoint distribution chart in the 2-dimensional plane, we can see directly that the distribution of the upper limb acupoints corresponding to the stomach and the following viscera in the **standard order** rotates from the lateral proximal forearm through the posterior forearm to the medial anterior hand (the standard anatomical position, **Figure 5.2**).

Here we fitted the lower limb acupoints corresponding to the lung (“lung above the heart”), the stomach, and the liver (and the gallbladder) under two different conditions.

- A) **The distribution region of acupoints is assumed to extend from the medial ankle upward backward, rotate around the Achilles tendon, and extend upward anteriorly to the anterior crus.**
- B) **The distributed region of acupoints is assumed to extend from the medial ankle upward anteriorly through the anterior ankle and extend upward backward to the anterior crus.**

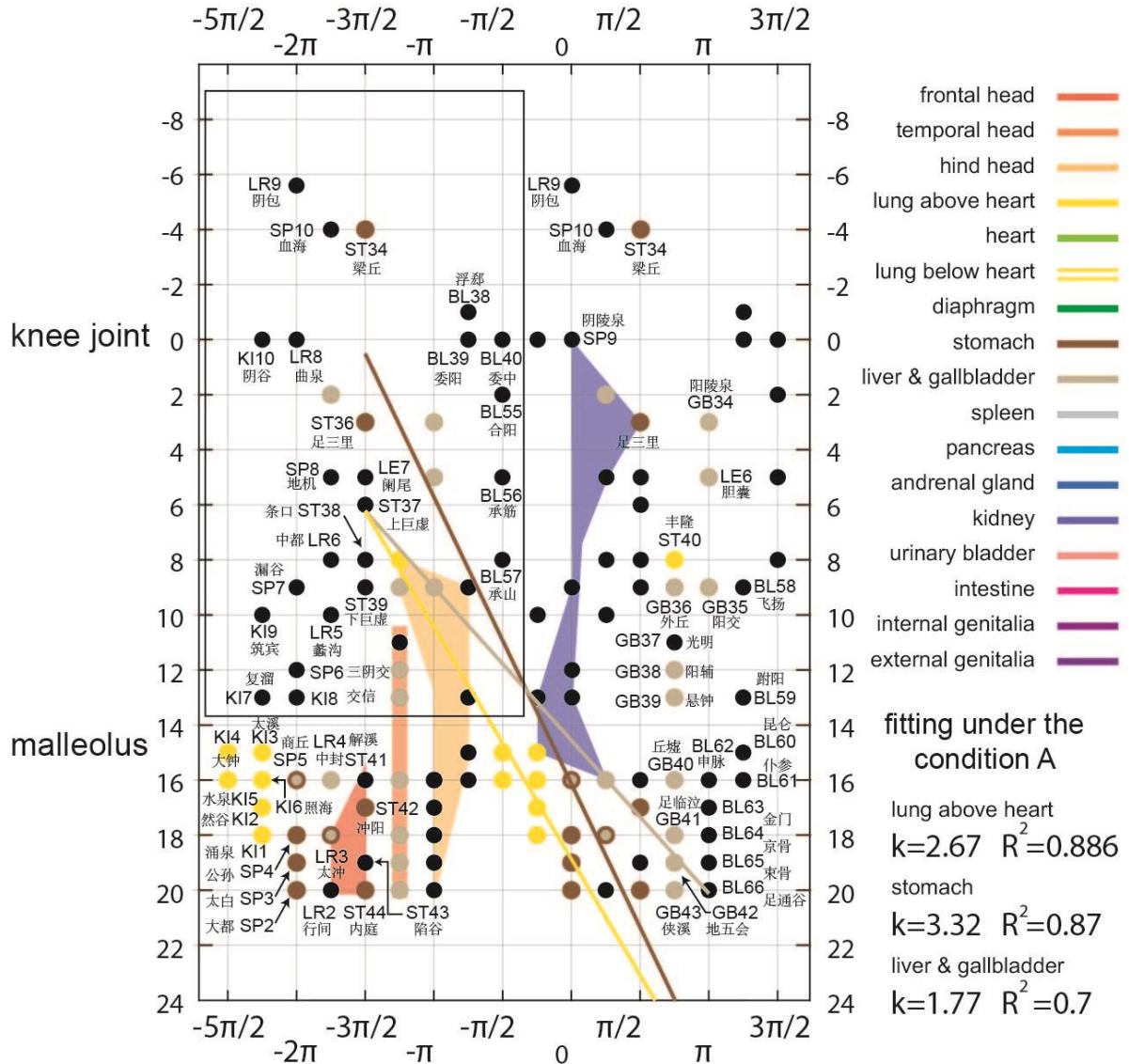
Under the condition A , 1) the locations of the acupoints along the Y axis show a better linear relationship with the azimuth angle in the X axis ( $R_{\text{heart}}^2=0.89$ ,  $R_{\text{stomach}}^2=0.87$ , and  $R_{\text{liver\&gallbladder}}^2=0.7$ ); the intersection angles among these three fitted lines are relatively small ( $3.76^\circ$ ,  $12.7^\circ$ , and  $8.94^\circ$ , respectively; the three lines are parallel to each other theoretically) ; 2) the alignment of the distribution regions of the acupoints corresponding to the head regions, the relative locations of the three fitted lines and the distribution regions of the kidney and following viscera in the **standard order** overall matches the TM - AALL (**Figure 5.3.1** ).

Under the condition B , 1) the locations of the acupoints along the Y axis show a worse linear relationship with the azimuth angle in the X axis ( $R_{\text{heart}}^2=0.75$ ,  $R_{\text{stomach}}^2=0.29$ , and  $R_{\text{liver\&gallbladder}}^2=0.07$ ); the intersection angles among these three fitted lines are relatively large ( $15.62^\circ$ ,  $6.12^\circ$ , and  $21.74^\circ$ , respectively; the three lines are parallel to each other theoretically) ; 2) the alignment of the distribution regions of the acupoints corresponding to the head regions, the relative locations of the three fitted lines and the distribution regions of the kidney and following viscera in the **standard order** does not match the TM - AALL (**Figure 5.3.2** ).

