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21世纪高等院校英语教材

新世纪大学医学英语教程

（上册）

王兰英　王玉安　主编

College English for Senior Medical Students

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PREFACE 前言

为了全面落实教育部新颁布的《大学英语课程教学要求》，提高医学生和医务工作者书面及口头交流医学信息与技术的能力，我们编写了《新世纪大学医学英语教程》。

本教材在编写过程中注重突出时代性和实用性。选材反映了最新的医学科技进展，体现现代医学理念，兼顾了读、写、译、说诸方面的能力培养，安排了一系列提高语言运用能力的练习。本教材还特别注意了与大学英语基础阶段教学要求的衔接，利于巩固语言基础知识，扩大医学词汇，提高语言应用能力。

本教材编排原则是精泛结合，以精为主，配合写作、翻译、会话和必备的医学知识，所以它既是教科书，又是案头必备的自学参考资料。教材分为上、下册。上册为基础医学，下册为临床医学。每单元课文（Text）部分为理论介绍，阅读（Reading）部分为相关疾病，课文和阅读材料均选自国外最新医学文献，语言规范，内容科学。通过该教材的学习，学生既可以强化语言知识，又可以巩固和扩展了医学知识。写作部分由论文写作、摘要写作、病例报告写作等内容构成。通过学习学生能掌握摘要和病历的写作技巧，为将来的医学学术交流打下坚实的基础。每单元的练习设计内容丰富，既可以扩充学生的高难度词汇量，又可以丰富其医学术语知识。通过 Word Building 部分的学习，学生可以掌握医学术语的构词法和记忆技巧。而医学对话部分有益于提高学生的口语能力。

本套教材可以结合学校的教学安排以及学生的实际情况组织教学，教师可以根据学时数选择性使用，并安排一定内容让学生自学。

全套教材由新乡医学院和广东医学院协作编写，王兰英教授负责总体设计，提供素材和审校工作。

上册编写分工为：李法智（第一单元）、平文江（第二、第九单元）、张瑞君（第三、第四单元）、王兰英（第五单元）、雍文明（第六、第八单元）、王玉安（第七、第十单元）。张帆负责部分文字输入工作，广州医学院的辛铜川教授参与了本册材料组织工作。

由于时间仓促，编者水平有限，不妥之处在所难免，希望广大读者批评指正。

教材编写委员会

2006 年 6 月

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Unit One

Text

Cells

All living organisms are made of cells and cell products. This simple statement, called the Cell Theory, was first proposed over 150 years ago. You may think of a theory as a guess or hypothesis, and sometimes this is so. But a theory is actually the best explanation of all the available evidence. All of the evidence science has gathered so far supports the validity of the Cell Theory.

Cells are the smallest living subunits of a **multicellular** organism such as a human being. A cell is a complex arrangement of the chemicals; is living; and carries out specific activities. Microorganisms, such as **amoebas** and bacteria, are single cells which function independently. Human cells, however, must work together, and function interdependently. Homeostasis depends upon the contributions of all of the different kinds of cells.

Human cells vary in size, shape, and function. Most human cells are so small they can only be seen with the aid of a microscope, and are measured in units called **microns**. One exception is the human **ovum** or egg cell, which is about one millimeter in diameter, just visible to the unaided eye. Some nerve cells, although microscopic in diameter, may be quite long. Those in our arms and legs, for example, are at least two feet long.

With respect to shape, human cells vary greatly. Some are round or spherical, others **rectangular**, still others irregular. White blood cells even change shape as they move.

Cell Structure

Despite their many differences, human cells have several similar structural features: a cell membrane, **cytoplasm** and cell **organelles**, and a nucleus. Red

blood cells are an exception since they have no nuclei when mature. The cell membrane forms the outer boundary of the cell, and surrounds the cytoplasm, organelles, and nucleus.

