SECTION

An Overview

The purpose of this section is to give you (1) the general vocabulary used to discuss and classify diseases, (2) a feeling for the general frequency and significance of particular diseases, and (3) an overview of the resources commonly used in diagnosis that bridge the gap between pathophysiology and the care of patients.

CHAPTER 1

Introduction to Pathology

OUTLINE

OBJECTIVES

1. Define disease and state the philosophic tenet of disease causation that forms the basis of allopathic medicine.
2. Define pathology and describe what pathologists do.
3. Define manifestation as used in the context of the workup of an ill patient, and describe the general categories of manifestations that healthcare practitioners use to identify diseases.
4. Compare and contrast functional and organic (structural) disease.
5. List, define, and give examples of the three major forms of organic disease.
6. Identify the three basic categories of exogenous causes of diseases.
7. Identify the three basic categories of endogenous causes of diseases.
8. Describe the steps involved in the workup, diagnosis, and treatment of a patient.
9. Describe some of the social, scientific, and economic obstacles to patient care.
10. Define and use in proper context all words and terms in this chapter that are in headings and in bold print.

KEY TERMS

allopathic medicine
anatomic pathology
cellular basis of disease
clinical pathologist
clinicopathologic observations
complications
cytopathology
developmental disease
diagnosis
differential diagnosis
disease
endogenous
etiology
evidence-based medicine
exogenous
experimental pathologist
external agents of injury
follow-up
functional disease
genetic disease
history
homeostasis
hyperplasia
iatrogenic
idiopathic
immunologic disease
infection
inflammation
internal mechanism of injury
laboratory finding
lesion
metabolic disease
neoplasia
nosocomial
organic disease
pathogenesis
pathology
pathophysiology
physical examination
prognosis
repair
sign
surgical pathology
symptom
syndrome
trauma
vascular disease
workup

Disease

Disease is a structural or functional change in the body that is harmful to the organism. Some changes in the body are perfectly normal, such as puberty, pregnancy, or increasing muscle mass in an athlete undergoing training. Also, the cells and tissues in the body can adapt to minor fluctuations in their environment, thereby maintaining a state of **homeostasis**. Disease occurs when the

cellular environment changes to such a degree that tissues are no longer able to perform their function optimally. For example, with cataracts, the crystalline lens of the eye undergoes degenerative changes over the course of a person's lifetime and becomes cloudy, obstructing the passage of light and causing decreased visual acuity. In diabetes, the extracellular tissue of blood vessel walls undergoes changes that lead to narrowing of the blood vessels, which in turn leads to decreased blood flow, decreased oxygen delivery, and eventually irreversible damage to tissues such as the retina, skin, heart, and kidney. In cancer, mutations accumulating in the nucleic acids of cells result in distorted structure and function of proteins, which in turn affect the way the cells interact with or react to other cells, growth factors, hormones, and the extracellular matrix in their environment. In multiple sclerosis, destruction of the protective myelin sheath around axons in the brain results in decreased electrical conduction, which manifests in neurologic signs and symptoms such as weakness, double vision, and incoordination. In each of these conditions, the ability of cells or tissues to optimally perform their function is compromised, with deleterious consequences to the organism.

Every society identifies conditions that are abnormal and has devised means of treating illness, but there is great variation between cultures and even within subcultures in what constitutes "normal," "abnormal," "disease," or "feelings of ill health." Over time and over place, the explanations that have been given for ill health have varied from spirit possession, witchcraft, sorcery, the anger of ancestors, balance or imbalance of energy, elements or "humors," nutrition, and the will of God, to the bad influence of the climate, weather, or environment. Treatments have accordingly been as various as exorcism, prayer, shamanic rites, rituals that bring the ill person back into the social and universal order, herbs and foods that restore the balance of internal elements, physical manipulations that restore the flow of energy in the body, the "laying on of hands," and arming the ill person with amulets that provide protection against potentially harmful forces. Obviously, the diseases identified or named by all these various systems are not comparable to one another. Imagine the perplexity of a Western medical doctor if s/he were confronted with a patient who claimed to have been possessed by an ancestor's spirit, to be suffering a blockage in the flow of *chi* (the energy at the root of Chinese medicine, including acupuncture), or to be suffering an attack of "nerves" (Latin America: *susto*) brought on by witnessing the traumatic death of a close family member.