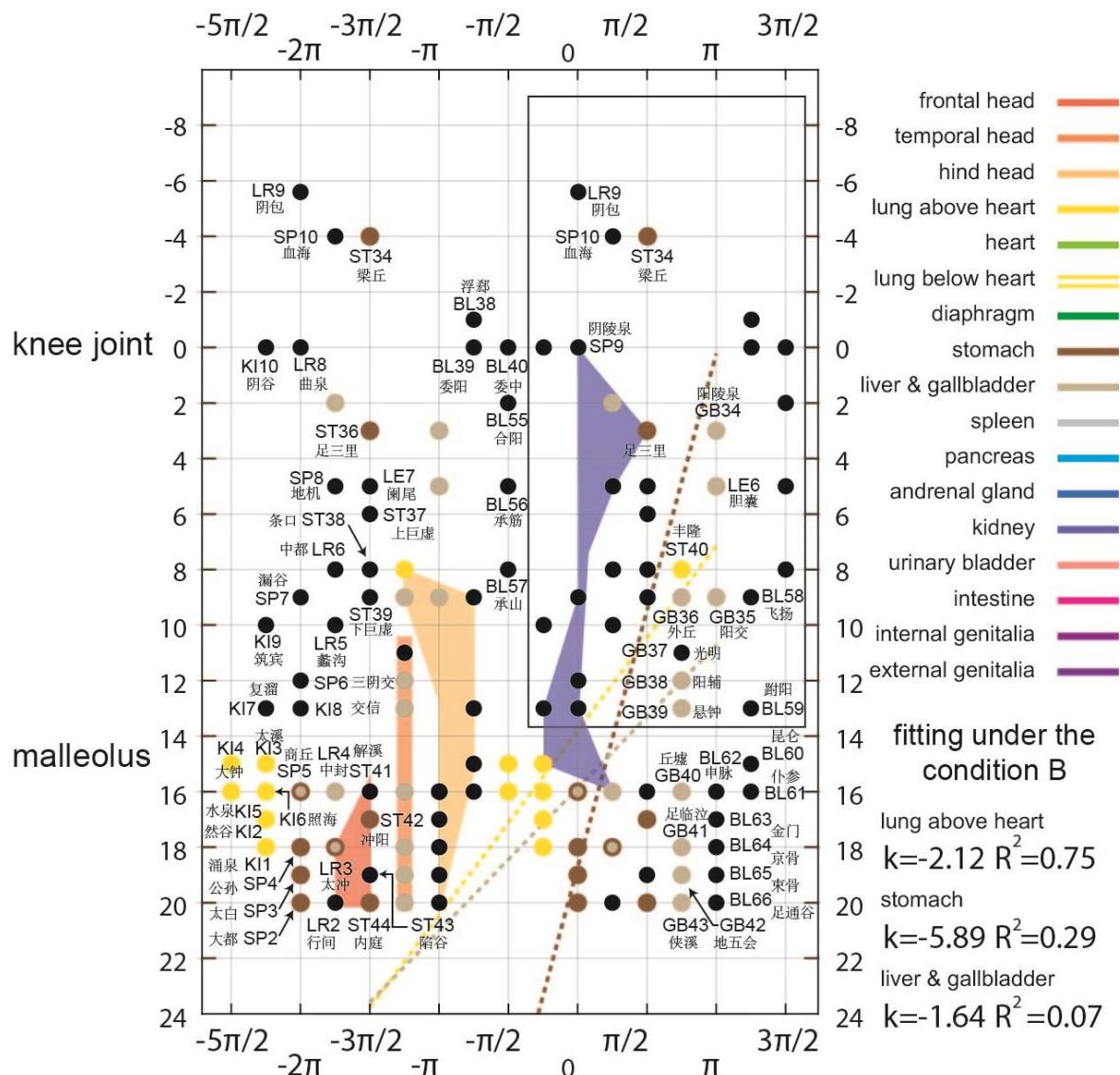


**Figure 5.2 the distribution pattern of upper limb long-distance acupoints in the 2-dimensional plane.** The right upper limb is unfolded into a 2-dimensional plane using the method above. The long-distance acupoints are colored according to the acupoint classification in the chapter 3. Note: acupoints corresponding to the intestine are distributed almost in the entire region below the representing area of the stomach in the **stand order** theoretically (**Figure 3.2.3** and **Figure 3.2.4**). On the upper arm, these acupoints are only distributed in the region below the representing area of the stomach in the **stand order** and close to the neighboring stomach

areas of the stomach representing region. Therefore, we think that these acupoints only correspond to the upper part of the intestine (the small intestine) below the stomach. The Y value of the elbow joint is 0. The distal direction has positive values, the proximal direction negative values. The length unit is cun in the TCM acupuncture. The upper limb is in the standard anatomical position.



**Figure 5.3.1 the distribution pattern of lower limb long-distance acupoints in the 2-dimensional plane.** The left lower limb is unfolded into a 2-dimensional plane using the method above. Some of the long-distance acupoints are colored according to the acupoint classification in the chapter 3. The linear function fitting of the acupoints corresponding to the lung ('lung above the heart'), the stomach, the liver, and the gallbladder is under the hypothesized condition A) that the distribution areas of these acupoints start from the medial ankle, extend upward and backward, rotates around the Achilles tendon, extends upward and anteriorly and end on the anterior crus (the acupoints above the BL60 are in the black rectangle). Note: the representing areas of the viscera below the kidney in the **standard order** largely overlapping with each other. Therefore, only the acupoints corresponding to the kidney are colored. Meanwhile, to easily visualize the TM - AALL, the colored area is in the next cycle of the same phase. The Y value of the knee joint is 0. The distal direction has positive values, the proximal direction negative values. The length unit is cun in the TCM acupuncture. The lower limb stands upright, the knee facing forward. But the gastrocnemius muscles are contracted and the toe tips point downwards.



**Figure 5.3.2 the distribution pattern of lower limb long-distance acupoints in the 2-dimensional plane.** The left lower limb is unfolded into a 2-dimensional plane using the method above. Some of the long-distance acupoints are colored according to the acupoint classification in the chapter 3. The linear function fitting of the acupoints corresponding to the lung ('lung above the heart'), the stomach, the liver, and the gallbladder is under the hypothesized condition **B**) that the distribution areas of these acupoints start from the medial ankle, extend upward and anteriorly, then extend upward and posteriorly via the upper anterior ankle and end on the anterior crus (the acupoints above the BL60 are in the black rectangle). Note: the representing areas of the viscera below the kidney in the **standard order** largely overlapping with each other. Therefore, only the acupoints corresponding to the kidney are colored. Meanwhile, to easily visualize the TM - AALL, the colored area is in the next cycle of the same phase. The Y value of the knee joint is 0. The distal direction has positive values, the proximal direction negative values. The length unit is cun in the TCM acupuncture. The lower limb stands upright, the knee facing forward. But the gastrocnemius muscles are contracted and the toe tips point downwards.

## 5.6 Appendix 6 --- Discussion about Some Suspected Viewpoint

### 5.6.1 Acupoint LI3 (Hegu, 合谷)

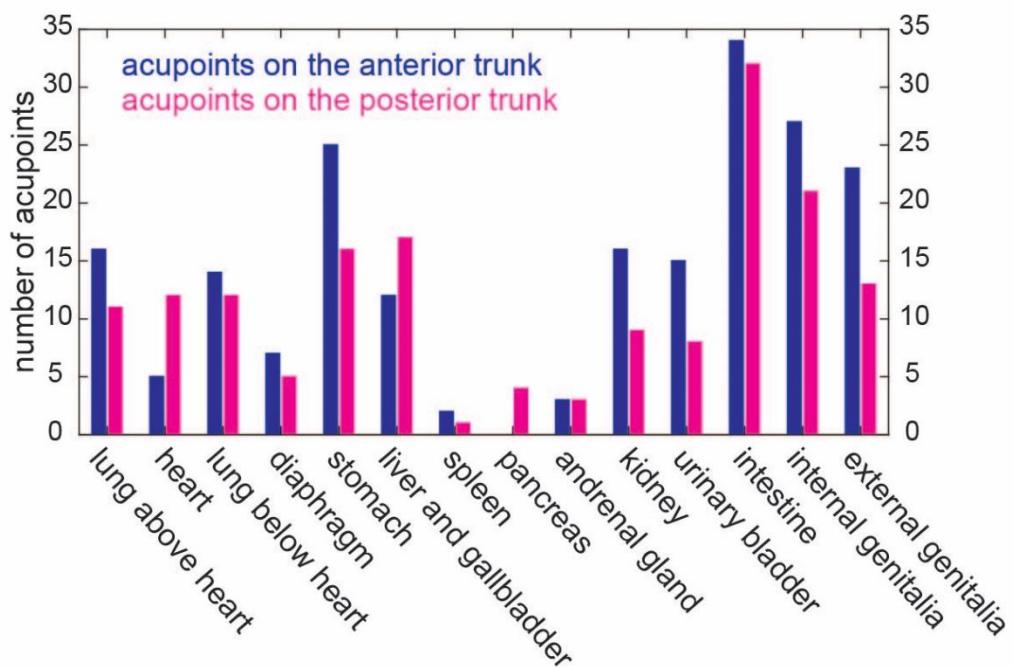
We can infer the corresponding viscera of acupoint, LI3 (Hegu, 合谷), based on its clinical functions and the relative location in the topographic map of acupoints. Except for diseases of the Frontal Head (the Frontal Head region in the shallow layer of the TM - AAUL), LI3 (Hegu, 合谷) is often used clinically for ① abdominal pain, constipation, dysentery, and other digestive disorders; ②, dysmenorrhea, amenorrhea, and protracted labor; ③ various pain. Regarding the location, LI3 (Hegu, 合谷) is in the intersection region of the “stomach, liver, gallbladder, spleen, pancreas, adrenal gland, kidney, and intestine” in the deep layer of the TM - AAUL (**Figure 3.2.5**), relatively far away from the “internal genitalia region” of the TM - AAUL (based on the TM - AAUL, the “internal genitalia region” is in the medial upper arm distal to the wrist, near the HT8 (Shaofu, 少府)). We think that LI3 (Hegu, 合谷) corresponds more likely to the “stomach, adrenal gland, and intestine regions (from the stomach to the small intestine)” of the TM - AAUL according to its function and location. Furthermore, the LI3 (Hegu, 合谷) can be selected together with acupoints SP6 (Sanyinjiao, 三阴交), ST36 (Zusanli, 足三里), CV4 (Guanyuan, 关元), CV6 (Qihai, 气海), GV4 (Mingmen, 命门), and BL23 (Shenshu, 肾俞) though we did not emphasize its function to adjust the activities of the adrenal gland in chapter 3.

