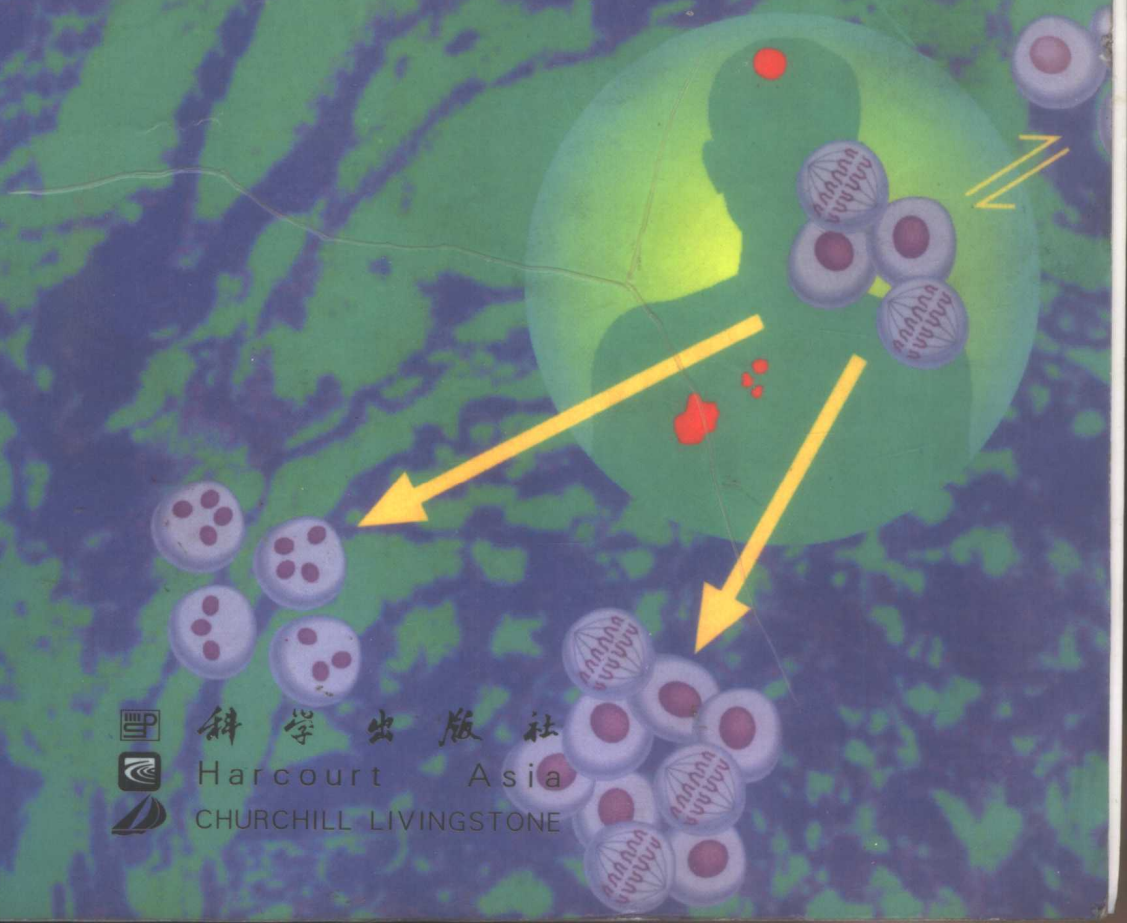
SECOND EDITION

英文影印版

# General and Systematic Pathology

# 系统病理学 第2版

J.C.E. UNDERWOOD



科学出版社
Harcourt Asia
CHURCHILL LIVINGSTONE

# 系统病理学

# General and Systematic Pathology

*Second Edition*

*第 2 版*

J. C. E. Underwood

科学出版社

Harcourt Asia

CHURCHILL LIVINGSTONE

General and Systematic Pathology 2nd Edition



**北京市版权局著作权登记号**:01—1999—1546

**图书在版编目(CIP)数据**

系统病理学:第 2 版:英文/(英)昂德伍德(Underwood, J. C. E.)主编
-北京:科学出版社,1999.10
书名原文:General and Systematic Pathology
ISBN 7-03-007724-5
Reprint ISBN 981-4033-87-1
Ⅰ.系… Ⅱ.昂… Ⅲ.病理学-英文 Ⅳ.R36

中国版本图书馆 CIP 数据核字(1999)第 27503 号

科学出版社
Harcourt Asia 出版
Churchill Livingstone
北京市东黄城根北街 16 号
邮政编码:100717
中国科学院印刷厂印刷
新华书店北京发行所发行 各地新华书店经销
*

| | |
|---|---|
| 1999 年 10 月第 一 版 | 开本:787×1092 1/16 |
| 1999 年 10 月第一次印刷 | 印张:59 3/4 |
| 印数:1—3 000 | 字数:1 417 000 |

**定价:120.00 元**

(如有印装质量问题,我社负责调换(北燕))

# Preface

This textbook, intended primarily for medical students, presents pathology in the context of modern medicine and of advances in cellular and molecular biology.

