参 考 译 文

练 习 答 案

英 语 文 选

1. Electromedicine[1]

Part I

In 1974 at the Hospital for Sick Children in Toronto, Canada, a radio-like electronic device about the size of a large coin was implanted under the skin just below the rib cage[2] of an eight-year-old girl with an abnormally curved spine[3]. Six months later, most of that curvature was gone. Almost at the same time, electrical current was being used at Columbia-Presbyterian Medical Center in New York City in a child with a broken shinbone long resistant to healing. With the electrical current, it healed.

Elsewhere today electrical currents are being used to heal skin ulcers and bedsores[4], relieve otherwise unyielding severe chronic pain[5], help epileptics[6], and overcome[7]—and even prevent—pain and other complications after surgery. And these are just a few examples of the scope of a rapidly developing, exciting new area of medicine—electromedicine—which uses electrical impulses to produce desired effects in the body that may be obtained no other way.

Scoliosis[8]—curvature of the vertebral column—may begin in infancy or later in childhood and sometimes may be the result of poor posture or unevenness of the legs, but usually the cause is

unknown. Special exercises may help to correct the curvature. More often, however, cast[9] or surgery may be required.

Dr. Walter Bobechko, an orthopedic surgeon at the Hospital for Sick Children, was one of the firsts to demonstrate that electrical stimulation might be used to correct curvature in laboratory animals. In 1974 he used it for the first time in a human patient, the little eight-year-old girl, and within a year was using it in 14 other children, the youngest 2, the oldest 13.

The radio receiver, which is implanted under the skin, has electrodes that run to carefully chosen points in muscles on the convex side of the curve of the spine. Then a little flat plastic disc containing a tiny antenna is placed on the skin over the receiver and connected to a transmitter[10] about the size of a package of cigarettes. When the transmitter is turned on, the selected muscles are stimulated to contract and exert force to try to straighten the spine.

Children are up and about[11] the same day the receiver is installed.[12] They wear and switch on the transmitter only at night, and the current causes no discomfort, some patients say that they get a 'nice, pleasant feeling'. And there are no restrictions on activities during the day.

Typically, in the eight-year-old girl, the curve, which originally measured 38 degrees, was reduced to 29 degrees in two months, and to 15 degrees in six months. Once the spine straightens, parents are told to stop using the transmitter. If curve starts to develop again, the transmitter is started up once more.

At the University of Pennsylvania, Drs. Carl T. Brighten and Z. B. Friedenburg found that in natural bone healing the body

uses electrical potential[13]. And after successful animal studies using supplementary potential from the outside, they chose their first human patient, a woman with an ankle fracture that had failed to heal at all in two years. Under local anesthesia, Drs. Brighton and Friedenburg inserted a small wire electrode[14] into[15] the fracture, taped[16] another to the skin, and added a short leg cast to which they taped a battery pack. And current from the battery—only 10 microamperes[17]—caused the bone to knit. In three weeks the ankle no longer was swollen and tender; six weeks later X-rays showed complete healing.

The same technique was used for a 14-year-old boy with a defect, pseudarthrosis[18] of the tibia[19], the main lower leg bone. In pseudarthrosis mineral elements of bone are lost, causing bending and fracture, and inability of the fracture to heal for lack of real bony structure. Bone grafts and other treatment had failed. Yet, with four months of continuous electric current stimulation, the fracture healed and the tibia became solid bone.

Notes to the text

1. electromedicine[i lektrəu'medisin] n. 电医学
2. rib cage 胸廓
3. curved spine 弯曲的脊椎
4. skin ulcers and bedsores 皮肤溃疡和褥疮
5. otherwise unyielding severe chronic pain 意为:用其他方法不屈服的(即顽固的)严重慢性疼痛
6. epileptic[epi'leptik]n. 癫痫患者
7. Elsewhere today electrical currents are being used to heal skin ulcers and bedsores, relieve otherwise unyielding severe chronic pain, help epileptics, and overcome——本句谓语 are being

used 后面跟有四个并列的不定式动词 heal, relieve, help 和 overcome,除第一个动词前面有不定式标志"to"外,后面三个动词前均省略。