### 5.6.2 Long-distance Acupoints on the Upper Arm and Thigh

The long-distance acupoints on the upper arm and the thigh are classified into the MT - AAUL and the MT - AALL in the main body and the following discussions (**Appendix 6**) of this book. In fact, however, there is another possibility: these acupoints can be regarded as the direct extension of the acupoints of the TM - AAAT from the thoracic region and the lower abdominal region to the upper and lower limbs, respectively. That explains why the acupoints corresponding to the heart in the anterior trunk are fewer than those acupoints with the same functions on the posterior trunk (**Figure 5.4**). Correspondingly, the region covered by the MT-AAUL and the MT-AALL can be decreased to below the elbow joint and knee joint (both cases including the joints), respectively. As we assumed before, the rotation of the limb long-distance acupoints around limbs starts at the elbow joint and knee joint during the embryo early development. The limb long-distance acupoints keep the alignment in the **standard order** but without large amplitude rotation around the limb. Before collecting more evidence, we think that these long-distance acupoints on the upper arm and thigh are: either 1) long-distance acupoints on the limbs; or 2) local acupoint belong to the anterior trunk but located on limbs.

### 5.6.3 Acupoints Corresponding to the Spleen and Pancreas

The numbers of acupoints corresponding to the spleen and the pancreas are small in the main body of this book (**Figure 5.4**). That is mainly due to the limited knowledge of the author. For instance, disorders of the pancreas can cause digestive problems which share similar symptoms of disorders resulting from other digestive inner organs. Therefore, acupoints corresponding to the intestine (classified in the main body of this book), close to the representing regions of the liver, the gallbladder, and the stomach likely correspond to the pancreas. Anyway, acupoints corresponding to the spleen and the pancreas are in the intersection regions of the “stomach, liver, gallbladder, and intestine” of the topographic map of acupoints according to our model.



**Figure 5.4** the number of the trunk acupoints (one side; including the acupoints on the vertical midline of the trunk) corresponding to the viscera. The vertical axis indicates the number of the acupoints. The data of the bar plot are from the **Table 3.2.3** and **Table 3.2.4**.

## 5.7 Appendix 7 --- Conic Helix Function

The upper (lower) limb acupoints corresponding to one inner organ can be simulated with a conic helix function (but in fact, since the distribution of acupoints on the hand (foot), the forearm (crus) and the upper arm (thigh) are not homogeneous, we usually simulate the distribution of the acupoints with two consecutive conic helix functions). According to the distribution patterns of acupoints, we can simulate the TM - AAUL (the TM - AALL) using a series of conic helix functions. We just need to use different parameters for the conic helix function for acupoints corresponding to different viscera (**note:** we **do not** fit the real 3-dimensional locations of those acupoints with conic helix functions. Instead, we simulate the limbs using conical frustums and simulate the TM - AAUL (the TM - AALL) and its developmental process with a series of conic helix functions).

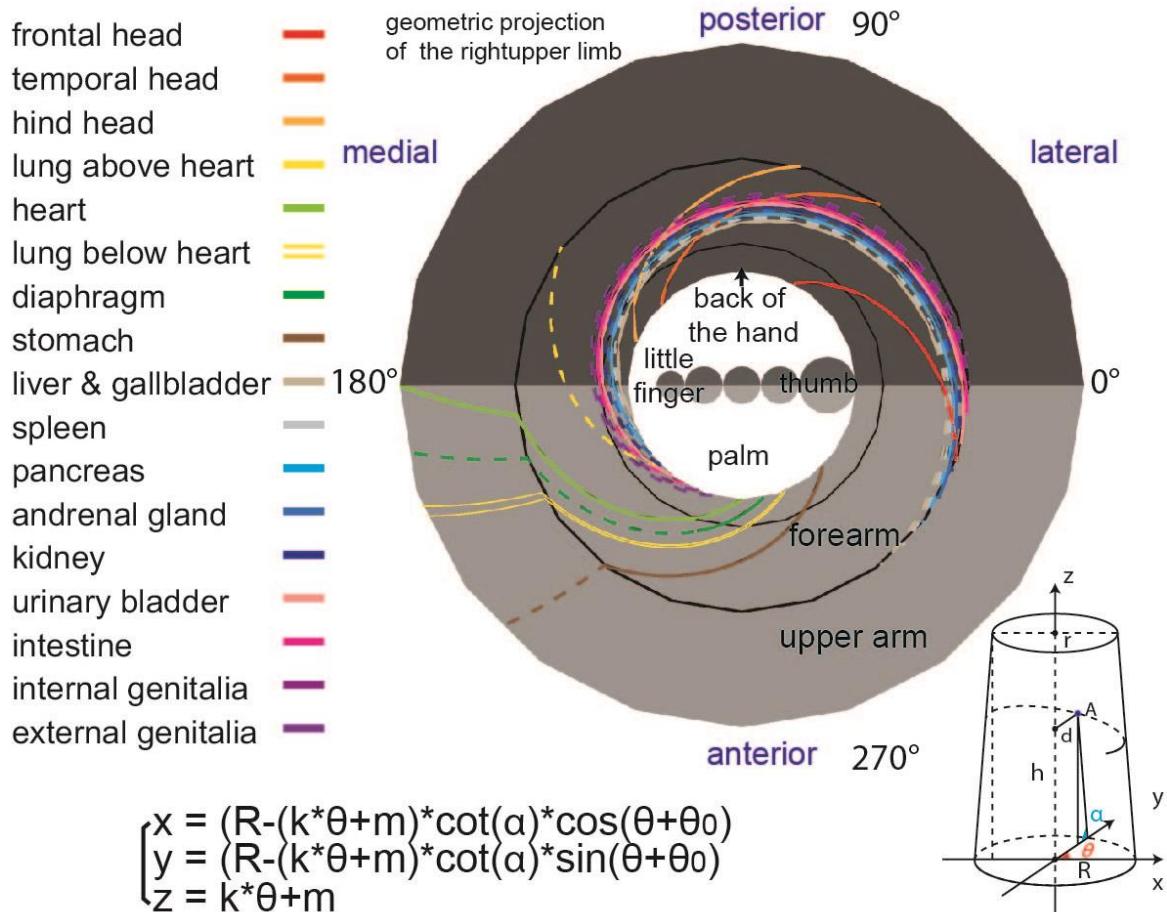


Figure 5.5 the TM - AAUL (projection plot) and the conic helix function

| Parameter  |  | example  |
|------------|--|--|
| $\theta$   | the rotating angles of conic helix function curve of the acupoints, which correspond to one inner organ in the TM - AAUL or the TM - AALL, around the upper limb or lower limb                             | the conic helix function curve of the acupoints corresponding to the heart in the TM - AAUL rotates about $90^\circ$ from the armpit to the palm while counterpart of the liver and gallbladder rotating about $180^\circ$ .<br>$\theta_{\text{heart}} = [180^\circ \ 270^\circ];$<br>$\theta_{\text{liver \& gallbladder}} = [45^\circ \ 225^\circ].$   |
| $\theta_0$ | the initial rotating angles (or the angular offset) of conic helix function curve of the acupoints, which correspond to one inner organ in the TM - AAUL or TM - AALL, in the proximal end.                | the rotating angle of the lateral (radial) side is regarded as $0^\circ$ . The initial rotating angle of the conic helix function curve of the acupoints corresponding to the heart in the TM - AAUL $\theta_{0\text{heart}} = 180^\circ$ ; the counterpart of the stomach $\theta_{0\text{stomach}} = 225^\circ$ .  |
| $\alpha$   | the angle between the lateral face and the lower circular face   |  |
| $k$        | the extending distance of conic helix function curve of the acupoints, which correspond to one inner organ in the TM - AAUL or the TM - AALL, along the limb when it rotates around the limb a unit angle. | the conic helix function curve of the acupoints corresponding to the heart in the TM - AAUL extend along the upper limb from the armpit to the palm when it rotates about $90^\circ$ ( $\pi/2$ ) around the upper limb. However, the counterpart of the liver and gallbladder only extends from the elbow joint to the wrist joint when rotating about $90^\circ$ ( $\pi/2$ ) around the upper limb.<br>$k_{\text{heart}} = \text{the length of the upper limb}/(\pi/2);$<br>$k_{\text{liver \& gallbladder}} = \text{the length of the forearm}/(\pi/2).$ |
| $m$        | the shift distance (or the distance offset) of conic helix function curve of the acupoints, which correspond to one inner organ in the TM - AAUL or the TM - AALL, towards the proximal end.               | (the armpit as 0)<br>$m_{\text{heart}} = 0;$<br>$k_{\text{Frontal Head}} = \text{the length of the forearm}.$  |

## 5.8 Appendix 8 --- the Connecting Model of the Trunk Acupoints and Long-distance Limb Acupoints with the Viscera (or the Head Region)

In Chapter 3, we talked about the acupoint distribution pattern, constructed an acupoints distribution model and proposed a hypothesis about the development and formation of the topographic map of acupoints (acupointotopy). But we did not explain how the acupoints on the surface of the body connect with viscera (or the head regions). Since we do not have enough evidence to support our hypothesis, the connection model is only introduced in **Appendix 8**.