Part 1 (Basic Pathology) deals with the nature and causes of disease and the role of pathology in clinical practice. Disease mechanisms are covered in Part 2. A clear understanding of the cellular and molecular defects involved in disease is important before learning in detail about the specific conditions affecting individual organs or body systems covered in Part 3.

After each major heading within a chapter, where it is considered appropriate, there is a summary panel of key facts serving two purposes: first, to provide the reader with a framework of basic knowledge on which the subsequent details can be placed; second, to assist revision by scanning the text. Where relevant, there are comments on treatment and its relationship to the pathological features of a disease. Each chapter ends with references to review articles and specialist texts for further reading.

Medical schools in many countries are using increasingly the principles of problem-oriented learning in their curricula. This encourages learning through enquiry and exploration. With this in mind, each of the chapters in Part 3 includes a table relating clinical problems (i.e. signs and symptoms) to the pathological abnormalities responsible for them. This approach may be useful as a diagnostic aid, but more importantly it provides a basis for the learning of pathology through clinical experience. Students are also encouraged to augment their learning of pathology by using the two companion textbooks—*MCQ Companion to General and Systematic Pathology* and *Case Studies in General and Systematic Pathology;* the latter is particularly relevant to problem-oriented learning.

Increasingly, the structural abnormalities in disease are being revealed by modern medical imaging techniques such as computerised tomography, ultrasound and magnetic resonance. This aspect of "morbid anatomy", often neglected in pathology textbooks and in medical teaching, is included here to emphasise the utility of images of structural pathology in clinical diagnosis.

The book ends with a glossary of words used frequently in pathology, but which, by usage, have a meaning different from that to be found in most dictionaries or in the public domain.

This new edition of *General and Systematic Pathology* builds on the success of the first edition which was adopted widely as the recommended textbook on pathology for medical undergraduates in many countries. All chapters have been revised and updated with advances in biomedical knowledge. Three new chapters have been introduced — 'Genetic and environmental causes of disease' (Chapter 3), 'Diagnostic pathology in clinical practice' (Chapter 4) and 'Ageing and death' (Chapter 12). A team of International Advisers has been established to ensure that, as far as possible, this and future editions accord with the developments in medical curricula internationally.

I continue to welcome comments from medical students and their teachers that will lead to further improvements in future editions.

Sheffield
1996

J.C.E.U.

# Acknowledgements

First, I am grateful to many students and pathologists from various countries who provided comments on the first edition. Their advice has been very useful in planning this second edition. I thank especially all of the International Advisers who devoted so much time to critically appraising the first edition from the perspective of medical education in their own countries; their suggestions have been immensely helpful.

As editor I am very grateful to all contributors for extensively revising and updating their chapters, particularly when the competing demands on their time have increased so dramatically since the first edition was prepared. As editor, and on behalf of all contributors, I thank the staff at Churchill Livingstone for their constant guidance and help, with only a brief respite between publication of the first edition and the planning of this new edition. I thank Peter Lamb for producing the new artwork. I am grateful to Dr Roy Jennings for dealing with my numerous queries about microbiological matters.

As with the first edition, I acknowledge the unfailing support I have enjoyed from my colleagues in the University of Sheffield Department of Pathology, many of whom are contributors, during the preparation of this new edition. I acknowledge also that they have contributed over many years to a departmental slide collection from which many of the illustrations are taken. My secretary, Brenda Barrass, has cheerfully accepted the extra work related to the preparation of this edition and shielded me from other matters during times when I was fully preoccupied with it.

My work on this edition would not have been possible without the constant encouragement, support and understanding of my wife, Alice, and of my family.

Sheffield
1996

J.C.E.U.

# International Advisers

The following individuals have made a valuable contribution to the development of the second edition of this textbook. In utilising their extensive knowledge of their countries' medical curricula and the teaching of pathology, it is hoped that this textbook will prove a valuable learning resource internationally. Their contribution is gratefully recognised.

