

高等学校试用教材

# 放射医学英语文选

苏州医学院外文教研室编

原子能出版社

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## 内 容 简 介

本书为放射医学系高年级学生的英语试用教材。全书共选文四十篇，内容包括放射医学系各门课程——放射卫生、放射损伤、放射毒理、核物理和职业病等方面的文献，其中以放射卫生和放射损伤方面的文献居多。

本书也可作为具有一定英语基础的放射医学工作者的自学材料。

### 放射医学英语文选

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## 編 者 說 明

一、根据当前我国科学技术的发展和实现四个现代化的需要，结合我院外语教学的具体情况，我们试编了这本《放射医学英语文选》，作为放射医学系高年级学生试用教材，目的在于培养学生阅读放射医学英语书刊的能力。本书也可作为具有一定英语基础的放射医学工作者的自学材料。

二、本书选文共四十篇，所选文献涉及放射医学系各门课程的内容，其中包括放射卫生、放射损伤、放射毒理、核物理和职业病等专业的文献，其中以放射卫生和放射损伤方面的文献居多。本书所有材料均选自英美出版的有关放射医学的书刊。

三、文章的选择，力求词汇比较常用，语言文体较为多样。选文按照我院放射医学系课程先后顺序编排，少数几篇略加删节。

四、为了减少阅读困难，每篇选文后均有词汇、词组及语法注释，并附有选文的参考译文，供参考。

五、本书由苏州医学院外文教研室主编和审校。我院放射医学系各兄弟教研室为我们提供了部分选文和部分选文的参考译文，在此表示衷心的感谢。由于编者水平有限，存在问题一定不少，欢迎同志们批评指正。

苏州医学院外文教研室

一九七九年七月

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# 1. Biology of the Human Body (Summary)

It will be useful to summarize those aspects of the biology of the human body which<sup>①</sup> are significant in the study of radiation damage.

The human body consists mainly of the lighter elements, and about 60% by weight of it<sup>②</sup> is water.

It is built of cells and dead cellular products, the latter being<sup>③</sup> mainly fibrous except in the case of<sup>④</sup> the blood fluids and the mineral part of the bones.

The cells are organized into tissues and organs. Some of these are more or less stable and remain unreplaced throughout life, whereas others are constantly being formed as older ones<sup>⑤</sup> are shed. The latter group includes the blood cells, the reproductive cells, the skin and the lining of the alimentary tract.

The whole body is divided into different tissues and organs, each of which<sup>⑥</sup> carries out only a small portion of the total function of the whole body. There is thus interdependence of the organs one on the other, and damage to one can, and usually does<sup>⑦</sup>, have a deleterious effect on others.

Reproduction is brought about by the union of pairs of cells, one from the male and one from the female. After a period of growth into a mass of undifferentiated cells, differentiation into tissues and organs of the young organism takes

place. Many characteristics of the offspring are handed down to them by the parents as an inherent part of the mechanism of reproduction. The study of this mechanism is called genetics.

The systems as a whole has an immunological character which enables it to respond to the presence of substances foreign to itself<sup>⑧</sup>, whether<sup>⑨</sup> these are invading organisms or some arbitrary foreign protein deliberately introduced. We shall see later that the effect of radiation on the immunological response is at once a benefit and a drawback.

(From Eaves, G. Principles of Radiation Protection)

## Words and Expressions

- biology [bai'ɒlədʒi] *n.* 生物学  
 summary ['sʌməri] *n.* 摘要  
 summarize ['sʌməraɪz] *vt.* 摘要, 扼要地讲  
 aspect ['æspekt] *n.* 样子, 方面  
 significant [sig'nifikənt] *a.* 意义深远的  
 radiation [reɪdi'eɪʃən] *n.* 放射, [理] 辐射  
 damage ['dæmɪdʒ] *n.* 损害, 伤害, 危害  
 light [laɪt] *a.* 轻的  
 element ['elɪmənt] *n.* 成分, 要素, [化] 元素  
 by weight 按重量  
 cellular product 细胞产物  
 except [ɪk'sept] *prep.* 除...之外  
 mineral ['mɪnərəl] *a.* 矿物的  
 organize ['ɔ:gənaɪz] *vt.* 组织  
 more or less 或多或少