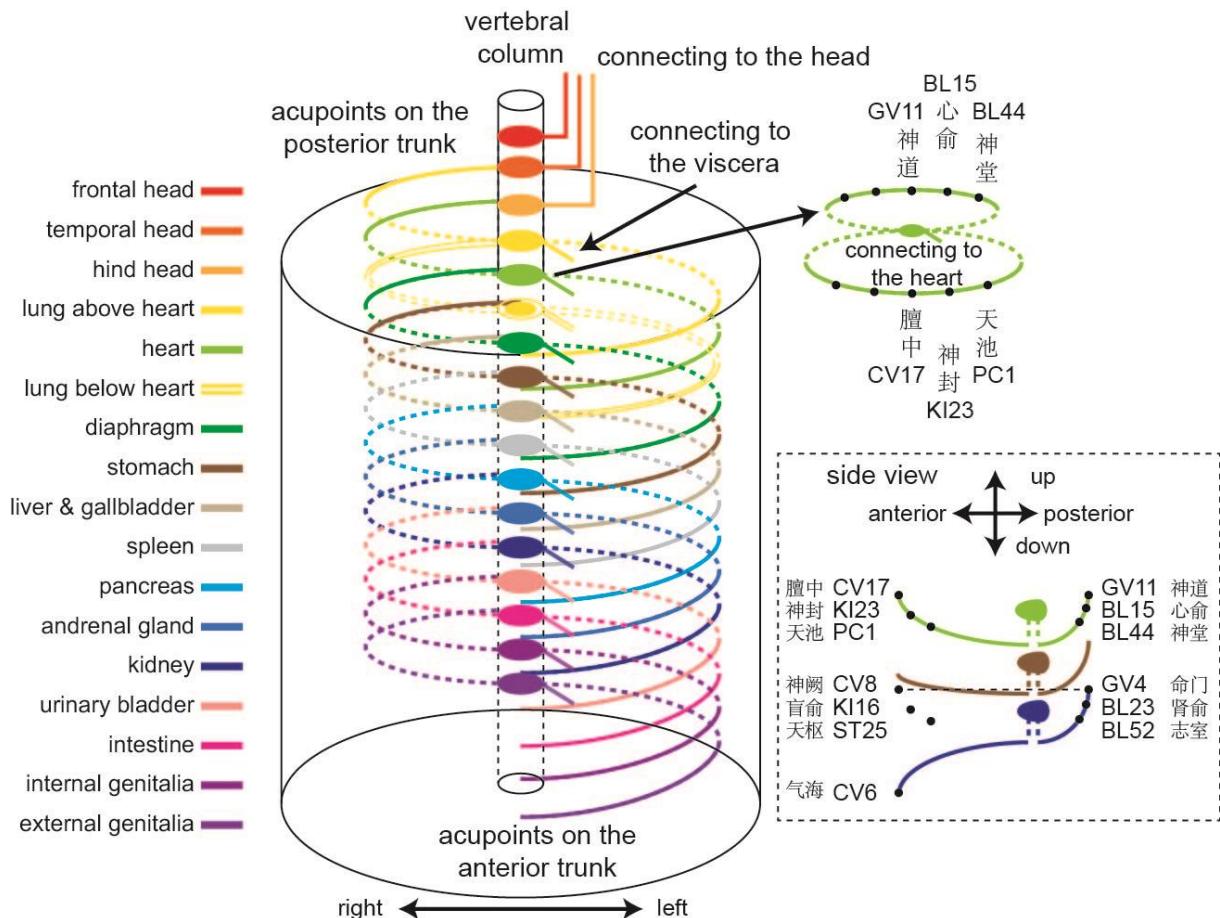
We hypothesize that the lower acupoint center (the lower center of acupoints, LCAs) to connect acupoints with the viscera lies in the vertebral column and it is arranged in the **standard order** from the top to the bottom along the vertebral column. The first three segments on the top connect with the Frontal Head, the Temporal Head, and the Hind Head, respectively.

The following segments connect with the lung (“above the heart”), the heart, the lung (“below the heart”), the diaphragm, the stomach, the liver, the gallbladder, the spleen, the pancreas, the adrenal gland, the kidney, the urinary bladder, the intestine, the internal genitalia, and the external genitalia, respectively (**Figure 5.6**). All the trunk acupoints and the limb long-distance acupoints connect with viscera indirectly via the LCAs. Regarding the functional mechanism, the stimulating signals to the acupoints flow into the LCAs first and influence the viscera in the corresponding segments (**Figure 5.6** and **Figure 5.7**).

### 5.8.1 Trunk Acupoint - LCAs - Viscera Connecting Model

We hypothesize that the LCAs connects with the trunk acupoints in a similar way like the projection of thoracic nerves. The ventral branch (rami) of the LCAs projects to the anterior median line via the sides of the trunk, connecting the acupoints on the anterior trunk almost horizontally. On the contrary, the posterior branch (rami) of the LCAs projects to the posterior median line through the back, connecting the acupoints on the posterior trunk almost horizontally. Since the posterior branch is small, the horizontal projection regions are also small. Therefore, acupoints on the posterior of the trunk are within 4 cun apart from the posterior median line horizontally. The posterior branch on each vertical level is almost on the same vertical level as the corresponding vertebra. Therefore, the distribution of the acupoints is almost parallel to the corresponding segment of vertebra. However, since the ventral branch of the LCAs projects slightly downwards (from the

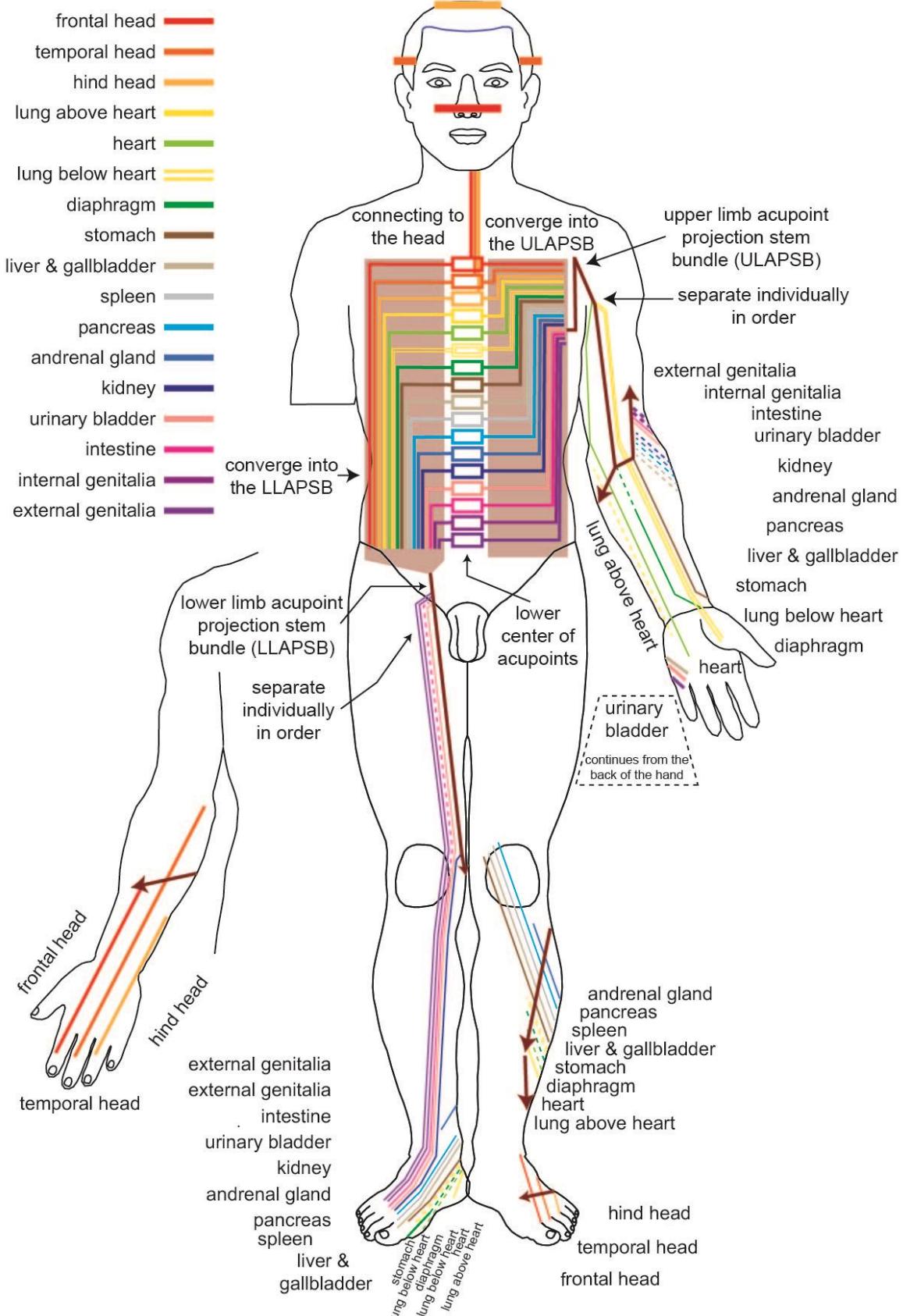
lateral upper towards the medial bottom), the vertical position of the projected acupoints is lower than that of that of acupoints on the posterior trunk projected from the same segment of the LCAs (**Figure 5.6**).