Professor J W Arends
Department of Pathology
University of Limburg
Maastricht
The Netherlands

Professor Y Collan
Department of Pathology
University of Turku
Turku
Finland

Professor J P Cruse
Department of Anatomical Pathology
University of Cape Town
Cape Town
South Africa

Dr H Goldman
Professor of Pathology
Harvard Medical School
Boston
United States of America

Professor Lai-Meng Looi
Department of Pathology
University of Malaya
Kuala Lumpur
Malaysia

Professor R Machinami
Department of Pathology
University of Tokyo
Tokyo
Japan

Professor T L Miko
Department of Histopathology
Szent-Györgyi University Medical School
Szeged
Hungary

Professor H K Muller
Department of Pathology
University of Tasmania
Hobart
Australia

Dr K Ramnarayan
Professor of Pathology
Kasturba Medical College
Manipal
India

Professor R H Riddell
Department of Anatomical Pathology
McMaster University Medical Centre
Hamilton
Canada

# Contributors

**D W K Cotton** BSc PhD BM MD MRCPath
Reader in Pathology, University of Sheffield; Honorary Consultant, Central Sheffield University Hospitals, Sheffield

**A J Coup** MB ChB FRCPath
Consultant Histopathologist, Barnsley District General Hospital, Barnsley, South Yorkshire; Honorary Clinical Lecturer in Pathology, University of Sheffield, Sheffield

**S S Cross** BSc MB BS MD MRCPath
Senior Lecturer, Department of Pathology, University of Sheffield Medical School; Honorary Consultant, Central Sheffield University Hospitals Trust, Sheffield

**M F Dixon** MD FRCPath
Reader in Gastrointestinal Pathology, University of Leeds, Leeds

**P J Gallagher** MD PhD FRCPath
Reader in Pathology, University of Southampton; Honorary Consultant Pathologist, Southampton University Hospital, Southampton

**J R Goepel** MB ChB FRCPath
Senior Lecturer in Pathology, University of Sheffield; Honorary Consultant Pathologist, Weston Park Hospital and Central Sheffield University Hospitals, Sheffield

**M Greaves** MD FRCP FRCPath
Professor of Haematology and Honorary Consultant Haematologist, University of Aberdeen, Aberdeen

**A J Howat** MB BS MRCPath
Consultant Histopathologist, Royal Preston Hospital, Preston; formerly Senior Lecturer in Pathology, University of Sheffield, Sheffield

**J W Ironside** BMSc MBChB MRCPath
Senior Lecturer in Pathology, University of Edinburgh; Honorary Consultant Neuropathologist, Western General Hospital, Edinburgh

**K A MacLennan** DM FRCPath
Reader in Tumour Pathology, Consultant Histopathologist, St James's University Hospital, Leeds

**M A Parsons** MB ChB FRCPath
Senior Lecturer and Honorary Consultant in Ophthalmic Pathology; Director, Ophthalmic Sciences Unit, University of Sheffield

**J R Shortland** BSc MB ChB PhD FRCPath
Honorary Clinical Lecturer, University of Sheffield; Consultant Histopathologist, Northern General Hospital, Sheffield

**T J Stephenson** MD MHSM MRCPath
Consultant Histopathologist, Central Sheffield Hospitals Trust, Sheffield; Honorary Clinical Lecturer, University of Sheffield