Cell Membrane

Also called the plasma membrane, the cell membrane is made of **phospholipids**, **cholesterol**, and proteins. The phospholipids permit lipid-soluble materials to easily enter or leave the cell by diffusion through the cell membrane. Cholesterol provides greater stability to the membrane. The proteins have several functions: some form pores or openings to permit passage of materials; others are enzymes that also help substances enter the cell. Still other proteins, with **oligosaccharides** on their outer surface, are antigens, markers that identify the cells of an individual as "self". And yet another group of proteins serves as receptor sites for hormones. Many hormones bring about their specific effects by first bonding to a particular receptor on the cell membrane. This bonding then triggers chemical reactions within the cell membrane or the interior of the cell.

Although the cell membrane is the outer boundary of the cell, it should already be apparent to you that it is not a static or wall-like boundary, but rather an active, dynamic one. The cell membrane is selectively permeable, that is, certain substances are permitted to pass through and others are not.

Nucleus

With the exception of mature red blood cells, all human cells have a nucleus. The nucleus floats in the cytoplasm, and is bounded by a double-layered nuclear membrane with many pores.

A **nucleolus** is a small sphere made of DNA, RNA, and protein. The nucleoli form a type of RNA called ribosomal RNA, which becomes part of **ribosomes** (a cell organelle) and is involved in protein synthesis.

The nucleus is the control center of the cell because it contains the **chromosomes**. The 46 chromosomes of a human cell are usually not visible; they are long threads called **chromatin**. When a cell divides, however, the chromatin coils extensively into visible chromosomes. Chromosomes are made of DNA and protein. Remember from our earlier discussion that the DNA is the genetic code for the characteristics and activities of the cell. Although the DNA

in the nucleus of each cell contains all of the genetic information for all human traits, only a small number of genes are actually active in a particular cell. These active genes are the codes for the proteins necessary for the specific cell type. How the genetic code in chromosomes is translated into proteins will be covered in a later section.

Cytoplasm and cell organelles

Cytoplasm is a watery solution of minerals, gases, and organic molecules that is found between the cell membrane and the nucleus. Chemical reactions take place within the cytoplasm, and the cell organelles are found here. Cell organelles are **intracellular** structures, often bounded by their own membranes, which have specific roles in cellular functioning.

The **endoplasmic reticulum** (ER) is an extensive network of membranous tubules that extend from the nuclear membrane to the cell membrane. Rough ER has numerous ribosomes on its surface, while smooth ER has no ribosomes at all. As a network of interconnected tunnels, the ER serves as a passageway for the transport of the materials necessary for cell function within the cell. These include proteins synthesized by the ribosomes on the rough ER, and lipids synthesized by the smooth ER.

Ribosomes are very small structures made of protein and ribosomal RNA. Some are found on the surface of rough ER, while others float freely within the cytoplasm. Ribosomes are the site of protein synthesis.

The Golgi apparatus is a series of flat, membranous sacs, somewhat like a stack of saucers. Carbohydrates are synthesized within the Golgi apparatus, and are packaged, along with other materials, for secretion from the cell. To secrete a substance, small sacs of the Golgi membrane break off and fuse with the cell membrane, releasing the substance to the exterior of the cell.

Mitochondria are oval or spherical organelles within the cytoplasm, bounded by a double membrane. The inner membrane has folds called cristae. Within the mitochondria, the **aerobic** (oxygen-requiring) reactions of cell respiration take place. Therefore, mitochondria are the site of ATP (and hence energy) production. Cells that require large amounts of ATP, such as muscle cells, have many mitochondria to meet their need for energy.

Lysosomes are single membrane structures within the cytoplasm that

contain digestive enzymes. When certain white blood cells **engulf** bacteria, the bacteria are digested and destroyed by these lysosomal enzymes. Worn-out cell parts and dead cells are also digested by these enzymes, which contributes to the process of inflammation in damaged tissues.

Centrioles are a pair of rod-shaped structures **perpendicular** to one another. Their function is to organize the **spindle** fibers during cell division.

Cilia and **flagella** are mobile thread-like projections through the cell membrane. Cilia serve the function of sweeping materials across the cell surface. They are usually shorter than flagella, and an individual cell has many of them. Cells lining the fallopian tubes, for example, have cilia to sweep the egg cell toward the **uterus**. The only human cell with a **flagellum** is the sperm cell. The flagellum provides motility, or movement, for the sperm cell.