**Figure 5.6 the trunk acupoint - LCAs - viscera connecting model.** The lower center of acupoints (LCAs) lies in the spine, connecting the head and the viscera. Meanwhile, the LCAs send two projections ventrally and a dorsally, connecting the acupoints with similar or the same functions. In the side view (the lower right panel), the dorsal projections corresponding to the viscera are almost parallel to the same segments of vertebral column while the ventral projections shift downwards cumulatively.

#### 5.8.2 Limb Long-distance Acupoint - LCAs - Viscera Connecting Model

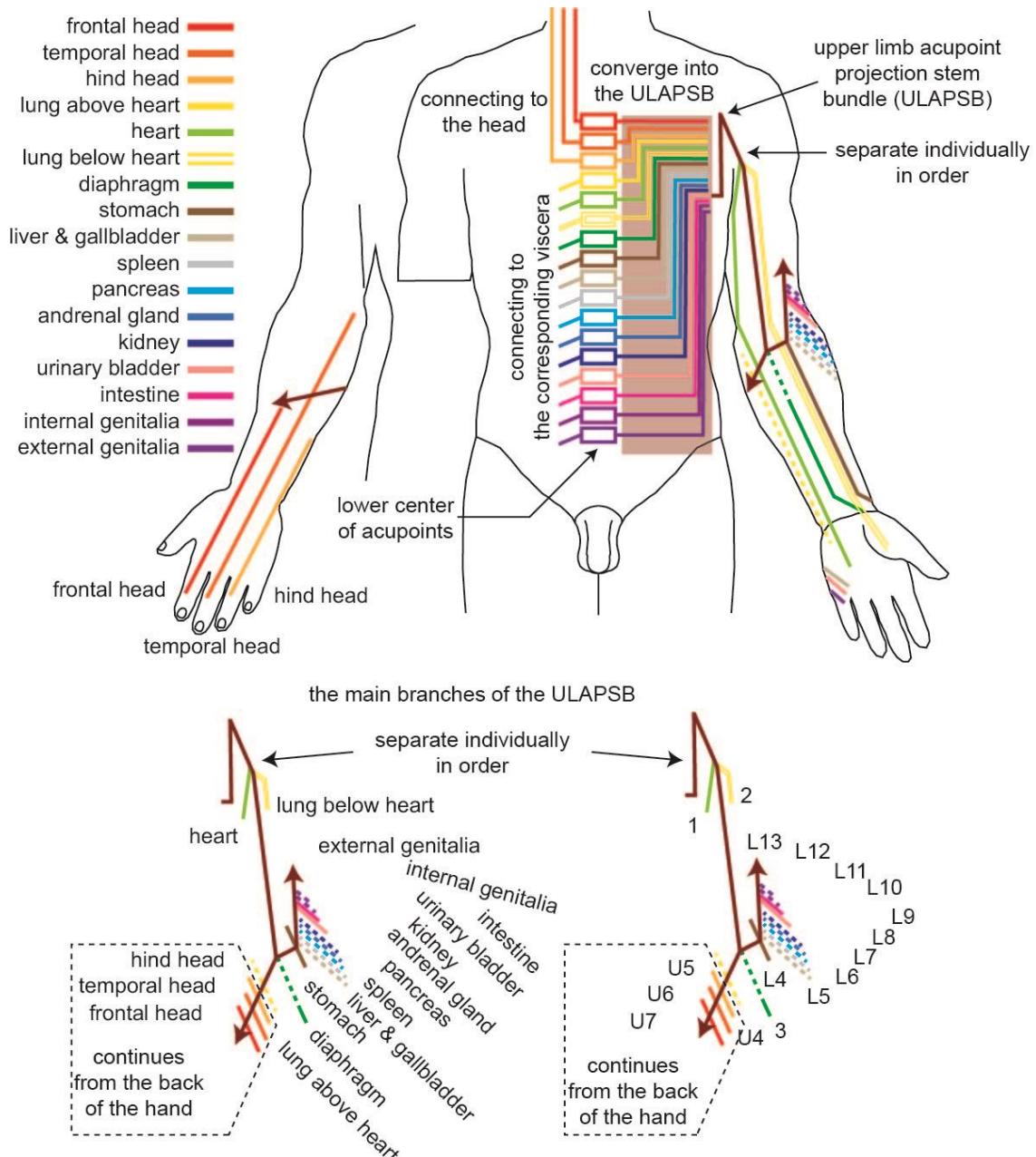
The projections of the LCAs to the limbs converge into an acupoint projection bundle (the upper and the lower limb acupoint projection stem bundle, the ULAPSB and the LLAPSB) first, and then the bundle enters the limbs and extends distally along the limb. Afterwards, the single projection to the “region of one inner organ or head region of the topographic map of acupoints” separates individually from the projection bundle in the **standard order** (or the **reversed standard order**) and extend distally along (sometimes with rotation around) the limb (**Figure 5.7**).



**Figure 5.7 the limb long-distance acupoint - LCAs - viscera connecting model.** The projections of the LCAs (colored rectangles in the midline of the trunk) to the limb long-distance acupoints converge into acupoint projection bundles (the upper and the lower limb acupoint projection stem bundle; in brown) in the **standard order** first, and then the single projections separate in specific orders from the ULAPSB and the LLAPSB individually and extend distally.

### 5.8.2.1 Upper Limb Long-distance Acupoint - LCAs - Viscera Connecting Model

The projections of the LCAs to the upper limb long-distance acupoints converge into the upper limb acupoint projection stem bundle (the ULAPSB). Then the ULAPSB enters the limbs from the armpit and extends distally along the upper limb. The acupoints corresponding to the heart and the lung (“lung below the heart”) separate from under the shoulder joint of the anterior upper arm and extend distally. When the ULAPSB reaches the elbow joint, 1) acupoints corresponding to the diaphragm separate from the ULAPSB and extends distally; 2) the ULAPSB splits into two bundles, the upper limb acupoint projection second-order upper bundle (the ULAP2UB) and the upper limb acupoint projection second-order lower bundle (the ULAP2LB). The former (the ULAP2UB) rotates from the medial anterior upper limb under (distal to) the elbow joint to the posterior upper limb and it contains acupoints corresponding to the head regions. These acupoints separate from the ULAP2UB at the posterior elbow joint and project to the distal posterior upper limb. The latter (the ULAP2LB) rotates from the lateral anterior upper limb near the elbow joint towards the distal lateral posterior upper limb and it contains acupoints corresponding to the stomach and the following viscera in the **standard order**. Afterwards, these acupoints corresponding to the viscera separate from the ULAP2LB and project to the distal posterior upper limb (**Figure 5.8**).