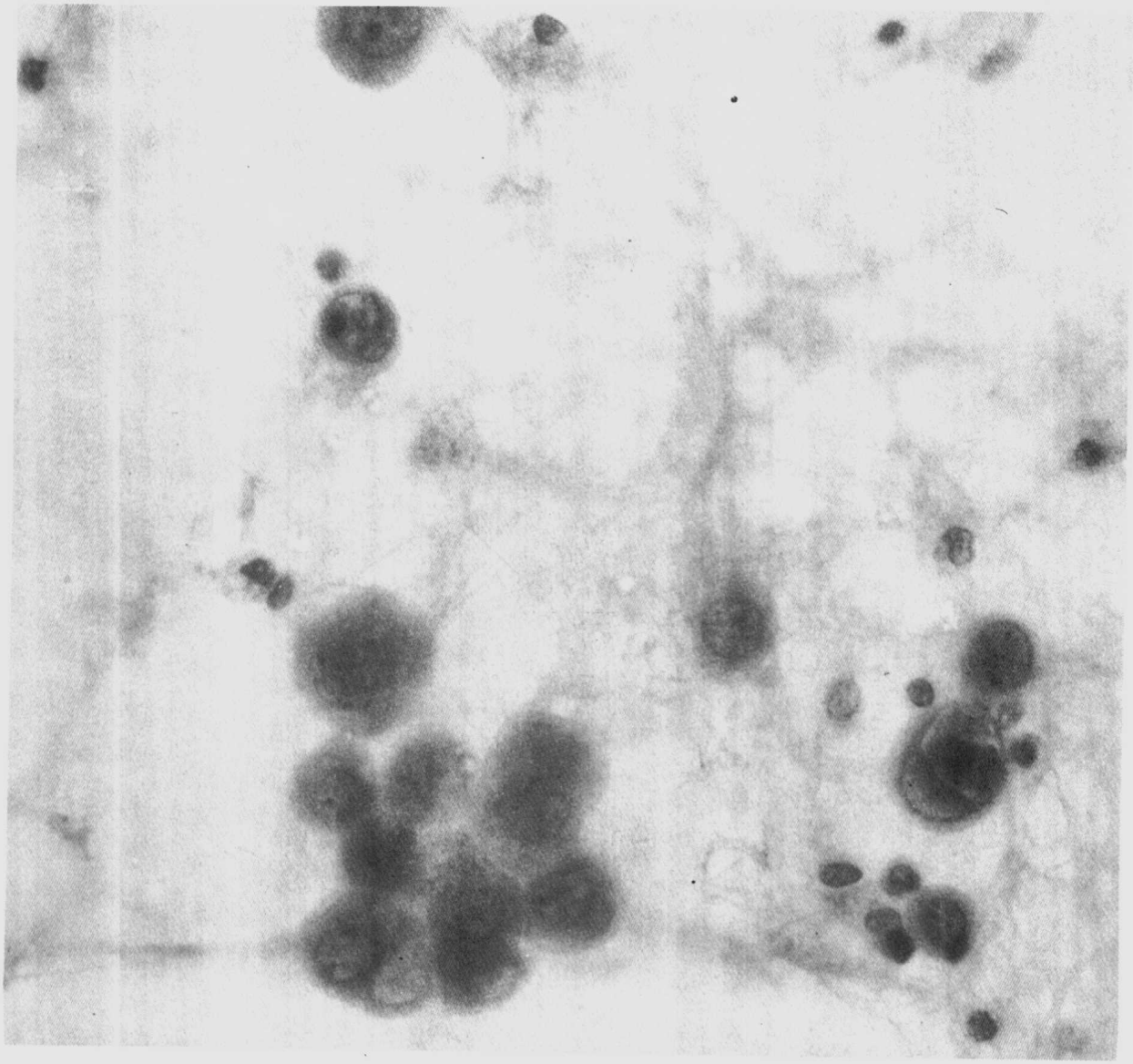
**R A Walker** MD FRCPath
Reader in Pathology, University of Leicester, Leicester

**M Wells** BSc MD FRCPath
Professor of Gynaecological Pathology, University of Leeds; Honorary Consultant Pathologist, St James's University Hospital, Leeds

# Contents

# Part 1

## BASIC PATHOLOGY



# 1

# Introduction to pathology

Pathology is the *scientific study of disease*. In clinical practice and medical education, pathology also has a wider meaning: pathology constitutes a large body of scientific knowledge, ideas and investigative methods essential for the understanding and practice of modern medicine.

Pathology is not synonymous with the morphology of diseased tissues; this is an outmoded perception. Pathology includes knowledge and understanding of the *functional* and *structural* changes in disease, from the molecular level to the effects on the individual.

Pathology is continually subject to change, revision and expansion as the application of new scientific methods illuminates our knowledge of disease.

The ultimate goal of pathology is the identification of the *causes* of disease, a fundamental objective that leads the way to disease prevention.

## HISTORY OF PATHOLOGY

The evolution of concepts about the causes and nature of human disease reflects the prevailing ideas about the explanation for all worldly events and the techniques available for their investigation (Table 1.1). Thus, the early dominance of *animism*, in the philosophies of Plato and Pythagoras, resulted in the attribution of disease to the adverse influences of immaterial or supernatural forces; it was therefore assumed that nothing could be learnt from the objective examination of the corpses of those who succumbed. Even when the clinical significance of many abnormal physical signs and postmortem findings was established early in the long history of medicine, the nature of the underlying disease was thought to be due to an excess or deficiency of the various *humors*—phlegm, black bile, and so on. These concepts are now firmly and irrevocably consigned to medical antiquity.