Cellular Transport Mechanisms

Living cells constantly interact with the blood or tissue fluid around them, taking in some substances and secreting or excreting others. There are several mechanisms of transport that enable cells to move materials into or out of the cell: **diffusion**, **osmosis**, **facilitated** diffusion, active transport, filtration, **phagocytosis**, and **pinocytosis**. Some of these take place without the expenditure of energy by the cells. But, others do require energy, in the form of ATP. Each of these mechanisms is described below and an example is included to show how each is important to the body.

Diffusion

Diffusion is the movement of molecules from an area of greater concentration to an area of lesser concentration. Diffusion occurs because molecules have free energy, that is, they are always in motion. The molecules in a solid move very slowly; those in a liquid move faster, and those in a gas move faster still, as when ice absorbs heat energy, melts, and then **evaporates**. As the sugar dissolves, the sugar molecules **collide** with one another. These collisions spread out the sugar molecules until they are evenly dispersed among the water molecules. The molecules are still moving, but as some go to the top others go to the bottom, and so on. Thus, an **equilibrium** is reached.

Within the body, the gases oxygen and carbon dioxide move by diffusion. In the lungs, for example, there is a high concentration of oxygen in the alveoli

(air sacs), and a low concentration of oxygen in the blood in the surrounding pulmonary **capillaries**. The opposite is true for carbon dioxide: a low concentration in the air in the alveoli and a high concentration in the blood in the pulmonary capillaries. These gases diffuse in opposite directions, each moving from where there is more to where there is less. Oxygen diffuses from the air to the blood to be circulated throughout the body. Carbon dioxide diffuses from the blood to the air to be exhaled.

Osmosis

Osmosis may be simply defined as the diffusion of water through a selectively permeable membrane or barrier. That is, water will move from an area with more water present to an area with less water. Another way to say this is that water will naturally tend to move to an area where there is more dissolved material, such as salt or sugar. If a 2% salt solution and a 6% salt solution are separated by a membrane allowing water but not salt to pass through it, water will diffuse from the 2% salt solution to the 6% salt solution. The result is that the 2% solution will become more concentrated and the 6% solution will become more dilute.

In the body, the cells lining the small intestine absorb water from digested food by osmosis. These cells have first absorbed salts, have become more "salty", and water follows salt into the cells. The process of osmosis also takes place in the kidneys, which reabsorb large amounts of water to prevent its loss in urine.

Facilitated Diffusion

The word facilitate means to help or assist. In facilitated diffusion, molecules move through a membrane from an area of greater concentration to an area of lesser concentration, but they need some help to do this.

In the body, our cells must take in glucose to use for ATP production. Glucose, however, will not diffuse through most cell membranes by itself, even if there is more outside the cell than inside. Diffusion of glucose into most cells requires carrier enzymes, proteins that are part of the cell membrane. Glucose bonds to the carrier enzymes, and by doing so becomes soluble in the phospholipids of the cell membrane. The glucose-carrier molecule diffuses through the membrane and glucose is released to the interior of the cell.

Active Transport

Active transport requires the energy of ATP to move molecules from an area of lesser concentration to an area of greater concentration. Notice that this is the opposite of diffusion, in which the free energy of molecules causes them to move to where there are fewer of them. Active transport is therefore said to be movement against a concentration gradient.

In the body, nerve cells and muscle cells have "**sodium** pumps" to move sodium ions (Na^+) out of the cells. Sodium ions are more abundant outside the cells, and constantly diffuse into the cell, their area of lesser concentration. Without the sodium pumps to return them outside, the incoming sodium ions would bring about an unwanted nerve impulse or muscle contraction. Nerve and muscle cells constantly produce ATP to keep their sodium pumps working and prevent **spontaneous** impulses.

Another example of active transport is the absorption of glucose and **amino** acids by the cells lining the small intestine. The cells use ATP to absorb these nutrients from digested food, even when their intracellular concentration becomes greater than their extracellular concentration.