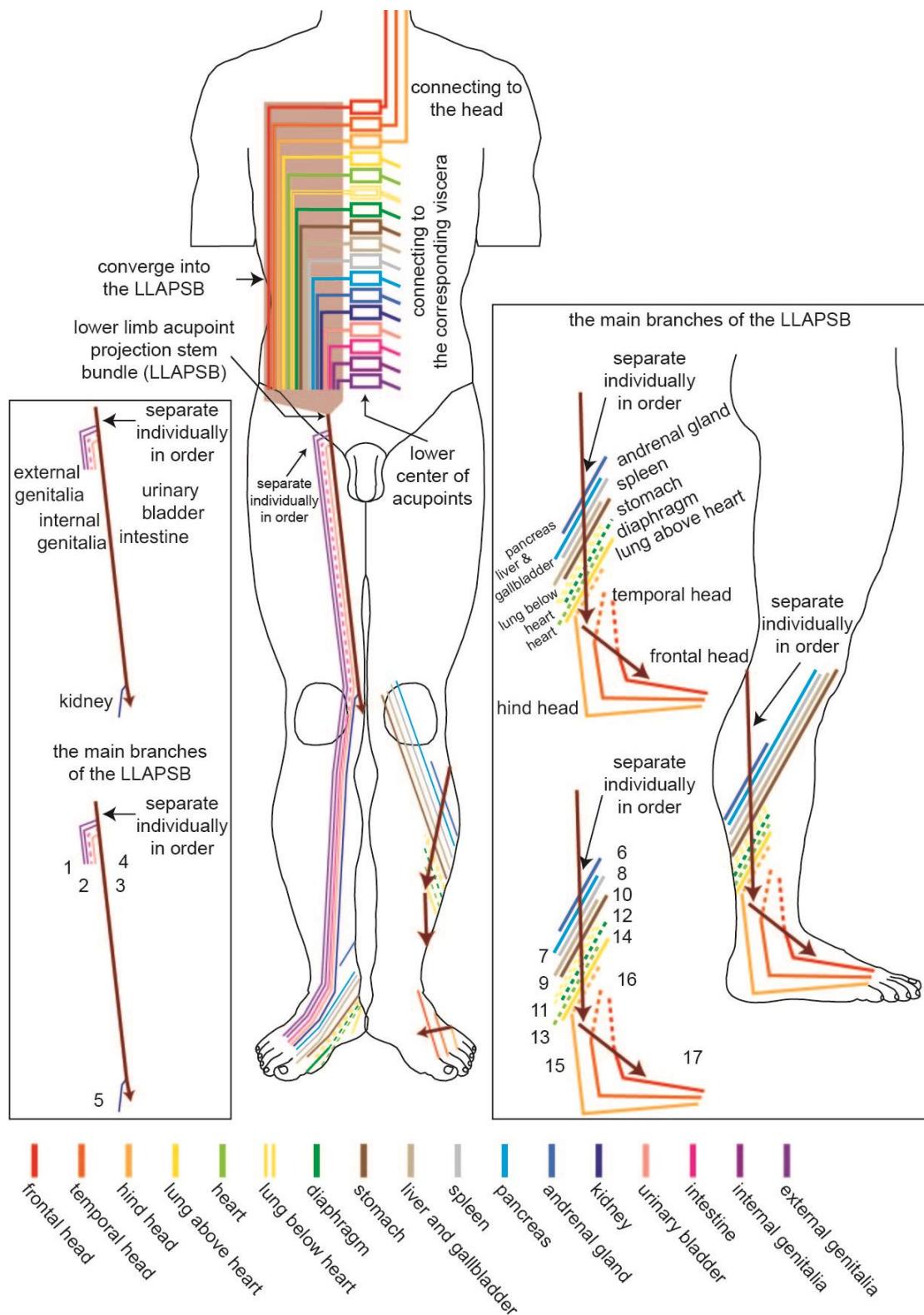
**Figure 5.8 the upper limb long-distance acupoint - LCAs - viscera connecting model.** The projections of the LCAs (colored rectangles in the midline of the trunk) to the upper limb long-distance acupoints converge into the ULAPSB (in brown) in the **standard order** first and enter the upper limb. Then the single projections separate in a specific order from the ULAPSB. The distribution areas of acupoints corresponding to the head or viscera are represented by lines. The dashed lines indicate that acupoints in those areas have not been found or do not exist (but the acupoints should be in the dashed line areas if they exist). The acupoint projections separated from the ULAPSB, the ULAP2LB, and the ULAP2UB are labeled with numbers according to the order in which they separate from these bundles.

### 5.8.2.1 Lower Limb Long-distance Acupoint - LCAs - Viscera Connecting Model

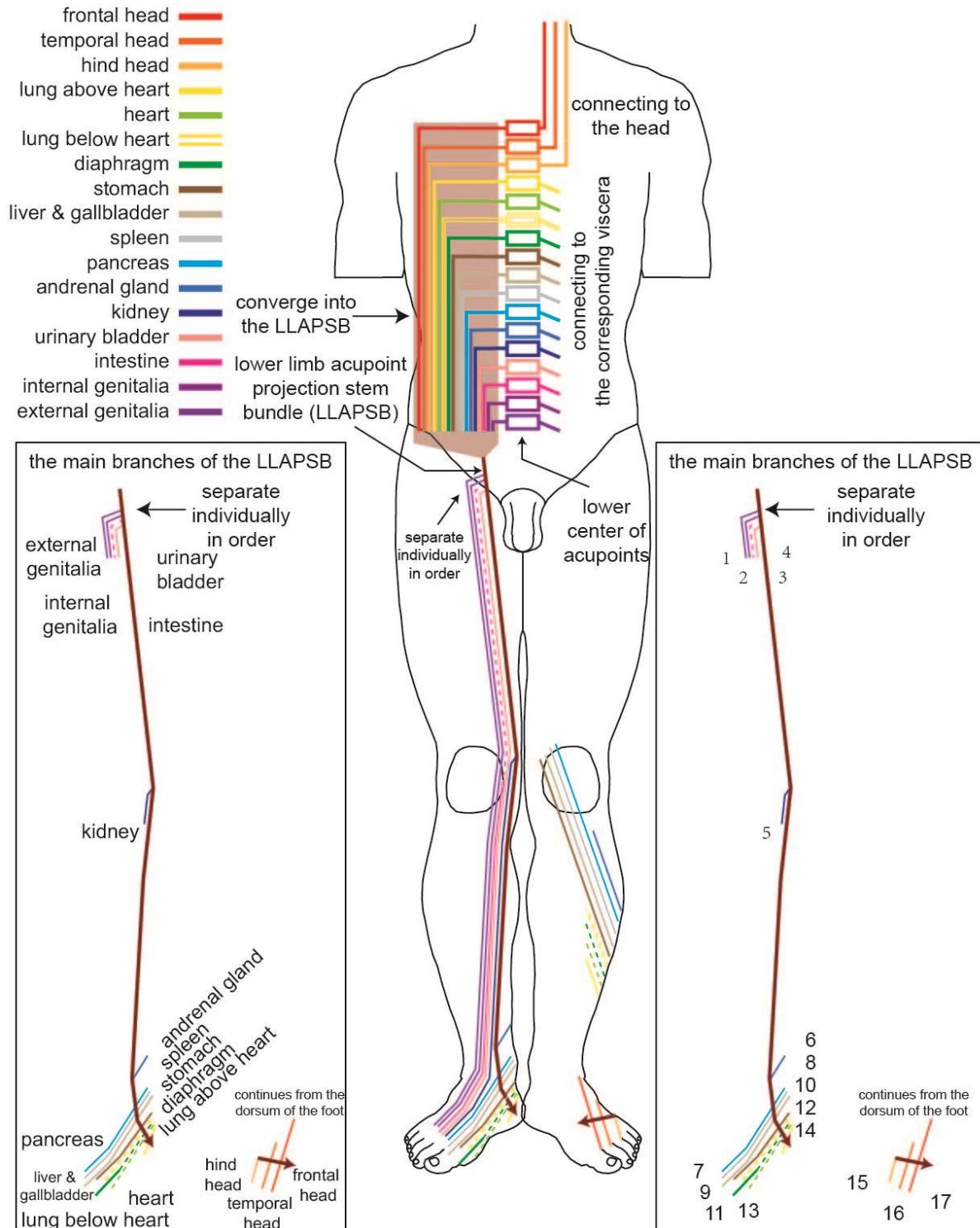
The projections of the LCAs to the lower limb long-distance acupoints converge into the lower limb acupoint projection stem bundle (the LLAPSB). Then the LLAPSB enters the limbs from the hip joint and extends distally along the lower limb. The single projection to the “region of one inner organ or head region of the topographic map of acupoints” separates individually from the LLAPSB in the **reversed standard order** and extends distally. 1) acupoint projections to the external genitalia, the internal genitalia, the intestine, and the urinary bladder separate individually from the LLAPSB at the anterior thigh below the hip joint; 2) acupoint projection to the kidney separate from the LLAPSB at the medial knee joint; 3) the LLAPSB rotates from the medial knee joint backward to the lateral anterior crus via the popliteal fossa and extends downwards until the dorsum of the foot. The acupoint projections to the adrenal gland, the pancreas, the spleen, the gallbladder, the liver, the stomach, the diaphragm, (“lung below the heart”), the heart, the lung (“lung above the heart”), the Hind Head, the Temporal Head, and the Frontal Head separate individually from the LLAPSB (**Figure 5.9.1**).