### Morbid anatomy

The first opportunity for the scientific study of disease came from the thorough internal examination of the body after death. *Autopsies* (necropsies or postmortem examinations) have been performed scientifically from about 300 BC and have revealed much information that has helped to clarify the nature of many diseases. As these examinations were confined initially to the gross (rather than microscopic) examination of the organs, this period is regarded as the era of *morbid anatomy*. During the 19th century in Germany, major contributions were made by Rokitansky and Aschoff, who meticulously performed and documented many thousands of autopsies and correlated their findings with the clinical signs and symptoms of the patients and with the natural history of a wide variety of diseases.

### Microscopy and cellular pathology

Pathology, and indeed medicine as a whole, was revolutionised by the application of *microscopy* to the

**Table 1.1 Historical relationship between the hypothetical causes of disease and the dependence on techniques for their elucidation**

| Hypothetical cause of disease | Techniques supporting causal hypothesis | Period |
|---|---|---|
| **Animism** | None | Primitive, though the ideas persist in some cultures |
| **Magic** | None | Primitive, though the ideas persist in some cultures |
| **Humors** (excess or deficiency) | Early autopsies and clinical observations | c. 300 BC to c.1500 AD |
| **Spontaneous generation** (abiogenesis) | Analogies with decomposing matter | Prior to 1800 AD |
| **Environmental** | Modern autopsy<br>Cellular pathology (e.g. microscopy)<br>Toxicology<br>Microbiology<br>Epidemiology | 1850 to present |
| **Genetic** | Molecular pathology (e.g. DNA analysis) and clinical observations on inherited defects | 20th century |

study of diseased tissues from about 1800. Prior to this, it was postulated that diseases arose by a process of *spontaneous generation*; that is, by a process of metamorphosis independent of any external cause or other influence. This notion seems ridiculous to us today, but 200 years ago nothing was known of bacteria, viruses, ionising radiation, carcinogenic chemicals, and so on. So Pasteur's demonstration that micro-organisms in the environment could contaminate and impair the quality of wine was a major landmark in our perception of the environment and our understanding of its possible adverse effects, and it has had an enormous impact on medicine.

Rudolf Virchow (1821–1902), a German pathologist and ardent advocate of the microscope, recognised that the cell was the smallest viable constituent unit of the body and contrived a new and lasting set of ideas about disease — *cellular pathology*. The light microscope enabled him to see changes in diseased tissues at a cellular level and his observations, extended further by electron microscopy, have had a profound influence. That does not mean to say that Virchow's cell pathology theory is immutable. Indeed, current advances in biochemistry are revolutionising our understanding of many diseases at a molecular level; we now have biochemical explanations for many of the cellular and clinical manifestations of disease.

## Molecular pathology

The impact of *molecular pathology* is exemplified by the advances being made in our knowledge of the biochemical basis of congenital disorders and cancer. Techniques with relatively simple principles (but less easy in practice) can reveal the change of a single nucleotide in genomic DNA resulting in the synthesis of the defective gene product that may be the fundamental lesion in a particular disease (Ch. 3).

### Cellular and molecular alterations in disease

As a result of the application of modern scientific methods, we now have a clearer understanding of the ways in which diseases can be attributed to disturbances of normal cellular and a molecular mechanisms (Table 1.2). It is by continuing to study disease in this way that knowledge can be advanced and treatment improved.

# THE SCOPE OF PATHOLOGY

Pathology is the foundation of medical science and practice. Without pathology, the practice of medicine would be reduced to myths and folklore.

## Clinical and experimental pathology

Scientific knowledge about human diseases is derived from observations on patients or, by analogy, from experimental studies on animals and cell cultures. The greatest contribution comes from the study in depth of tissue and body fluids from patients.

### Clinical pathology

Clinical medicine is based on a longitudinal approach to a patient's illness — the patient's history, the examination and investigation, the diagnosis, and the treatment. Clinical pathology is more concerned with a cross-sectional analysis at the level of the disease itself, studied in depth — the cause and mechanisms of the disease, and the effects of the disease upon the various organs and systems of the body. These two perspectives are complementary and inseparable: clinical medicine cannot be practised without an understanding of pathology; pathology is meaningless if it is bereft of clinical implications.