8. scoliosis[ˌskəliˈəusis]n. 脊椎侧凸
9. cast[kɑ:st]n. 固定用敷料(如上石膏)
10. transmitter[trænsˈmitə]n. 发送机,发射器
11. be up and about: 起来(起床)四处走动
12. install[insˈtɔ:l]v. 安装,设置
13. potential[pəˈtenʃəl]a. 潜在的
14. electrode[iˈlectrəud]n. 电极
15. insert ...into... 将…插入
16. tape[teip]v. 用胶布把…粘牢
17. microampere[ˌmaikrəuˈæmpɛə]n. 微安(培)
18. pseudarthrosis[ˌspju:dɑ:ˈθrəusis]n. 假关节(=pseudoarthrosis)
19. tibia[ˈtibiə]n. 胫骨

Increase your vocabulary

Write out the Chinese meanings of the following terms:

1. electromedicine 电医学
   electrotherapy ( ) electroanesthesia ( )
2. microampere 微安
   microsecond ( ) microbiology ( )
3. transmitter 传递器,发射器
   transfusion ( ) transplantation ( )
4. pseudoarthrosis 假关节
   pseudodiphtheria ( ) pseudoappendicitis ( )
5. endoscope 内窥镜
   endocarditis ( ) endocrine ( )

Check your understanding

Choose the best answer for each unfinished statement.

1. Electromedicine makes use of _____ to heal patients.
   a. electronic signals
   b. electronic receiver
   c. radio waves
   d. electrical currents
2. According to the author, the best way to correct the curvature of the vertebral column is _____.
   a. cast
   b. surgery
   c. electrical stimulation
   d. special exercises
3. Scoliosis patients who have a radio receiver implanted _____.
   a. must remain in bed for two weeks
   b. are not restricted on activities during the day
   c. may get a uncomfortable feeling
   d. have electrocutes running to the muscles around it
4. Drs Brighton and Friedenbury have used electronic impulses to _____.
   a. heal ulcers
   b. help heal complications after surgery
   c. help heal the curved spine
   d. help heal bone fracture
5. In the case of pseudarthrosis the bone is likely to bend and get fractured because of _____.
   a. the losing of mineral elements in the bone
   b. the inflammation of the bone
   c. a wound in the bone
   d. repeated stimulation to the bone

2. Electromedicine

Part I

At Columbia-Presbyterian Medical Center, Dr. Andrew L. Basset has been able to produce bone regeneration[1] in children with congenital pseudarthrosis by using electromagnetic[2] forces, eliminating[3] need for any implant. Through windows cut in a plaster cast, a pair of rectangular coil[4] is placed on either side of the fracture. When small current is fed to the coil, they produce a magnetic field which in turn induces voltage near the fracture.

Used in a group of children, all of whom had undergone numerous unsuccessful operations, the technique has led to healing in four months or less during which the electromagnetic fields are applied at home 16 hours a day, with eight hours left for school and play. The youngsters have had to enter the hospital only once—as outpatients for having casts applied and coils inserted.

Electrical stimulation can also relieve pain. Stimulation has been used for many backache patients at the ICD Rehabilitation[5] and Research Center in New York City. Often back pain comes from muscle spasm[6]— continuous abnormal muscle contraction — that may follow even a minor injury. With small currents directed to them, the spasmodic[7] muscles are forced to contract even more vigorously until they become so fatigued that they let loose, providing relief for the spasm and pain.

And, for patients with chronic, agonizing[8], drug-resistant pain—from backache, cancer, neuralgia[9], or other causes—a device called a dorsal column stimulator has been developed. It consists of a transmitter about the size of a pocket transistor[10] radio

that is carried in a shirt pocket. The transmitter activates a receiver implanted under the skin of the chest and connected by electrodes to the spinal column. At will[11], the minute he feels a pain attack coming on, the patient can turn on the transmitter to generate electrical pulses that are conveyed to the spinal column via the receiver and electrodes. The pulses set up a barrier to pain signals, obliterating[12] discomfort.

At Methodist Hospital, Minneapolis[13], Dr. Alan C. Hymes and other investigators decided to try electrical stimulation in an acutely painful situation—surgery. The stimulation, applied directly to the skin close to surgical incisions[14] via plastic-backed aluminum strips[15], has dramatically[16] reduced the incidence of two of the most troublesome complications after surgery—atelectasis[17], or lung collapse[18], and ileus[19], in which the bowel fails to contract normally and the patient suffers often-agonizing[20] abdominal pain and distention.