In addition, the acupoint projections to the adrenal gland, the pancreas, the spleen, the gallbladder, the liver, the stomach, the diaphragm, (“lung below the heart”), the heart, the lung (“lung above the heart”), and the head regions is possibly in the following alternative way: 1) the acupoint projections to the adrenal gland, pancreas, spleen, gallbladder, liver, stomach, diaphragm, ('lung below the heart'), heart, lung ('lung above the heart') starts from the distal medial crus and the medial foot, close to the ankle joint; 2) the LLAPSB rotates from the bottom (plantar side) of the foot to the dorsum of the foot, and the acupoint projections to the Hind Head, the Temporal Head, and the Frontal Head separate individually from this location (**Figure 5.9.2**).

The two projection ways look different, but they are essentially identical according to the topology. The first projection way matches the developmental hypothesis in Chapters 3 while the second way looks simpler and it is easy to understand.



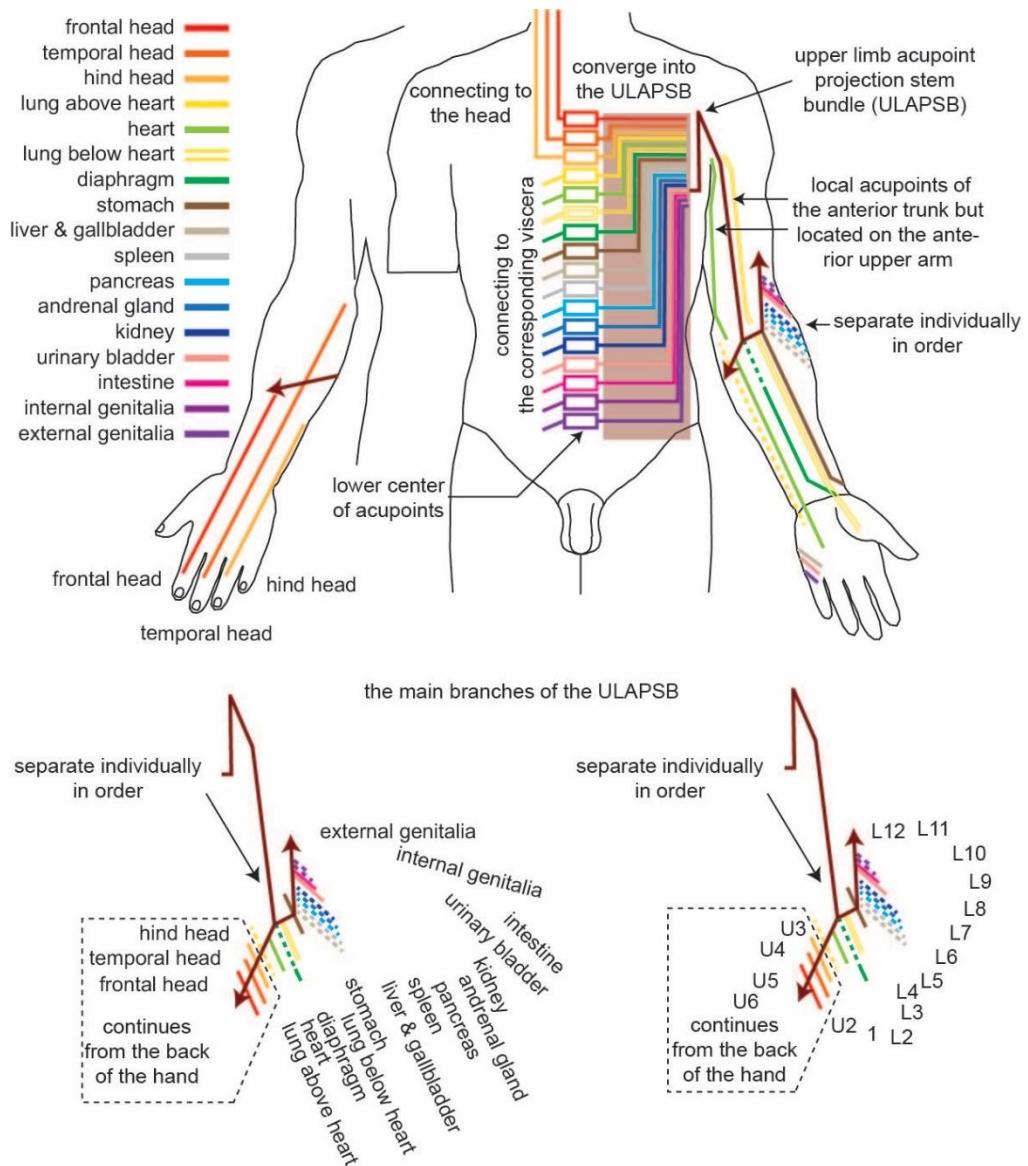
**Figure 5.9.1 the lower limb long-distance acupoint - LCAs - viscera connecting model.** The projections of the LCAs (colored rectangles in the midline of the trunk) to the lower limb long-distance acupoints converge into the LLAPSB (in brown) in the **standard order** first. Then the single projections separate from the LLAPSB in the **reversed standard order**. The distribution areas of acupoints corresponding to the head or viscera are represented by lines. The dashed lines indicate that acupoints in those areas have not been found or do not exist (but the acupoints should be in the dashed line areas if they exist). The acupoint projections separated from the LLAPSB are labeled with numbers according to the order in which they separate from the bundle.