stable [steɪbl̩] *a.* 稳定的

unreplaced [ˈʌnrɪˈpleɪsd̩] *a.* 不被代替的

throughout life 毕生

whereas [weəˈræz] *conj.* 而

shed [ʃed] *vt.* (shed, shed) 流, 脱壳, [生物] 排出(孢子)等  
脱落

interdependence [ɪntədiˈpendəns] *n.* 互相依赖

bring about 引起, 完成

deleterious [deliˈtɪəriəs] *a.* 有害(身心)的

union [ˈjuːnjən] *n.* 结合

undifferentiated [ˈʌndɪfəˈrenʃieɪtɪd̩] *a.* 不能区别的, 未分化的

differentiation [dɪfərenʃiˈeɪʃən] *n.* 区别, [生物] 分化

young organism 幼生物, 幼体

take place 发生

characteristic [kærɪktəˈrɪstɪk] *n.* 特征, 特点

offspring [ˈɒfsprɪŋ] *n.* (复数形式不变) 子孙, 后裔, 产物

hand down to 传递, 传给

inherent [ɪnˈhɪərənt] *a.* 固有的, 先天的

genetics [dʒiˈnetɪks] *n.* 发生学, 遗传学

as a whole 整个来说

immunological [ɪmjuˈnɒlədʒɪkəl] *a.* 免疫学的

character [ˈkærɪktə] *n.* 性格, 特征

enable [ɪˈneɪbl̩] *vt.* 使能够

respond [rɪsˈpɒnd] *vi.* 反应

presence [ˈprezns] *n.* 存在

substance [ˈsʌbstəns] *n.* 物质

arbitrary [ˈɑːbɪtrəri] *a.* 任意的, 适宜的

foreign [ˈfɔːrɪn] *a.* 外国的, 异的

protein [ˈprəʊtiːn] *n.* 蛋白

deliberately [dɪˈlɪbəreɪtli] *ad.* 细观过的, 有意地

introduce [intrə'dju:s] *vt.* 引入, 注入  
 effect of radiation on 辐射对...的效应  
 response [ris'pɒns] *n.* 反应  
 at once 立即, 同时  
 benefit ['benɪfɪt] *n.* 利益, 好处  
 drawback ['drɔ:bæk] *n.* 障碍, 缺点, 弊端

## Notes

1. those...which... which 引出定语从句, those 形容词, 与 which 有呼应作用。
2. 60%=sixty per cent 读作[sɪksti pə'sent] about 60% by weight of it=about 60% of the body by weight.
3. the latter being mainly fibrous=the latter is mainly fibrous 分词独立结构, 由“名词(或代词)+分词+其他成分”构成。
4. except in the case of 除了在...情况下, in the case of... 介词短语作介词 except 的宾语。
5. older ones = older cells 不定代词 one, 代替前述相同的词, 可由形容词修饰, ones 是复数形式。
6. each of which carries out... = each of the different tissues and organs carries out... 这是一种定语从句。
7. damage to one can, and usually does, have... =damage to one can have... and usually does have... 助动词 does 在这里起加强语气作用, 原形为 do.
8. substances foreign to itself = substances which are foreign to itself.
9. whether these are invading organisms or some arbitrary foreign protein deliberately introduced = whether these are invading organisms or (are) arbitrary foreign protein

which is deliberately introduced. whether...or 不论...或  
..., 连接词, 此处引起的是状语从句。

## 参 考 译 文

### 人 体 生 物 学

在辐射损伤的研究中, 对具有重要意义的人体生物学各方面进行总结是有用的。

人体主要由一些轻元素组成, 水占体重的 60%。

人体由细胞和无生命的细胞产物所组成。除了血液和骨的矿物质部分之外, 这种无生命的细胞产物主要是纤维性的。

细胞组成各种组织和器官。其中有些细胞具有不同程度的稳定性, 终生永不更替, 而另一些细胞, 当其衰老脱落时, 不断有新的细胞形成。后者包括血细胞、生殖细胞、皮肤和消化道内壁。

整个人体分成各种不同的组织和器官。每一个组织和器官只是执行着整个机体总功能中一小部分功能。因此, 各种器官是相辅相成的, 一个器官依赖于另外一个器官。对一个器官的损害, 有可能而且往往肯定对其他器官有着有害的影响。

生殖是由两性细胞的结合而完成的。一个细胞来自男性, 一个细胞来自女性。两性结合的细胞(受精卵)长成未分化的细胞团, 一个时期之后, 就分化成幼体各种组织和器官。后代的许多特性都是由其父母以生殖机制的先天基因形成传递下来的。研究这种机制的学科称为遗传学。

这些系统作为一个整体具有免疫特性。这种免疫特性能使人体对异物起反应, 无论这些物质是侵入机体的, 还是有意地注入到体内的异种蛋白。以后, 我们将会懂得, 放射对免疫反应的作用既有益处, 也有弊端。

## 2. The Principal Methods Used in Radiochemical Separations

### Precipitation and Co-precipitation

Precipitation and co-precipitation were the earliest techniques used in radiochemical separations and their use has been described in many standard texts. The amounts of added carrier used in precipitation steps may be a disadvantage when subsequent procedures, e.g. ion exchange, are most satisfactory with small amounts of material.