For 60 years the medical profession has experimented with electricity as an anesthetic that might relieve pain without the adverse side effects that sometimes occur with gas or drug anesthetics. Today the patient first receives an injection of sedative and tranquilizing[21] agents. Then current is passed through the brain via a headband wired with three electrodes, producing anesthesia. The system, used thus far for more than 500 patients, appears to be totally harmless as well as effective, and the hope is that with further improvement it can be used without any drugs at all.

Skin sores or ulcers that develop as the result of blood circulation disturbances associated with diabetes, spinal cord damage, or prolonged bedrest are often difficult to treat. At the University of Missouri Medical Center, doctors have used small electrical cur-

rents to cut healing time by two-thirds.

Notes to the text

1. bone regeneration 骨再生
2. electromagnetic[ˌiˌlektrəumægnetik]n. 电磁铁
3. eliminate[iˈlimineit]v. 排除
4. coil[kɔil]n. 线圈，线蜷
5. rehabilitation[ˌriːhəbiliˈteiʃn]n. 恢复，康复 the ICD Rehabilitation = Institute of Child Development Rehabilitation
6. spasm[spæzm]n. 痉挛
7. spasmodic[spæzˈmɔdik]a. 痉挛的
8. agonizing[ˈægənaiziŋ]a. 令人痛苦的
9. neuralgia[njuəˈrældʒiə]n. 神经痛
10. transistor[trænˈsistə]n. 晶体管，半导体管
11. at will 随意，任意，听便
12. obliterate[əbˈlitəreit]v. 使消失，除去
13. Minneapolis[miniˈæpəlis]n. 明尼阿波利斯(美国明尼苏达州东南部城市)
14. incision[inˈsiʒən]n. 切开，切入
15. via plastic-backed aluminum strips 通过以塑料垫底的铝条(带)
16. dramatically[drəˈmætikəli]a. 显著地
17. atelectasis[ætiˈlektəsis]n. (肺)膨胀，不张
18. collapse[kəˈlæps]v. & n. 坍陷，倒坍
19. ileus[ˈiliəs]n. 肠梗塞
20. often-agonizing[ˈɔ(ː)fn-ˈægnaiziŋ]a. 常令人极度痛苦的
21. tranquilizing[ˈtræŋkwilaiziŋ]a. 安定的，镇定的

Increase your vocabulary

Choose a word which is closest in meaning to the headword:

1. eliminate:
   a. increase b. pollute c. omit d. investigate
2. rehabilitation:
   a. restoration b. organization c. relation d. operation
3. dramatically:
   a. freely b. quickly c. fortunately d. obviously
4. prolong:
   a. seek b. lengthen c. doubt d. hesitate
5. adverse:
   a. inadequate b. enormous c. unfavorable d. numerous

Check your understanding

Write "T" if the statement is true and "F" if it is false.

1. Used to treat skin sores or ulcers, electrical currents have reduced healing time by 20 percent. ( )
2. As an anesthetic, electricity has not proved successful at all. ( )
3. In surgery, electrical stimulation is applied to the patient's head and neck to reduce fear. ( )
4. By using a dorsal column stimulator, a patient can turn on his transmitter whenever he feels a pain. ( )
5. In the treatment of congenital pseudarthrosis, Dr. Andrew L. Basset has used a technique with electrical current that has brought healing in four months. ( )

3. Electromedicine

Part Ⅱ

At St. Barnabas Hospital in New York City, Dr. Irving Cooper is using a tiny brain "pacemaker[1]" for patients with drug-resistant[2] epilepsy. Implanted upon the cerebellum portion of the brain, the device exerts a dampening[3] effect on other brain areas that cause seizures[4] by firing electrical impulses abnormally. Among Cooper's patients is a 26-year-old man who suffered from uncontrollable daily seizures but who has had no major attacks since implantation of the device.

At the University of Southern California, Los Angeles, Dr. Vernon L. Nickel and James B. Reswick have developed devices to stimulate hip and leg muscles in stroke patients and to overcome in other patients the disabling[5] effects of muscles in a limb which have contracted into a fixed position.