Although these conceptualizations of ill health are at variance with the definition of disease set forth in this textbook, it is necessary to recognize that they are millennia old, are based on a vast amount of experiential evidence, and are as real to the sufferers and the people who take care of them as are notions of cancer and infection to Western health practitioners. Though we may not understand them, and may argue that they have no basis in science, we have no right to dismiss them or belittle them as "superstitious" or "uneducated" because this does no service to the patient who is suffering. Instead, we need to attempt to translate the patient's distress into something that does make sense in terms of our own notions of disease causation.

With the Enlightenment, people began to look at the workings of the body in a scientific manner—in other words, through repeated observations made under controlled circumstances. As knowledge about the way the body works accrued, scientifically oriented doctors began to formulate the idea that disease is not some external force that takes possession of the body, but rather arises from organs and tissues and leaves visible traces there. Physicians gained these insights by closely observing the course of disease on a patient's body, often over weeks or months, and then correlating the clinical findings with the appearance of the organs after death, as seen at autopsy. On the basis of these **clinicopathologic observations**, a philosophy developed that is called the **cellular basis of disease**. This states that diseases can be traced to deranged structures or functions of organs, tissues, and cells. Nowadays, we have expanded the definition to include changes at the molecular level, including proteins and, ultimately, genes. The medical tradition that has evolved from this philosophy is variously called **allopathic medicine**, biomedicine, or Western medicine.

Pathology

The term **pathology** has several meanings. In the broadest sense, pathology is the study of disease. All people working in a health-related field are lifelong students of pathology because, in one way or another, all are interested in altering the course of disease through scientific understanding of its nature. A course in pathology, such as the one you are taking, provides a concentrated study of the nature of disease and lays the foundation for its further study within specific disciplines. Pathology includes the study of basic structural and functional changes associated with a disease, as well as the sequence of events that leads from structural and functional abnormalities to clinical manifestations. This sequence is referred to as the **pathogenesis** of disease; its study is called **pathophysiology**. The term **etiology** means the study of causes, but it is also commonly used simply to connote the cause of disease.

Pathology is also the name of one of the specialties of medicine, one that deals with analysis of body fluids and tissues for diagnostic purposes and with teaching and research relating to fundamental aspects of disease (**Table 1–1**). Pathologists usually practice laboratory medicine or study basic aspects of disease within a department of pathology associated with a hospital and/or medical school. The field of pathology is

TABLE 1–1 Roles of a Pathologist

Role	Subject
Experimental pathology	*Research*
Academic pathology	*Teaching, research, anatomic, and/or clinical pathology*
Anatomic pathology	*Morphologic examinations*
Autopsy pathology	Postmortem study of the body
Surgical pathology	Biopsies and resected tissues
Cytopathology	Individual cells removed by scraping or washing
Clinical pathology	*Laboratory tests*
Chemistry	Chemical analysis
Microbiology	Microorganisms
Hematology	Blood cells and bone marrow, blood clotting
Blood banking	Blood transfusion services
Immunopathology	Antigen and antibody detection
Molecular diagnosis	Nucleic acid (DNA and RNA) analysis

itself subspecialized. There are experimental pathologists, anatomic pathologists, and clinical pathologists. **Experimental pathologists** are basic scientists who spend the majority of their time in research, investigating the causes and mechanisms of disease. **Anatomic pathologists** perform autopsies, examine all tissues removed from live patients (**surgical pathology**), and examine cell preparations to look for cancer cells (**cytopathology**). **Clinical pathologists** analyze various specimens removed from patients, such as blood, urine, feces, spinal fluid, or sputum, for chemical substances, microorganisms, antigens and antibodies, nucleic acids, atypical blood cells, and coagulation factors. Anatomic and clinical pathologists are primarily concerned with diagnosing diseases, but, especially at hospitals associated with medical schools, they may also be engaged in research and teaching.