Co-precipitation is a process in which a tracer ion is carried by another precipitate, though the tracer concentration is too<sup>①</sup> low for it to be precipitated on its own. Several mechanisms are involved; compound formation, the formation of solid solutions, mechanical inclusion and surface adsorption. In co-precipitation the carrier ion is usually added before the precipitating ion so that the former is incorporated into the precipitate and not merely adsorbed on the surface of a preformed precipitate. One advantage of co-precipitation is that the wanted ion may be separated from the carrier and subsequent steps continued<sup>②</sup> with smaller amounts of material, e.g. carrier iron separated by solvent extraction.

Co-precipitation is frequently used to remove other ions from solution by scavenging and for this purpose hydrous oxides, especially ferric hydroxide, are used. Although their carrying properties are non-specific, separations are possible

by adjusting the conditions.

## Ion Exchange

Ion exchange on synthetic resin exchangers is very widely used in radiochemical analysis. The scope of these materials has been greatly extended over the past 25 years with the use of complexing agents in cation exchange, eluents of high ionic strength in anion exchange and the use of mixed solvent systems. More limited use has been made of<sup>③</sup> chelating resins and synthetic inorganic exchangers. The two procedures used most frequently are ion exchange elution chromatography and selective sorption. In the former, near equilibrium conditions are maintained and the process is fairly slow, though rapid separations have been carried out with resins of small particle size operating under high pressure. In selective sorption, one species is much more strongly retained by the exchanger than the others, equilibrium conditions need not be maintained, and high flow rates can be employed.

## Extraction

Liquid-liquid extraction is widely used in radiochemical work as it can be carried out rapidly with simple equipment which is capable of automation, it can be made very selective<sup>④</sup> and can be applied to a wide range of concentrations. The principles have been described by Morrison and Freiser and by De Khopkar and Chalmers. Separations usually depend on the distribution of material between an aqueous phase and an organic phase, the two being practically immiscible<sup>⑤</sup>. The extracted material may consist of simple molecules, e.g. iodine, ruthenium tetroxide, or it may be rendered soluble<sup>⑥</sup>.

in the organic phase by chelate formation, solvation, ion pairing or ion exchange processes. A classification of extraction systems was given by Morrison and Freiser.

(From "Radiochemical Methods in Analysis" by

D. I. Coomber pp. 178—179, p. 189)

## Words and Expressions

- principal [ˈprɪnsəpəl] *a.* 主要的, 基本的  
 precipitation [prɪsɪpiˈteɪʃən] *n.* 沉淀  
 co-precipitation [kou-prɪsɪpiˈteɪʃən] *n.* 共沉淀  
 radiochemical [ˈreɪdiəʊkɛmɪkəl] *n.* 放化的  
 separation [sepəˈreɪʃən] *n.* 分离  
 carrier [ˈkæriə] *n.* 载体  
 disadvantage [disədˈvɑːntɪdʒ] *n.* 不利  
 subsequent [ˈsʌbsɪkwənt] *a.* 随后的  
 procedure [prəˈsiːdʒə] *n.* 程序  
 ion [ˈaɪən] *n.* 离子  
 satisfactory [ˌsætɪsˈfæktəri] *a.* 满意的, 良好的  
 trace [treɪs] *a.* 微量的, 示踪量的  
 concentration [kənsənˈtreɪʃən] *n.* 浓度  
 mechanism [ˈmekənɪzəm] *n.* 机理  
 involve [ɪnˈvɒlv] *vt.* 包含  
 compound [ˈkɒmpaʊnd] *a. n.* 复合的, 化合物  
 formation [fɔːˈmeɪʃən] *n.* 形成  
 solid [ˈsɒlɪd] *a.* 同一的, 均相的, 固体的  
 solution [səˈluːʃən] *n.* 溶液  
 mechanical [miˈkænɪkl] *a.* 机械的  
 inclusion [ɪnˈkluːʒən] *n.* 内含物, 夹杂物, 夹带物