### Experimental pathology

Experimental pathology is the observation of the effects of manipulations on experimental systems such as animal models of disease or cell cultures. Fortunately, advances in cell culture technology have reduced the usage of laboratory animals in medical research and experimental pathology. However, it is extremely difficult to reproduce in cell cultures the physiological milieu that prevails in the intact human body.

## Subdivisions of pathology

Pathology is a vast subject with many ramifications. In practice, however, it can be split into major subdivisions:

- *histopathology*: the investigation and diagnosis of disease from the examination of tissues
- *cytopathology*: the investigation and diagnosis of disease from the examination of isolated cells
- *haematology*: the study of disorders of the cellular and coagulable components of blood
- *microbiology*: the study of infectious diseases and the organisms responsible for them

**Table 1.2 Examples of the involvement of cellular and extra-cellular components in disease**

| Component | Normal function | Examples of alterations in disease |
|---|---|---|
| **Cellular** | | |
| Nucleus | Genes encoded in DNA | Inherited or spontaneous mutations (e.g. inherited metabolic disorders, cancer) |
| | | Site of viral replication |
| Mitochondria | Oxidative metabolism | Mutations of mitochondrial DNA |
| | | Enzyme defects |
| Lysosomes | Enzymic degradation | Metabolic storage disorders |
| | | Defects in microbial killing |
| Cell membrane | Functional envelope of cell | Defects in ion transfer (e.g. cystic fibrosis, hereditary spherocytosis) |
| Adhesion molecules | Cellular adhesion | Altered expression in inflammation |
| | | Decreased expression in neoplasia |
| HLA substances | Immune recognition | Aberrant expression associated with autoimmune disease |
| | | Haplotypes correlate with risk of some diseases |
| Receptors | Specific recognition | Hormone receptors cause cells to respond to physiological or pathological hormone levels |
| | | Lymphocyte receptors enable immune responses to antigens |
| **Secreted products** | | |
| Collagen | Mechanical strength of tissues | Integrity of wounds<br>Inherited defects (e.g. osteogenesis imperfecta) |
| Immunoglobulins | Antibody activity in immune reactions | Deficiency leads to increased infection risk |
| | | Secreted by myeloma cells |
| | | Specific antibody activity may be in response to infection or a marker of autoimmune disease |
| Nitric oxide | Endothelium-derived relaxing factor causing vasodilatation, inhibition of platelet aggregation and of proliferation | Increased levels in endotoxic shock and in asthma |
| Hormones | Control of specific target cells | Excess or deficiency due to disease of endocrine organs |
| Cytokines | Regulation of inflammatory and immune responses and of cell proliferation | Increased levels in inflammatory, immunological and reparative tissue reactions |
| Free radicals | Microbial killing | Inappropriate or excessive production causes tissue damage |

- *immunology:* the study of the specific defence mechanisms of the body
- *chemical pathology:* the study and diagnosis of disease from the chemical changes in tissues and fluids
- *genetics:* the study of abnormal chromosomes and genes
- *toxicology:* the study of the effects of known or suspected poisons
- *forensic pathology:* the application of pathology to legal purposes (e.g. investigation of death in suspicious circumstances).

These subdivisions are more important professionally (because each requires its own team of specialists) than educationally. The subject must be taught and learnt in an integrated manner, for the body and its diseases make no distinction between these conventional subdivisions.

This book, therefore, adopts a multidisciplinary

approach to pathology. In the systematic section, the normal structure and function of each organ is summarised, the pathological basis for clinical signs and symptoms is described, and the clinical implications of each disease are emphasised.

## TECHNIQUES OF PATHOLOGY

Our knowledge of the nature and causation of disease has been disclosed by the continuing application of technology to its study.

### Gross pathology

Before microscopy was applied to medical problems (c. 1800), observations were confined to those made with the unaided eye, and thus was accumulated much of our knowledge of the *morbid anatomy* of disease. Gross or macroscopic pathology is the modern nomenclature for this approach to the study of disease and, especially in the autopsy, it is still an important investigative method. The gross pathology of many diseases is so characteristic that, when interpreted by the experienced pathologist, a fairly confident diagnosis can often be given prior to further investigation by, for example, light microscopy.

### Light microscopy

Advances in the optical quality of lenses have resulted in a wealth of new information about the structure of tissues and cells in health and disease that can be gleaned from their examination by light microscopy.

If solid tissues are to be examined by light microscopy, the sample must first be thinly sectioned to permit the transmission of light and to minimise the superimposition of tissue components. These sections are routinely cut from tissue hardened by permeation with and embedding in wax or, less often, transparent plastic. For some purposes (e.g. histochemistry, very urgent diagnosis) sections have to be cut from tissue that has been hardened rapidly by freezing. The sections are stained to help distinguish between different components of the tissue (e.g. nuclei, cytoplasm, collagen).