Manifestations of Disease

We use the term *manifestation* to refer to all the data gathered about a disease as it occurs in a patient. The manifestations that are of interest to the allopathic doctor are symptoms, signs, and laboratory abnormalities (**Table 1–2**). **Symptoms** are evidence of disease perceived by the patient, such as pain, a lump, or diarrhea. Health practitioners carefully elicit these during an interview with the patient and record them in the patient's chart as the *history*. **Signs** are physical observations made by the person who examines the patient. Examples include tenderness, a mass, or abnormal heart sounds. Signs are elicited and observed during the *physical examination,* the results of which are also recorded in the patient's chart. **Laboratory findings** are observations made by the application of tests or special procedures, such as x-rays, blood counts, or biopsies. **Diagnosis** is the process of assimilating the information from the history, physical examination, and laboratory findings to identify the condition causing the disease. Diagnosis also refers to the name given to that disease, such as "multiple sclerosis" or "diabetes." This name is a shorthand way of communicating and thinking. It sums up all the essential information from the history, physical examination, and laboratory findings so that a prognosis can be rendered and appropriate therapy can be initiated. Underlying diagnosis and treatment is, of course, the assumption that diseases of the same name run a predictable course that can be altered, to lesser or greater degree, by medical intervention.

Sometimes, a diagnosis cannot immediately be made. For example, Alzheimer disease cannot be definitively diagnosed until a patient's brain is examined after his or her death. Obviously, it is too late to do anything about it then, so, while the patient is alive, the patient is given a provisional diagnosis of "Alzheimer-type dementia." Other diseases, such as rheumatologic, neurologic, or gastrointestinal ones, may also be vaguely identified (for example, "paralysis of unknown cause") and treated symptomatically until the disease "declares itself," or develops some features that allow its unique identification. In such cases, the clinical problem—paralysis, dementia—is used as the focus of symptomatic treatment until the patient's disease can be definitively identified.

Clusters of findings commonly encountered with more than one disease are called **syndromes**. For example, leakage of protein into the urine, low serum

TABLE 1–2 Manifestations of Disease

Type of Manifestation	Nature of Data	Name for Collection of Results
Symptoms	Patient's perceptions	History
Signs	Examiner's observations	Physical examination
Laboratory abnormalities	Results of tests and special procedures	Laboratory findings

protein, and edema are a common set of findings in the "nephrotic syndrome," which can be caused by a number of different diseases that affect the renal glomeruli. The syndrome is a description of a constellation of symptoms, and though treatments can be initiated to alleviate the symptoms and laboratory abnormalities, specific treatment of the disease causing the syndrome is still necessary.

Structural Diseases

Structural diseases, or **organic diseases**, are characterized by structural changes within the body. Structural changes are called **lesions**. Until recently, lesions were visually identified, either by changes visible to the naked eye or changes visible through the light or electron microscope. With the advent of molecular medicine, health professionals also recognize lesions that occur at the level of proteins and genes. Three broad categories suffice to classify most structural diseases (**Table 1–3**). As with all classification schemes, there are always some items that do not fall easily into just one category, and some items are simply difficult to classify. Nevertheless, the scheme does capture most structural diseases, so it is useful to start sorting the vast numbers of diseases you will learn about.

Genetic diseases are caused by abnormalities in the genetic makeup of the individual, either at the level of chromosomes, such as increased chromosome numbers or translocations, or at the genetic level, such as mutations. **Developmental diseases** are ones that developed during an individual's life *in utero*—in other words, during embryonic and fetal development. The range of genetic and developmental abnormalities is very broad, extending from deformities present at birth, to biochemical changes caused by genes but influenced by environment so that they appear later in life, such as diabetes mellitus.

Degenerative and inflammatory diseases are caused by forces or agents that destroy cells or intercellular substances, deposit abnormal substances in cells and tissues, or cause the body to injure itself by means of the inflammatory process. **External agents of injury** include physical and chemical substances and microbes. The major **internal mechanisms** of injury are vascular insufficiency, immunologic reactions, and metabolic disturbances. There are two general reactions to injury: inflammation and repair. **Inflammation** is a vascular and cellular reaction that attempts to localize the injury, destroy the offending agent, and remove damaged cells and other materials. **Repair** is the replacement of damaged tissue by new tissue of the same type and/or fibrous connective tissue. Inflammation is a stereotyped response with several important variations. Unlike necrosis and inflammation, repair is greatly influenced by the type of tissue or organ that has been injured.

Hyperplastic and neoplastic diseases include those in which the basic abnormality is an increase in cell populations. **Hyperplasia** is a proliferative reaction to a prolonged external stimulus and usually regresses when the stimulus is removed. **Neoplasia** results from genetic changes that favor the growth of a single population of cells. Neoplasms are divided into two groups, benign and malignant, based on whether the cells remain localized or develop the ability to grow into surrounding tissue or even migrate to other tissues. *Cancer* is the colloquial term for malignant neoplasm. Certain types of hyperplasias can slowly evolve, presumably through a series of genetic changes induced by external agents, into malignant neoplasms.