Filtration

The process of **filtration** also requires energy, but the energy needed does not come from ATP. It is the energy of mechanical pressure. Filtration means that water and dissolved materials are forced through a membrane from an area of higher pressure to an area of lower pressure.

In the body, blood pressure is created by the pumping of the heart. Filtration occurs when blood flows through capillaries, whose walls are only one cell thick and very permeable. The blood pressure in capillaries is higher than the pressure of the surrounding tissue fluid, and more tissue fluid is formed. In capillaries throughout the body, blood pressure forces plasma and dissolved materials through the capillary membranes into the surrounding tissues. This is how tissues receive glucose, amino acids, and other nutrients. Blood pressure in the capillaries of the kidneys also brings about filtration, which is the first step in the formation of urine.

Phagocytosis and Pinocytosis

These two processes are similar in that both involve a cell engulfing

something. An example of phagocytosis is a white blood cell engulfing bacteria. The white blood cell flows around the bacterium, taking it in and eventually digesting it.

Other cells that are stationary may take in small molecules that become adsorbed or attached to their membranes. The cells of the kidney tubules reabsorb small proteins by pinocytosis, so that the protein is not lost in urine. *195*

New Words and Phrases

multicellular /ˌmʌltiˈseljulə/ ***adj.*** 多细胞的,多房的

amoeba /əˈmiːbə/ ***n.*** form of animal life, made up of a single cell 变形虫, 阿米巴

micron /ˈmaikrɔn/ ***n.*** 微米

ovum /ˈəuvəm/ ***n.*** female egg cell which begins to develop into an embryo 卵子

rectangular /rekˈtæŋgjulə/ ***adj.*** 矩形的,长方形的

cytoplasm /ˈsaitəuplæzm/ ***n.*** substance inside the cell membrane, which surrounds the nucleus of a cell 细胞质

organelle /ˌɔːgəˈnel/ ***n.*** 细胞器,小器官

phospholipid /fɔsfəˈlipid/ ***n.*** 磷脂

cholesterol /kəˈlestərəul,-rɔl/ ***n.*** 胆固醇

oligosaccharide /ˌɔligəuˈsækəraid/ ***n.*** 低聚糖

nucleolus /njuːˈkliːələs/ ***n.*** 核仁

ribosome /ˈraibəsəum/ ***n.*** tiny particle in a cell, containing RNA and protein, where protein is synthesized 核蛋白,核糖体

chromosome /ˈkrəuməsəum/ ***n.*** rod-shaped structure in the nucleus of a cell, formed of DNA which carries the genes 染色体

chromatin /ˈkrəumətin/ ***n.*** network which forms the nucleus of a cell and can be stained with basic dyes 染色质

intracellular /ˌintrəˈseljulə/ ***adj.*** inside or within the cells in tissue 细胞内的

endoplasmic /ˈendəuˌplæzmik/ ***adj.*** 内质的,内胚层质的

reticulum /riˈtikjuləm/ ***n.*** series of small fibres or tubes forming a network 网状组织,蜂窝胃

mitochondria /ˌmaitəuˈkɔndriə/ ***n.*** tiny rod-shaped part of a cell's cytoplasm responsible for cell respiration 线粒体

aerobic /ˌeiəˈrəubik/ ***adj.*** living or occurring only in the presence of oxygen 需氧生活的,氧存在

lysosome /ˈlaisəsəum/ ***n.*** particle in a cell which contains enzymes which break down substances which enter the cell(细胞中的)溶酶体

engulf /inˈgʌlf/ ***v.*** 吞没,吞噬

centriole /ˈsentriəul/ ***n.*** 细胞中心粒,中心体

perpendicular /ˌpəːpənˈdikjulə/ ***adj.*** 成直角的,垂直的

spindle /ˈspindl/ ***n.*** long thin structure 纺锤体

cilia /ˈsiliə/ ***n.*** 纤毛

flagella /fləˈʤelə/ ***n.*** 鞭毛

uterus /ˈjuːtərəs/ ***n.*** hollow organ in a woman's pelvic cavity, behind the bladder and in front of the rectum 子宫

flagellum /fləˈʤeləm/ ***n.*** tiny growth on a microorganism, shaped like a whip 鞭毛