And, at the University of Washington, Seattle, Dr. George A· Ojemann discovered that stimulation of the thalamus[6] area of the brain can help long-term memory. In trials[7] with patients undergoing brain surgery under local anesthesia for various movement disorders, information was presented both with and without stimulation of the thalamus, and the patients were checked later on how much information they retained[8]. The results suggest that stimulation makes mental, and especially memory, processes function more rapidly and effectively. If this is confirmed with more study, thalamic stimulation, Dr. Ojemann believes, could be of great value[9] for patients with language and learning disabilities.

Meanwhile, at Queens University, Kingston, Ontario, Dr.

Cesar Romero-Sierra, professor of neuroanatomy[10], has found in animal studies that electromagnetic stimulation causes certain cells, called glial cells[11], to generate material for faster wound healing. Glial cells also are responsible for forming myelin[12], the sheath[13] for nerves. And it is the breakdown of myelin which is characteristic of multiple sclerosis (MS)[14]. Dr. Romero-Sierra is enthusiastic about the possibility of using electromagnetic energy to reverse MS myelin breakdown.

One of the most hopeful facts about electromedicine is that results to date[15] have been achieved even though the field is in a crude beginning state. Many investigators consider it very likely that different tissues of the body require electrical signals of different frequency, amplitude[16], and other characteristics—and that what has been achieved thus far[17] is only a small prelude[18] to what can be expected when the requirements are fully understood.

Notes to the text

1. pacemaker['peismeikə]n. 起搏器
2. drug-resistant['drʌg-ri'zistənt]a. 耐药性的
3. dampening['dæmpəniŋ]a. 阻抑的
4. seizure['si:ʒə]v. 发作
5. disabling[dis'eibliŋ]a. 使……残废的
6. thalamus['θæləməs]n. 丘脑
7. trial['traiəl]n. 试用;试验
8. retain[ri'tein]v. 保留
9. be of great value 中的 of great value 是介词短语作表语。
10. neuroanatomy[njuərəuə'nætəmi]n. 神经解剖学
11. glial cells 胶质细胞
12. myelin['maiəlin]n. 髓鞘质

13. sheath[ʃi:θ]n. 鞘
14. MS = multiple sclerosis, sclerosis [ˌskliə'rəusis]n. 硬化
15. to date 到今天,到现在
16. amplitude['æmplitju:d]n. 幅,振幅
17. thus far 至今,到现在为止
18. prelude['prelu:d]n. 序曲,前奏曲

Increase your vocabulary

Write "S" if the words are same in meaning and "O" if they are opposite:

1. tiny——huge ( )
2. implant——insert ( )
3. cerebellum——cerebrum ( )
4. device——instrument ( )
5. disability——weakness ( )
6. contract——expand ( )
7. local——general ( )
8. confirm——approve ( )
9. multiple——single ( )
10. breakdown——disintegration ( )

Check your understanding

Choose the best answer for each unfinished statement.

1. Implanted in the cerebellum, a small brain "pacemaker" has been used successfully on patients with _____.
   a. drug-resistant epilepsy b. drug-resistant amnesia
   c. drug-resistant pseudarthrosis d. drug-resistant cancer
2. For stroke patients electrical devices have been developed to stimulate _____.

a. the cerebellum　　b. hip and leg muscles

c. memory processes　　d. blood circulation

3. Stimulation of the thalamus can help _____.

a. loss of appetite　　b. relieve chronic pain

c. long-term memory　　d. reduce neuralgia

4. It is believed that stimulation of the _____ may be of value for patients with language and learning disabilities.

a. spine　　b. cerebellum

c. heart　　d. thalamus

5. Glial cells are responsible for forming _____.

a. multiple sclerosis　　b. muscle fatigue

c. myelin　　d. anesthesia

4. Applied Bionics[1]

In 1934 the first artificial heart-lung machine began operation. As a bionic device, it served as[2] a temporary substitute[3] while a patient was in surgery or having short-term treatment.

The next bionic device was the artificial[4] heart valve[5], a synthetic[6] replacement for defective heart valves. Today some people have as many as three of these valves! Another bionic device is the electronic pacemaker that is implanted in the body to aid the beating of the heart. Some pacemakers will function for years before the batteries need changing.

What is bionics? it is a relatively young science, having been defined in about 1960. Bionics scientists contribute their knowledge of living systems together, for example, with the knowledge of an engineer to produce devices or machines that emulate[7] life.

In 1954 a turning point[8] in medical history, resulting from