TABLE 1–3 Major Categories of Structural Diseases

- Genetic and developmental diseases
- Acquired injuries and inflammatory diseases
- Hyperplasias and neoplasms

Functional Diseases

Functional diseases are those in which there are no visible lesions, at least at the onset of the disease. The basic change is a physiologic or functional one. Two of the most common functional disorders are tension headache and irritable bowel syndrome, disorders that may be the result of unconscious stimulation of the autonomic nervous system.

Other examples of common functional disorders are diabetes and hypertension. These diseases are diagnosed by laboratory evidence of increased circulating glucose in the blood and increased blood pressure readings, respectively. Only over time do structural changes become evident, first in blood vessels and then in the form of end-organ damage, such as necrosis of renal tissue and its replacement by fibrosis. By this time, the disease has progressed to such a degree that complications (stroke, heart disease, blindness, and kidney disease, among others) are inevitable. Many mental illnesses are considered functional disorders; however, there is increasing evidence that they may, indeed, have an organic basis. The same is true for many other functional disorders, including diabetes and hypertension. In fact, most diseases have a genetic basis. Even how people respond to external stimuli such as infectious agents, alcohol, or environmental toxins is genetically based. The classification of such diseases as "functional" may therefore be an oversimplification, but for the present purposes it is still of heuristic value.

Causes of Disease

Diseases are initiated by injury, which may be either external or internal in origin. Agents acting from without are termed **exogenous**; those acting from within are referred to as **endogenous**.

Exogenous causes of disease are divided into physical, chemical, and microbiologic (**Table 1–4**). Direct physical injury is called **trauma**. Physical agents causing disease include extremes of heat and cold, electricity, atmospheric pressure changes, and radiation (electromagnetic and particulate). Chemical injuries are generally subdivided by the manner of injury into poisoning (accidental, homicidal, or suicidal) and drug reactions (toxic effects of prescription or proprietary drugs taken to treat disease). Microbiologic injuries are usually classified by the type of offending organism (bacteria, fungi, rickettsiae, viruses, protozoa, and helminths) and are called **infections**.

Endogenous causes of disease fall into three large categories (**Table 1–5**). **Vascular diseases** include obstruction of blood supply to an organ or tissue (e.g., myocardial ischemia secondary to atherosclerosis), hemorrhage (e.g., a ruptured abdominal aortic aneurysm), or altered blood flow (e.g., microvascular changes in diabetes or hypertension). **Immunologic diseases** are those caused by aberrations of the immune system. Failure of the immune system to work when it is needed results in immunodeficiency disease. Overreaction of the immune system causes allergic, or hypersensitivity, diseases. Abnormal reaction of the immune system to endogenous substances causes autoimmune diseases. The category of **metabolic diseases** encompasses a wide variety of biochemical disorders that may be genetically determined or secondary effects of acquired disease. Metabolic diseases are most commonly categorized as abnormalities primarily involving lipids, carbohydrates, proteins, minerals, vitamins, and fluids.

Some diseases cannot be classified according to internal or external causes because the cause is not known. Diseases of unknown cause are termed **idiopathic**. Adverse reactions resulting from treatment by a health specialist produce **iatrogenic** disease. **Nosocomial** diseases are those acquired from a hospital environment.

TABLE 1–4 Exogenous Causes of Disease

Physical injury
• Trauma
• Heat/cold
• Electricity
• Pressure
• Ionizing radiations
Chemical injury
• Poisoning
• Drug reactions
Microbiologic injury
• Bacteria
• Fungi
• Rickettsiae
• Viruses
• Protozoa
• Helminths

TABLE 1–5 Endogenous Causes of Disease

Vascular
• Obstruction
• Bleeding
• Deranged flow
Immunologic
• Immune deficiency
• Allergy
• Autoimmunity
Metabolic
• Abnormal metabolism or deficiency of:
Lipids
Carbohydrates
Proteins
Minerals
Vitamins
Fluids

The Care of Patients

The typical approach to disease in allopathic medicine is to wait for the patient to seek help because of bothersome symptoms. The health practitioner, presented with a sick patient, proceeds in a systematic fashion to help the patient (**Table 1–6**). The **workup** of a patient encompasses three major steps: (1) taking the **history**, which involves listening to the patient or to the patient's relatives to ascertain the patient's symptoms, and reviewing any other past or present medical problems that might relate to them; (2) performing a **physical examination**, or systematically looking, feeling, listening, and sometimes even smelling accessible parts of the body for signs of illness; and (3) when needed, ordering laboratory tests, radiologic imaging tests, and specialized clinical procedures to detect chemical and physiologic abnormalities. After acquiring the history, performing the physical examination, and reviewing initial ancillary tests, the health practitioner makes a list of possible diagnoses. This is called a **differential diagnosis**. Additional tests are ordered to exclude specific diagnoses on the list so that in the end one diagnosis is made that is the best interpretation of the symptoms, signs, and laboratory data.

