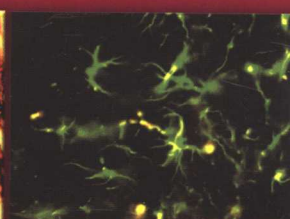
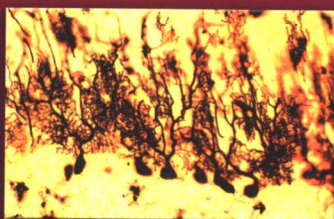
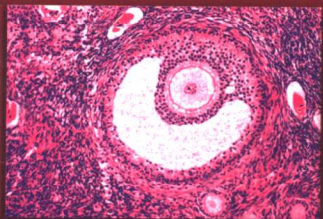


Textbook of Human Development and Histology



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上海科学技术出版社

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Capsule Summary

Histology plays an important role in the biomedical courses. The study of macromolecular components and all kinds of organelles of the cells, the myriad of cells and cell products that are assembled to form basic tissues (including **epithelial, connective tissue, muscular tissue, and nervous tissue**), and certain aspects of the microscopic structure of organs are all in the realm of the histology. Histology now encompasses much of cellular and molecular biology, and many fields of physiology and biochemistry, as well as traditional microscopic anatomy. The basic techniques of histology (including **light microscopy, electronic microscopy, cytochemistry** and **immunochemistry**) are now routinely applied to study cells, tissues, and organs, in term of basic medical science, clinical medicine, and preventive medicine as well.

The purpose of this book is to concisely present the main contents of Histology and early development of human body, and to enable the Chinese students initially to gain an overview of Histology and Embryology by English and later to review the discipline, which is particularly important and necessary in today's biomedical curriculum for reason of the reduction in time devoted to basic sciences.

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PREFACE

As it is common knowledge that human histology and embryology, one of the key disciplines of medical curriculum, is under the umbrella of morphology, Human histology is the study of human microstructure and its relevant function, while human Embryology is concerned with prenatal human development and its mechanism. Scientifically, both disciplines are closely interrelated and interwoven aiming at investigation of human development, microstructure and function. During the past 50 years, Human histology and embryology are given separately in most Chinese medical colleges, and usually histology prior to embryology.

Fully understanding the development, microstructure and function of human as a whole is at the heart of medicine. We decided to take an innovated approach, combining both human histology and embryology into a comprehensive new course, namely "Textbook of Human Development and Histology", starting with gametes, fertilization and early embryo development, followed by four basic tissues, then a synthetical description of development, microstructure and function of all the organs and systems. In 2003, a new textbook, titled as "Human Developmental and Functional Histology" was published, under the leadership of the late dis-

tinguished Histo-embryologist Cheng Lingzhong. In recent years, with the rapid development of modern life science, especially in the field of cell and molecular biology, enormous progress has been made in explaining the normal development, microstructure and functions of human. So we tried to reflect these new events briefly in this textbook as well.

Since 2003, this textbook has been widely used in many Chinese medical colleges, and favorably recognized by vast numbers of medical students. At the request of broad readers, Professor Zhong Cuiping, one of the chief editors of this book, and others dedicated to compile an English Syllabus to the textbook, which provides medical students with an useful reference tool for learning. I do hope and sincerely wish that medical students and other readers can appreciate the link between the English Syllabus and the textbook, facilitating greater understanding and easier studying.

Wang Yifei

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Chapter 1 Introduction of Histology

General Introduction

- What is **Histology** and why should medical students learn it
- Main histological techniques and methods

Light microscopy

Electron microscopy

Tissue preparation

Freeze-fracture and freeze-etching

Histochemistry and cytochemistry

Immunohistochemistry and immunocytochemistry

***In situ* hybridization**

Observation of living cells and tissues

1.1 What is Histology and Why should Medical Students Learn it

Anatomy could be subdivided into **gross anatomy**, which is visible to the naked eye, and **microscopic anatomy**, which can be seen only with the aid of a microscope. The later can be further subdivided into **organology** (the study of organs),

histology (the study of tissues), and **cytology** (the study of cells). Today the term of "Histology" is used loosely to include all subdivisions of microscopic anatomy. Histology refers, therefore, to the knowledge, or science of cells, tissues, organs and systems.

Despite its complexity, the human body is composed of four basic types of tissue: **epithelial tissue**, **connective tissue**, **muscular tissue**, and **nervous tissue**. These tissues, which are formed by cells and molecules generally called extracellular matrix, do not exist as isolated units but rather in association with one another and in variable proportions, forming different organs and systems of the body.

Histology is the meeting-place of anatomy, biochemistry and physiology. The chemical molecules, e. g. enzymes, nucleic acids, glycogen and lipids, are not floated randomly in the cells and tissues, but precisely organized inside the cells and tissues into discrete structures. Each type of cell and tissue, as well as each organ is specially adapted to perform one or several particular functions. Normal physiological processes are closely associated with normal structures; abnormal physiological processes are usually expressed in altered structures or relationships of the cells and intercellular substances. Therefore, learning the microscopic structure of the human body not only completes the study of gross anatomy, but also turns to be a necessary prelude to the study of **biochemistry**, **physiology** and **pathology**.

Histology embraces the study of structures as well as

functions of cells, tissues and organs. The correlation between structure and function provides the reason why Histology is such an intriguing and readily understandable subject. When students examine the structure of an organ or a tissue, they can deduce much about its function. Conversely, if they know the function of an organ or a tissue, they can forecast much of its microscopic structure.

Although most medical students are not going to become histologists, a thorough knowledge of histology is fundamental for their medical career as being a doctor in the future.

1.2 Main Histological Techniques and Methods

Familiarity with the tools and methods of any branch of science is essential for proper understanding of the subject. The small size of cells and matrix components makes histology dependent on the use of and improvements in microscopes. As far as the histological study methods have been concerned, there are two aspects that should be paid consideration to; the kind of microscope to be used and the preparation of the cell, tissue or organ in a manner suitable for viewing with the microscope.

Advances in chemistry, physiology, immunology, and pathology, and the interactions among these fields, contribute to a better knowledge of histology. Integration of knowledge in these fields has resulted in histochemistry,