### Histochemistry

Histochemistry is the study of the chemistry of tissues, usually by microscopy of tissue sections after they have been treated with specific reagents so that the features of individual cells can be visualised.

### Immunohistochemistry and immunofluorescence

Immunohistochemistry and immunofluorescence employ antibodies (immunoglobulins with antigen specificity) to visualise substances in tissue sections or cell preparations; these techniques use antibodies linked chemically to enzymes or fluorescent dyes respectively. Immunofluorescence requires a microscope specially modified for ultraviolet illumination and the preparations are often not permanent (they fade). For these reasons, immunohistochemistry has become more popular; in this technique, the end product is a deposit of opaque or coloured material that can be seen with a conventional light microscope and does not deteriorate. The repertoire of substances detectable by these techniques has been greatly enlarged by the development of *monoclonal antibodies*.

### Electron microscopy

Electron microscopy has extended the range of pathology to the study of disorders at an organelle level, and to the demonstration of viruses in tissue samples from some diseases.

### Biochemical techniques

Biochemical techniques applied to the body's tissues and fluids in health and disease are now one of the dominant influences on our growing knowledge of pathological processes. The clinical role of biochemistry is exemplified by the importance of monitoring fluid and electrolyte homeostasis in many disorders. Serum enzyme assays are used to assess the integrity and vitality of various tissues; for example, raised levels of cardiac enzymes in the blood indicate damage to cardiac myocytes.

### Haematological techniques

Haematological techniques are used in the diagnosis and study of blood disorders. These techniques range from relatively simple cell counting, which can be performed electronically, to assays of blood coagulation factors.

### Cell cultures

Cell cultures are widely used in research and diagnosis. They are an attractive medium for research because of the ease with which the cellular environment can be modified and the responses to it monitored. Diagnostically, cell cultures are used to prepare chromosome spreads for *cytogenetic analysis*.

### Medical microbiology

Medical microbiology is the study of diseases caused by organisms such as bacteria, fungi, viruses and parasites. Techniques used include direct microscopy of appropriately stained material (e.g. pus), cultures to isolate and grow the organism, and methods to identify correctly the cause of the infection. In the case of bacterial infections, the most appropriate antibiotic can be selected by determining the sensitivity of the organism to a variety of agents.

### Molecular pathology

Many important advances are now coming from the science of molecular pathology revealing defects in the chemical structure of molecules arising from errors in the genome, the sequence of bases that directs amino acid synthesis. Using *in situ hybridisation* it is possible to render the presence of specific genes or their messenger RNA visible in tissue sections or cell preparations. Minute quantities of nucleic acids can be amplified by using the *polymerase chain reaction* using oligonucleotide primers specific for the genes being studied.

Molecular pathology is manifested in various conditions, for example: abnormal haemoglobin molecules, such as in sickle cell disease (Ch. 23); abnormal collagen molecules in osteogenesis imperfecta (Ch. 3); and alterations in the genome governing the control of cell and tissue growth, now believed to play an important part in the development of tumours (Ch. 11).

## GENERAL AND SYSTEMATIC PATHOLOGY

Pathology is best taught and learnt in two stages:

- *general pathology:* the mechanisms and characteristics of the principal types of disease process (e.g. congenital versus acquired diseases, inflammation, tumours, degenerations)
- *systematic pathology:* the descriptions of specific diseases as they affect individual organs or organ systems (e.g. appendicitis, lung cancer, atheroma).

### General pathology

General pathology is our current understanding of the causation, mechanisms and characteristics of the major categories of disease.

These processes are covered in Part 2 of this textbook and many specific diseases mentioned by way of illustration. It is essential that the principles of general pathology are understood before an attempt is made to study systematic pathology. General pathology is the foundation of knowledge that has to be laid down before one can begin to study the systematic pathology of specific diseases.

### Systematic pathology

Systematic pathology is our current knowledge of specific diseases as they affect individual organs or systems. ('Systematic' should not be confused with 'systemic' in this context. Systemic pathology would be characteristic of a disease that pervaded *all* body systems!) Each specific disease can usually be attributed to the operation of one or more categories of causation and mechanism featuring in general pathology. Thus, acute appendicitis is acute inflammation affecting the appendix; carcinoma of the lung is the result of carcinogenesis acting upon cells in the lung, and the behaviour of the cancerous cells thus formed follows the pattern established for malignant tumours; and so on.