A diagnosis is simultaneously a summing up of a patient's problem, a prediction about the course the disease will take, or **prognosis**, and a guide for treatment.

TABLE 1–6 Steps in the Care of a Patient's Illness

1. Gather facts:
• History
• Physical examination
• Laboratory and radiology tests
2. Interpret the facts and render a diagnosis.
3. Treat the patient, if feasible.
4. Follow up on results of treatment.

Therapy is undertaken in an attempt to alter the natural course of the patient's disease. The goal of therapy depends on the disease. The goal of treating a middle ear infection in a child is to eradicate the infection. The goal of treating diabetes is to prevent complications. The goal of surgery after a patient has been in a motor vehicle accident and has a major internal hemorrhage is to stop the hemorrhage and thereby avert the patient's death. The goal of treatment of widely metastatic cancer is no longer to cure but to alleviate pain in the last days or weeks of a patient's life. Whatever the goal of treatment, **follow-up** of the patient is essential to monitor progress toward the goal; determine whether **complications**, or secondary problems that emerge as a consequence of treatment, have developed; and alter therapeutic efforts accordingly.

Diagnosis of specific diseases is useful not only for determining treatment and prognosis in any specific instance of disease but also to future patients. It is through collection of data by disease category that knowledge of prognosis, effectiveness of treatment, and frequency of complications is derived. Sometimes these data also further the health profession's understanding of the cause of a disease. This is particularly true when the distribution of the disease gives clues as to possible causative factors. For example, our knowledge about how the human immunodeficiency virus (HIV), the cause of AIDS, is spread began with the insight that the first patients to come down with this disease in the United States were (homosexual) men practicing unprotected sex with multiple sexual partners.

Obstacles to Patient Care

The process of patient care described here is limited by availability of resources, the nature of particular diseases, and clinicians' ability to understand disease processes. The greatest improvements in our health care have come from preventive measures, including sanitation, improved nutrition, immunization, control of infectious diseases, and avoidance of toxic substances. Whereas infections were once the major cause of death in Western nations, reducing life expectancy to the 40- to 50-year range, we now have the means to prevent, control, and eradicate these diseases. However, as the recent example of AIDS has shown, the amount of initiative, time, and money that it takes to spread knowledge about diseases and convince people to adopt protective measures is exorbitant. It also paints a very stark line between societies that have such resources and those that do not. Whereas in the United States we might claim that AIDS is more or less under control, the incidence of this disease having been pretty stable since the late 1990s (around 56,300 new cases per year), it is primarily under control among white men and women. Blacks, especially young African American women, are at seven times greater risk of contracting the disease than are whites.[1] Worldwide, AIDS is one of the major killers: 2.0 million people died of AIDS in 2008, and more than three-quarters of these deaths occurred in poverty-stricken nations of sub-Saharan Africa.[2] There, as in Asia, the people most vulnerable to contracting the disease are poor women, and, by extension, their children. The reasons for this are multifactorial, but they can be summarized as lack of resources: poverty driving women to trade sex for food, no health education to learn how to prevent contracting the disease, and no access to therapies that slow progression of the disease.

Moreover, the application of new knowledge about a disease process or therapeutic intervention lags far behind discoveries. Smoking is an illustrative example. As early as the 1920s, autopsy series documented the strong link between smoking and lung cancer. By 1964, a special commission set up by President John F. Kennedy was able to review more than 7,000 scholarly articles, many of them meticulously researched and prepared by the American Cancer Society, on the effect of smoking cigarettes on health. The resultant Surgeon General's report stunned the nation by detailing the magnitude of the effect of smoking on health, attributing 70% increased mortality and a 9- to 10-fold increase in the incidence of lung cancer in smokers as compared to nonsmokers. Despite the incontrovertible scientific evidence that smoking is harmful to health, cigarette consumption actually increased over the next decades. It was not until 1987 that the first anti-smoking law, banning smoking on airlines, was passed in the United States. It took another several years for cities and states to begin banning smoking in public places, such as the workplace, restaurants, and bars. Of course, there is a lot more to smoking, beginning to smoke, and quitting smoking than personal will and judgment based on scientific evidence: peer pressure, social expectations and values, and addiction are major influences, if not determinants, of smoking behaviors. But similar lag times are well known for other scientific insights, as well. It is estimated that it takes 15 to 20 years for a scientific discovery to be translated into a standard of practice.