- adsorption [əd'sɔ:pʃən] *n.* 吸附, 吸收
- incorporate [in'kɔ:pəreit] *vt.* 结合, 掺入
- precipitate [pri'sipiteit] *vt.* 沉淀
- preform ['pri:'fɔ:m] *vt.* 预先形成
- solvent ['sɒlvənt] *a.* 溶解的, *n.* 溶剂
- extraction [iks'trækʃən] *n.* 萃取 (法)
- scaving ['skævɪndʒ] *vt.* 清除
- hydrous ['haidrəs] *a.* 含水的, 水合的
- oxide ['ɒksaɪd] *n.* 氧化物
- ferric ['ferɪk] *a.* 含铁的
- hydroxide [hai'drɒksaɪd] *n.* 氢氧化物
- non-specific [nɒn-spi'sɪfɪk] *a.* 非特异性的
- adjust [ə'dʒʌst] *vt.* 调整, 使适应
- exchange [iks'tʃeɪndʒ] *vt.* 交换
- synthetic [sɪn'θetɪk] *a.* 合成的
- resin ['rezɪn] *n.* 树脂
- exchanger [iks'tʃeɪndʒə] *n.* 交换剂
- analysis [ə'neɪləsɪs] (*pl.* analyses [ə'neɪləsɪ:z]) *n.* 分析
- scope [skəʊp] *n.* 范围
- extend [iks'tend] *vt.* 扩大, 扩充
- complexing ['kɒmpleks] *a.* 络合的
- cation ['kætaɪən] *n.* 阳离子
- anion ['ænaɪən] *n.* 阴离子
- eluent 淋洗剂
- chelate [ki:'leɪt] *vt.* 形成螯合物, *n.* 螯合作用
- inorganic [ɪnɔ:'gænɪk] *a.* 无机的
- mix [mɪks] *vt.* 使混合
- elution [i'lu:ʃən] *n.* 洗提, 淋选
- chromatography [kroumə'tɒgrəfi] *n.* 色层 (分离) 法, 层析
- sorption ['sɔ:pʃən] *n.* 吸附

equilibrium [i:kwi'libriəm] *n.* 平衡

particle ['pɑ:tɪkl] *n.* 微粒, 粒子

retain [ri'tein] *vt.* 保持

phase [feɪz] *n.* 阶段, 状态, 相

immiscible [i'mɪsəbl] *a.* 不能混合的, 不能相溶的

molecule ['mɒlɪkjʊ:l] *n.* 分子

iodine ['aɪədi:n, 'aɪədain] *n.* 碘

ruthenium tetroxide [ru(:)'θi:niəm tetr'ɒksaɪd] *n.* 四氧化钌



render ['rendə] *vt.* 移交, 托付, 提取

soluble ['sɒljubl] *a.* 可溶解的

## Notes

1. Co-precipitation is a process in which a tracer ion is carried by another precipitate, though the tracer concentration is too low for it to be precipitated on its own.

在 too...to...结构中, 后面的动词不定式表示“否定”的意思, 因此 though the tracer concentration is too low for it to be precipitated on its own 可直译为“虽然该微量离子的浓度尚太低, 不足使它本身被沉淀”。

2. One advantage of co-precipitation is that the wanted ion may be separated from the carrier and subsequent steps continued with smaller amounts of material, e.g. carrier ion separated by solvent extraction.

句中 continued 和 separated 之前均省略了 may be.

3. More limited use has been made of chelating resins and synthetic inorganic exchangers.

...use has been made of 是 make use of 的现在完成被动形式。



4. ...it can be made very selective...

句中 very selective 为主语补足语, 说明主语“具有...性质”。

5. ...the two being practically immiscible. 为分词独立结构。

6. ...it may be rendered soluble in the organic phase...

句中 soluble 为主语补足语, 说明主语“具有...性质”。

## 参考译文

### 放化分离的基本方法

#### 沉淀和共沉淀

沉淀和共沉淀是用于放化分离方面最早的技术, 它们的应用, 在许多权威著作中均有阐述。在沉淀的步骤中加入大量的载体是不利的, 因其后的程序, 例如离子交换, 处理少量的物质最为满意。

微量离子的浓度太低, 自己不能沉淀下来, 但可用另外的沉淀物载带它们沉淀, 这个过程即为共沉淀。共沉淀包括几种机制: 化合物生成、固溶体的生成、机械夹带和表面吸附。在共沉淀中, 通常在加入沉淀剂离子以前先加入载体离子, 为的是使微量离子结合到沉淀物内部去, 而不仅仅是吸附在预先生成的沉淀物表面上。共沉淀的一个优点是可以从载体中再将所需要的离子分离出来, 其后的步骤可仍继续处理较少量的物质, 例如, 通过溶剂萃取分离载体铁。

共沉淀常用于除去溶液中的其他离子通过“清扫作用”, 如可使用水合氢氧化物, 尤其是用氢氧化铁达到这个目的。虽然它们的载带性质是非特异性的, 但条件选择得当, 分离是可能的。