Systematic pathology is covered in Part 3 of this textbook.

## LEARNING PATHOLOGY

There are two apparent difficulties that face the new student of pathology: *language* and *process*. Pathology, like most branches of science and medicine, has its own vocabulary of special terms: these need to be learnt and understood not just because they are the language of pathology; they are also a major part of the language of clinical medicine. The student must not confuse the learning of the language with the learning of the mechanisms of disease and their effects on individual organs and patients. For example, the term 'hyperplasia' means an increase in the size of an organ due to the proliferation of its constituent cells; this definition must be learnt before the student attempts to learn about the process of hyperplasia. In this book, each important term will be clearly defined in the main text or the glossary or both.

Disease mechanisms constitute general pathology, knowledge that can be applied to related diseases occurring in different organs or systems. It is absolutely vital to understand general pathology before attempting to study systematic pathology in

depth. Systematic pathology deals more with specific diseases; the rules of general pathology apply, but there are many variations peculiar to the same disease process affecting different organs.

A logical and orderly way of thinking about diseases and their characteristics must be cultivated; for each entity the student should be able to run through the list of chief characteristics that apply to any disease:

- incidence
- aetiology
- pathogenesis
- pathological and clinical features
- complications and sequelae
- prognosis
- treatment.

Our knowledge about many diseases is still incomplete, but at least such a list will serve to prompt the memory and enable students to organise their knowledge.

Pathology is learnt through a variety of media; in addition to this textbook the student will no doubt have a fairly comprehensive course of relatively didactic lectures perhaps supplemented by tutorials, problem-solving-oriented practical classes involving the gross and microscopic examination of diseased tissues, demonstrations, and postmortem teaching. If a student's curriculum lacks one or more of these features it should not be considered in any way deficient; there is no prescribed way of teaching the subject and each medical school will have evolved its own scheme based on local factors. Nevertheless, students of pathology should be encouraged to avail themselves of every opportunity to learn about diseases. Even the bedside, operating theatre and outpatient clinic provide ample opportunities for further experience of pathology; hearing a diastolic cardiac murmur through a stethoscope should prompt the listening student to consider the pathological features of the narrowed mitral valve orifice (mitral stenosis) responsible for the murmur, and the effects of this stenosis on the lungs and the rest of the cardiovascular system.

## Pathology in the problem-oriented integrated medical curriculum

Although medicine, surgery, pathology and other disciplines are frequently taught as separate subjects in the curriculum, students must develop an integrated understanding of disease. Diseases are compartmentalised in this way only so that all aspects can be taught in sufficient depth to provide a full and working understanding. In practice, no such boundaries exist.

To encourage this integrated attitude, in this textbook the pathological basis of common clinical signs is frequently emphasised so that students can develop an interface between their everyday clinical experiences and their knowledge of pathology.

In general, the development of a clinicopathological understanding of disease can be pursued by two equally legitimate and complementary approaches:

- problem-oriented
- disease-oriented.

In learning pathology, the disease-oriented approach is more relevant because medical practitioners require knowledge of diseases (e.g. pneumonia, cancer, ischaemic heart disease) so that correct diagnoses can be made and the most appropriate treatment given.

### The problem-oriented approach

Historically, before diseases had been properly characterised, the problems caused by diseases constituted all that was known about them. The classification of disease was based almost entirely upon symptomatology supported by a limited range of clinical signs.

The problem-oriented approach is still the first step in the clinical diagnosis of disease. In many illnesses, symptoms alone suffice for diagnosis. In other illnesses, the diagnosis has to be supported by clinical signs (e.g. abnormal heart sounds). In some instances, the diagnosis can be made conclusively only by special investigations (e.g. laboratory analysis of blood or tissue samples, imaging techniques).

The links between *diseases* and the *problems* they produce are emphasised in the systematic chapters (Part 3) and are exemplified here (Table 1.3).

Justifications for the problem-oriented approach are that:

- Patients present with 'problems' rather than 'diagnoses'.
- Some clinical problems lack a known pathological basis (this is true particularly of psychiatric conditions such as depressive illness).
- Clinical treatment is often directed towards relieving the patient's problems rather than curing their disease (which may either remit spontaneously or be incurable).

### The disease-oriented approach

Modern pathological understanding of illnesses is based on a disease-oriented approach; knowledge of diseases and their clinical manifestations is fundamental to good medical practice.