Standards of allopathic practice, though based in scientific evidence, are not universally adhered to. It has been well documented now for several decades that hypertension is a major risk factor for stroke and heart disease, yet the percentage of Americans who are adequately treated for hypertension is only about 30–40%. It is senseless and possibly harmful and counterproductive to take antibiotics, which inhibit the growth of bacteria, for conditions not caused by bacteria, yet many doctors continue to prescribe antibiotics for diseases that are caused by a virus (for example, upper respiratory tract infections and middle ear infections in children). These are only two examples, yet variability in patient assessment and care is such a matter of fact that patients often visit more than one doctor—and may even be encouraged to do so by their first doctor—for the same

condition to gather a second opinion that will help them make a more informed or confident decision about their therapeutic plan. While in some cases the second opinion is the same as the first, it may not be. This leads to frustration on the part of the patient, who is expecting a single "answer" based on scientific data. It also leads to frustration on the part of doctors who believe that, for the maximal benefit of patients, medicine should be practiced strictly along guidelines formulated on the basis of a thorough review of the scientific literature. These practice guidelines, issued by expert panels, form the core of **evidence-based medicine**.

Although evidence-based practice guidelines ensure that physicians know what the standard of care should be, there is still a great amount of variation in how patients are treated. Economic factors, including the resources available at a particular clinic or hospital, the patient's insurance status, the age of the patient, other illnesses the patient has, religious beliefs, personal experiences of the physician in treating similar patients, and personal wishes of the patient all influence the treatment plan.

Moreover, the focus of treatment varies widely by clinic type and demographic factors. In large hospitals affiliated with universities, so-called academic hospitals, patients are treated at the forefront of scientific advances: organ transplantations, experimental cancer treatments, and treatment of rare and complicated diseases are the main focus at such centers. Conversely, in inner-city clinics, the main focus is on preventive care, such as maternal and child health, and on management of diseases that are most common in that population, such as diabetes and heart disease.

Scientific and technical knowledge and progress are not the only factors affecting health and health care. The United States is one of the world leaders in scientific and technical advances in the healthcare field, and it spends more money than any other nation on health care, yet it ranks very low in general measures of health, such as infant mortality and life expectancy. There is no doubt that the largest challenge faced by healthcare workers in the United States is equitable distribution of resources. Health practitioners have the knowledge to prevent many diseases and delay if not entirely avoid complications of others, but a large percentage of the population is denied access to this knowledge, either because of lack of the ability to pay for it, lack of health education, or lack of clinics and healthcare workers willing to serve an underprivileged community. In addition, U.S. society must confront the issue of cost containment in terminally ill patients, for whom procedures are often performed with costs that are out of proportion to the benefit received. This will mean engaging in economic studies, ethical debates, and legal reforms that will hold the healthcare industry accountable for the money it consumes. Such debates need to be informed by a solid understanding of the pathophysiology of diseases. The information in this text will allow you to become an informed participant in the healthcare debate.

The Structure of This Text

This text presents a basic classification scheme for diseases and an introductory discussion of their causes. The first part of the text discusses disease processes that are applicable to all tissues in the body, such as genetics, inflammation, and neoplasia. The second part of the text discusses diseases by organ system. The third part presents diseases that affect many different organs simultaneously, such as infections and immunologic diseases.

Each chapter begins with a short review of the structure and function of the organ system under discussion. It should be stressed that this is a review: though you probably do not need to have a background in physiology to understand the diseases as they are presented here, it is certainly advisable for you to have had a course in physiology to better understand pathophysiology.

After the review of structure and function, we list the diseases of that organ system that are most common. This means there is a certain degree of redundancy in the text because we might explain some aspect of pathophysiology in this section and reiterate this or explain it in greater detail later in the chapter. This is intentional. Getting a sense of how common a disease is and what impact it has on a population enhances learning about the disease, and repetition is one of the key factors in retention of information.