osmosis /ɔzˈməusis/ ***n.*** movement of solvent from one part of the body through a semipermeable membrane to another part where there is a higher concentration of molecules 渗透(作用),渗透性

diffusion /diˈfjuːʒən/ ***n.*** 扩散,透析,免疫扩散

facilitate /fəˈsiliteit/ ***vt.*** (不以人作主语的)使容易,使便利

phagocytosis /fægəsaiˈtəusis/ ***n.*** destruction of bacteria cells and foreign bodies by phagocytes 噬菌作用

pinocytosis /ˌpainəusaiˈtəusis/ ***n.*** process by which a cell surrounds and takes in fluid 胞饮作用

evaporate /iˈvæpəreit/ ***v.*** to convert liquid into vapor(使)蒸发,消失

collide /kəˈlaid/ ***v.*** 碰撞,互撞,冲突

equilibrium /ˌiːkwiˈlibriəm/ ***n.*** 平衡,均衡;沉着

capillary /kəˈpiləri/ ***n.*** 毛细血管

sodium /ˈsəudjəm,-diəm/ ***n.*** 钠

spontaneous /spɔnˈteinjəs,-niəs/ ***adj.*** which happens without any particular outside cause 自动的;本能的

amino /ˈæminəu/ ***adj.*** 氨基的

filtration /filˈtreiʃən/ ***n.*** substance which has passed through a filter 滤液,过滤水

Notes

1. **DNA**: deoxyribonucleic acid,脱氧核糖核酸。多数生物的遗传物质,由脱氧核糖、磷酸和含氮杂环碱构成的核苷酸多聚体。
2. **RNA**:ribonucleic acid,核糖核酸。含有核糖与尿嘧啶的一类核酸,相对分子质量比 DNA 小,一般为单链。

Word Study

diffuse

v. to spread about, to become widely dispersed 散开,扩散

e. g. The valley was diffused with fog. 山谷中大雾弥漫。

adj. (1) widely spread or scattered, not concentrated 散开的

e. g. The organization is becoming diffuse. 这个组织变得松散了。

(2) wordy 冗长的,唠叨的

e. g. His diffuse style discouraged readers. 他冗赘的文体使读者无法读下去。

pore

n. tiny opening 小孔

e. g. He was sweating at every pore. 他的每个毛孔都在出汗。

v. (1) study with great closeness 仔细研究,熟读

e. g. She pores over a book. 她仔细研读一本书。

(2) consider 考虑

e. g. Let's pore deeply on the matter. 让我们深入考虑一下这件事。

pressure

n. (1) force exerted continuously on or against sth. by sth. that touches it 压力

e. g. See that the tire pressure is right. 确保轮胎的压力正常。

(2) compelling force or influence 强制力,影响力

put pressure on sb. 强迫某人

(3) sth. that oppresses or weighs down 压迫物;困苦,艰难

e. g. He lived under the pressure of poverty. 他生活在苦难之中。

Word Building

Combining Form	Meaning	Terminology	Chinese Meaning
cocco-	ball	coccobacteria	球菌
		coccoid	球菌样的
		coccolith	球面
cyto-	cell	cytobiology	细胞生物学
		cytolysis	细胞溶解
		cytoplasm	细胞质
endo-	within	endocrine	内分泌
		endoderm	内胚层
		endolymph	内淋巴
fore-	before	forearm	前臂
		forebrain	前脑
		foregut	前肠
gluco-	sweetness	glucogen	糖原
		glucolysis	糖酵解
		glucosan	葡萄聚糖
homo-	same	homotype	同型
		homograft	同种移植物
		homogenicity	同种性
immuno-	immunity	immunocyte	免疫细胞
		immunodeficiency	免疫缺陷
		immunodiffusion	免疫扩散
kera-	horn	keracele	角质瘤
		kerasin	角苷脂
		keratin	角蛋白
lyo-	to dissolve	lyoenzyme	可溶酶
		lyocephalin	溶血脑磷脂
		lyolipase	可溶脂酶
micro-	small	microadenpathy	细淋巴管病