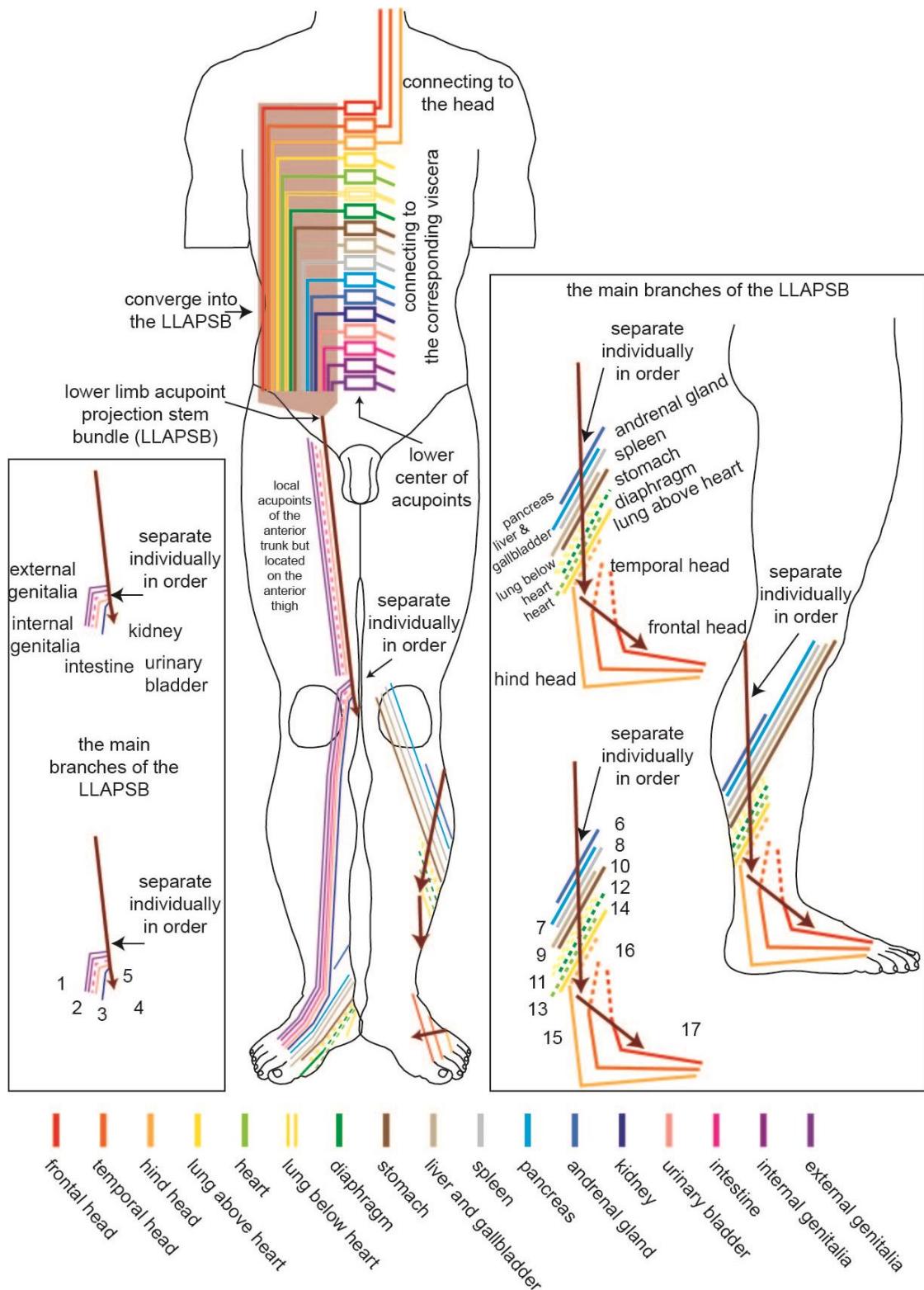
**Figure 5.9.2 the lower limb long-distance acupoint - LCAs - viscera connecting model (alternative).** The projections of the LCAs (colored rectangles in the midline of the trunk) to the lower limb long-distance acupoints converge into the LLAPSB (in brown) in the **standard order** first. Then the single projections separate from the LLAPSB in the **reversed standard order**. The distribution areas of acupoints corresponding to the head or viscera are represented by lines. The dashed lines indicate that acupoints in those areas have not been found or do not exist (but the acupoints should be in the dashed line areas if they exist). The acupoint projections separated from the LLAPSB are labeled with numbers according to the order in which they separate from the bundle.

### 5.8.3 Limb Long-distance Acupoint - LCAs - Viscera Connecting Model (variant)

We mentioned that the acupoints corresponding to the viscera on the upper arm and the thigh can be regarded as local acupoints of the anterior trunk but located on the limbs in the **Appendix 6.**



**Figure 5.10.1 the upper limb long-distance acupoint - LCAs - viscera connecting model.** The projections of the LCAs (colored rectangles in the midline of the trunk) to the upper limb long-distance acupoints converge into the ULAPSB (in brown) in the **standard order** first and enter the upper limb. Then the single projections separate in a specific order from the ULAPSB. The distribution areas of acupoints corresponding to the head or viscera are represented by lines. The dashed lines indicate that acupoints in those areas have not been found or do not exist (but the acupoints should be in the dashed line areas if they exist). The acupoint projections separated from the ULAP2LB and the ULAP2UB are labeled with numbers according to the order in which they separate from these bundles.



**Figure 5.10.2 the lower limb long-distance acupoint - LCAs - viscera connecting model.** The projections of the LCAs (colored rectangles in the midline of the trunk) to the lower limb long-distance acupoints converge into the LLAPSB (in brown) in the **standard order** first. Then the single projections separate from the LLAPSB in the **reversed standard order**. The distribution areas of acupoints corresponding to the head or viscera are represented by lines. The dashed lines indicate that acupoints in those areas have not been found or do not exist (but the acupoints should be in the dashed line areas if they exist). The acupoint projections separated from the LLAPSB are labeled with numbers according to the order in which they separate from the bundle.

The ULAPSB (LLAPSB) enters the upper (lower) limb and extends distally along the upper (lower) limb. The single projection to the “region of one inner organ or head region of the topographic map of acupoints” from the LCAs separates individually from the projection stem bundle in the **standard order** (or **reversed standard order**) and extends distally along (sometimes with rotation around) the upper (lower) limb (**Figure 5.10**).

## 6 Index

|   |  |   |                    |
|---|--|---|--------------------|
| assistant acupoints .....                               | 131, 139, 178  | The Acupoint Anterior Axis of the Lower Limb .....  | 59                 |
| Back-Shu Points .....                                   | 116, 117, 131  | The Acupoint Anterior Axis of the Upper Limb .....  | 59                 |
| Baekan .....  | 23, 25, 26   | The Acupoint Axis of the Lower Limb .....           | 59                 |
| blastula .....  | 50   | The Acupoint Axis of the Upper Limb .....           | 59                 |
| Cleft Points .....                                      | 111  | The Acupoint Drifting Axis of the Lower Limb .....  | 59                 |
| Combination of Isofunct-Allotop-Acupoints               | 133  | The Acupoint Posterior Axis of the Lower Limb ..... | 59                 |
| Combination of Isofunct-Isotop-Acupoints                | .132   | The Acupoint Reverse Axis of the Lower Limb .....   | 59                 |
| Combination of Similar and Complementary Acupoints..... | 136, 137   | The Acupoint Reverse Axis of the Upper Limb .....   | 59                 |
| comparative thinking paradigm .....                     | 3  | the autonomic nervous system .....                  | 47                 |
| conic helix function .....                              | 189, 190   | The Axis of Acupoints on the Anterior Trunk         | 58                 |
| cranial nerves ..                                       | 32, 33, 34, 45, 48, 90, 162, 179                             | The Axis of Acupoints on the Posterior Trunk .....  | 59                 |
| Five Elements .....                                     | 3, 4   | the Axis of Lower Limb Bloodletting Sites ..        | 155                |
| Five-Shu Points Combination .....                       | 131  | the Axis of Upper Limb Bloodletting Sites ..        | 154                |
| Front-Mu Points .....                                   | 116, 131   | the celiac trunk .....                              | 43                 |
| gastrula.....   | 50   | the Combination of Yuan Point and Luo Point .....   | 111, 161           |
| host acupoints .....                                    | 131, 132, 139, 178   | the dermomyotome .....                              | 51                 |
| intercostal arteries .....                              | 40, 42   | the Five Great Elements .....                       | 23                 |
| limb bud.....   | 52, 53, 118, 122, 123, 127, 128                              | the foregut.....                                    | 36, 43             |
| LLAPSB .....  | 193, 197, 202  | the inferior mesenteric artery .....                | 43                 |
| long-distance acupoints .                               | 13, 63, 74, 78, 79, 80, 86, 87, 161, 162, 187, 191, 195, 197 | the lower center of acupoints .....                 | 191                |
| Loong .....   | 23, 24, 26, 27   | the midgut .....                                    | 36                 |
| Luo Points .....  | 111  | the parasympathetic nervous system .....            | 48                 |
| Neural crest cells .....                                | 53   | the paraxial mesoderm.....                          | 32, 33, 34, 51, 90 |
| pharyngeal arch arteries .....                          | 40   | the sclerotome.....                                 | 31, 51             |
| Shenzhibing .....                                       | 13, 14, 15, 61, 66, 89, 161, 177                             | the superior mesenteric artery.....                 | 43                 |
| somite.....   | 31, 56   |   |                    |
| spinal nerve .....                                      | 45, 47, 51, 90, 118, 162, 179                                |   |                    |
| Synergic Combination of Acupoints .....                 | 139  |   |                    |

|  |        |                   |                |
|--|--------|-------------------|----------------|
| the sympathetic nervous system .....   | 48, 70 | TP - ALLBS .....  | 155, 156       |
| The theory of Three Principal Energies .....                                 | 23     | TP - AULBS.....   | 154, 155, 156  |
| the Topographic Map of the Acupoint Axis of<br>the Lower Limb.....           | 87     | Tripa.....        | 23, 24, 25, 26 |
| the Topographic Map of the Acupoint Axis of<br>the Upper Limb.....           | 79     | ULAPSB.....       | 192, 195, 202  |
| the Topographic Map of the Axis of Acupoints<br>on the Anterior Trunk.....   | 90     | Yin-Yang .....    | 1, 2, 79       |
| the Topographic Map of the Axis of Acupoints<br>on the Posterior Trunk ..... | 69, 90 | Yuan Points ..... | 111            |
|  |        | Zang-Fu .....     | 5, 7, 66, 116  |