Although the diseases included for discussion in this text are those that are most common, or classically illustrate a disease process, the list of diseases is long and the reading will unfortunately get tedious. In addition, the discussion for some diseases may not be as detailed as you would like. Several excellent resources are available that provide more information. Robbins and Cotran's *Pathologic Basis of Disease* (edited by Vinay Kumar, Abul Abbas, Nelson Fausto, and Jon Aster, Saunders, 2009) and *Rubin's Pathology* (edited by Raphael Rubin and David Strayer, Lippincott Williams and Wilkins, 2007) are pathology texts used in medical schools that have detailed explanations and many pictures and diagrams that aid in understanding disease processes. If you have access to a health library, the electronically published *UpToDate* (of which there is also a "patients" edition that is free to general readership) provides information on pathophysiology and gives much more detailed information on diagnostic and treatment strategies than we provide in this text. The Internet is also an invaluable resource. Numerous excellent web pages have been designed by disease interest groups. These are governmental, such as the National Institutes for Health (NIH) and the Centers for Disease Control and Prevention (CDC); private or nonprofit, such as the American Heart Association; and driven by physician (e.g., Mayo Clinic or Cleveland Clinic Web pages) or patient groups (e.g.,

Susan G. Komen "for the [breast cancer] Cure" organization). Although you do need to be careful about believing everything you read on the Internet, by carefully searching and questioning the sources, you can gather much information from these web pages, in a concise and readable format.

We hope that the information you find in this text helps you in your career. It is important to have a broad foundation of knowledge about basic pathophysiologic principles and causes of common diseases, such as is presented in this text, before becoming enmeshed in the details of an area of specialization. In addition, such knowledge should help you formulate your own informed opinions about how best to help patients and where to most effectively put our society's resources to prevent disease and alleviate patients' suffering.

Practice Questions

1. A 54-year-old woman has a breast biopsy. Which of the following pathologists will look at and diagnose the biopsy?
   - **A.** Surgical pathologist
   - **B.** Cytopathologist
   - **C.** Clinical pathologist
   - **D.** Research pathologist
   - **E.** Microbiologist
2. The three categories of endogenous causes of disease are
   - **A.** microbiologic, immunologic, metabolic.
   - **B.** physical, vascular, metabolic.
   - **C.** metabolic, immunologic, vascular.
   - **D.** chemical, microbiologic, vascular.
3. An ulcerating sore on a person's skin is
   - **A.** an infection.
   - **B.** a lesion.
   - **C.** a functional change.
   - **D.** a complication.
4. A 55-year-old man complains to his physician of extreme tiredness. This is an example of
   - **A.** a symptom.
   - **B.** a sign.
   - **C.** a manifestation.
   - **D.** a complication.
5. Which of the following is the basic philosophical tenet of allopathic medicine?
   - **A.** Disease is caused by external agents that leave visible traces on organs and tissues.
   - **B.** Disease is caused by deranged structure and/or function of tissues, cells, or molecules.
   - **C.** Diseases cause visible changes in tissues and organs.
   - **D.** Diseases are caused by structural changes in genes that result in functional changes in tissues.
   - **E.** Diseases can be diagnosed by the scientific method.
6. Which of the following is not a manifestation of disease?
   - **A.** Ultrasonographic evidence of abnormal heart chambers in a fetus
   - **B.** Fever, leukocytosis, and abdominal pain in a child with appendicitis
   - **C.** A history of breast cancer in a close family member
   - **D.** A necrotizing skin ulcer
   - **E.** A feeling of shortness of breath and abnormal lung sounds in a patient with pneumonia
7. Care of a symptomatic patient includes all of the following except which one?
   - **A.** Taking a history
   - **B.** Performing a physical exam
   - **C.** Performing screening procedures
   - **D.** Seeing the patient in follow-up
   - **E.** Prescribing treatment plans
8. A differential diagnosis is
   - **A.** a list of possible diseases a patient may have, generated during the workup of a patient.
   - **B.** a constellation of symptoms that is not unique to a particular disease.
   - **C.** a diagnosis that is made presumptively, without confirmatory laboratory tests.
   - **D.** the opinion of a second physician, which is different from that of the first physician consulted.
   - **E.** a diagnosis rendered by a practitioner of alternative medicine.

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