

## Passage 1

### Nicotine's Fatal Attraction

The nicotine in a single cigarette can trigger a long-lasting chemical change in brain cells, scientists have discovered. If they can confirm that similar changes occur in living brains, it might lead to new treatments for nicotine addiction.

Rats exposed to nicotine have raised levels of the neurotransmitter dopamine in their brains. Dopamine is responsible for feelings of pleasure, and high levels of the chemical last for hours after exposure to nicotine. Scientists suspected that this leads to addiction.

Now neurobiologists Daniel McGehee and Hulbert Mansvelder from the University of Chicago have uncovered how nicotine has this insidious effect. Working on slices of rat brain, the team discovered that nicotine attaches to alpha7, a specific sub-unit of a family of nicotinic receptors in neurons. As a result, these neurons release glutamate. This in turn persuades other neurons to release dopamine. Levels of this key neurotransmitter persist for 45 minutes or more after nicotine exposure.

They say the buzz is higher the next time the same part of the brain is exposed to nicotine. The effect, called long-term potentiation, is also linked to memory and learning in a part of the brain called the hippocampus. "It's an insidious process that is motivating us to breathe carcinogens into our lungs," says McGehee. The team has calculated that the nicotine from just one cigarette is enough for the brain to remember the "high" that results.

The addictive effect of nicotine explains why so many people cannot stop smoking, despite widespread awareness that it causes heart disease and cancer. Experts estimate that one in two smokers will die prematurely as a direct result of their habit.

The new finding runs counter to the traditional theory that addiction comes when repeated exposure to a chemical weakens its effect, so that a person needs to take more and more of the drug to get a "hit". But the results are consistent with a newer theory of addiction, according to Ian Stolerman of the Institute of Psychiatry at King's College, London. This theory says that repeated exposure increases the user's sensitivity to a drug. And this is what makes the experience more and more pleasurable – and therefore harder to give up.

Now the researchers need to reproduce the results in live animals, Stolerman says. Earlier studies in animals failed to show that blocking alpha7 receptors affects nicotine dependence.

"If it can be verified that alpha7 receptors play a role in tobacco addiction it opens up possibilities of new drugs that may help people to stop smoking," says Stolerman. The drugs most often used today to block nicotine have marked effects outside the brain. They cause low blood pressure, dizziness and blurred vision, adds Stolerman.

He suggests that new drugs might avoid such problems. "Since alpha7 receptors

such problems. “Since alpha7 receptors are mainly in the brain, drugs that block only these receptors would not have these side effects.”

### Vocabulary

trigger *v.* 引发, 引起

addiction *n.* 上瘾

neurotransmitter *n.* 神经递质

dopamine *n.* 多巴胺

insidious *a.* 阴险的

glutamate *n.* 谷氨酸盐

buzz *n.* 陶醉

potentiation *n.* 加强

hippocampus *n.* 海马

prematurely *adv.* 过早地

consistent *a.* 一致的

### Reading Comprehension

**Directions:** *There are four suggested answers to each of the following questions. Choose the best one according to the passage you have just read.*

1. As scientists have discovered, process of addiction to nicotine involves
  - A. attachment of nicotine to alpha7.
  - B. release of glutamate by neurons.
  - C. release of dopamine.
  - D. all of the above.
2. Which of the following may be the role hippocampus plays in the process of addiction to nicotine?
  - A. It links memory to learning.
  - B. It remembers the pleasure caused by nicotine.
  - C. It helps one to breathe nicotine into our lungs.
  - D. It is the first part of brain exposed to nicotine when one smokes.
3. It can be inferred from the passage that many people keep smoking because
  - A. they do not know the danger.
  - B. they want to die prematurely.
  - C. smoking is a widespread habit.
  - D. smoking can make them feel “high”.
4. To which of the statements would both Daniel and Ian be most likely to agree?
  - A. The more one smokes, the more he wants to smoke.
  - B. The more one smokes, the less he feels pleased when smoking.
  - C. The more one smokes, the more easily he will get a “hit”.
  - D. The less one smokes, the more easily he will get “high”.

5. To develop the new drug mentioned in the last paragraph, researchers have to do which of the following first?
  - A. To confirm similar changes discovered by Daniel occur in living brains.
  - B. To verify side effects of the drugs used today.
  - C. To prove the effect of alpha7 on brain cells.
  - D. To do experiment on the smokers.
  
6. The new treatments for nicotine addiction mentioned at the beginning paragraph may
  - A. make people dizzy.
  - B. blur people's vision.
  - C. cause low blood pressure.
  - D. involve action on alpha7receptors.

### Passage 3

## How to Kill Tooth Decay without a Drill

A LASER wand could replace the dentist's drill if clinical trials beginning next year are successful. The key is photodynamic therapy (PDT), in which light activates a killer molecule that wipes out bacteria in decaying teeth.

In tests on extracted teeth, Mike Wilson and his team at the Eastman Dental Institute in London have shown that PDT sterilizes the infected tooth tissue. Once teeth in people's mouths are clear of infection, their bone tissue should be able to regenerate itself.

The team also hopes PDT could help combat other infections, particularly the hospital "superbugs" that are resistant to antibiotics. The team has already tested PDT against MRSA, a virulent superbug. "We wiped out over 99.9 per cent of the colony in samples where human tissue was present," Wilson told the BA meeting.

To treat cavities, dentists drill the parts of the tooth infected with decay-causing bacteria, leaving only healthy tissue. "Most dentists are overcautious and drill away a large part of the tooth," says Wilson.

PDT uses a photosensitiser molecule which binds only to the bacteria. When the photosensitiser is bathed in laser light, it releases oxygen radicals that kill the bacteria by punching holes in them.

Wilson says he has disinfected extracted teeth using a photosensitiser called toluidine blue. He will begin clinical trials in people with cavities next year.

The researchers don't think bacteria will become resistant to PDT. "So far, we haven't found any one site the photosensitiser is binding to," explains Mark Wainwright of the University of Central Lancashire, who is also working on PDT. "It just seems to adhere generally around the cell walls." He says the bacteria would have to change several aspects of their structure to become resistant.

### Vocabulary

wand *n.* 棒, 棍

photodynamic *a.* 光力学的

extract *v.* 拔除

combat *v.* to fight against

virulent *a.* 病毒的

colony *n.* 菌落

photosensitiser *n.* 光敏剂

radical *n.* 根, 基, 原子团;

## Reading Comprehension

**Directions:** *There are four suggested answers to each of the following questions. Choose the best one according to the passage you have just read.*

1. The LASER wand takes action by
  - A. replacing the dentist's drill.
  - B. activating a killer molecule.
  - C. extracting decaying teeth.
  - D. absorbing light.
  
2. What are "superbugs" mentioned in the passage?
  - A. Effective antibiotics.
  - B. Decaying cavities.
  - C. Virulent bacteria.
  - D. Tested samples.
  
3. All of the following are involved in PDT except
  - A. photosensitiser molecules
  - B. oxygen radicals
  - C. dentist's drill
  - D. laser light
  
4. The researchers imply that PDT may depend on which of the following for its success?
  - A. Bacterial structure.
  - B. Bacterial resistance.
  - C. Dentists' preference.
  - D. Site of decaying tooth.
  
5. The purpose of the passage is to
  - A. make a comparison between methods for dental care.
  - B. persuade the dentists to give up using their drills.
  - C. introduce a new alternative of dental care.
  - D. study decay-causing bacteria.

### Passage 3

**Directions:** There are 10 blanks in the following passage. For each blank there are four choices marked **A**, **B**, **C**, and **D**. You should choose the ONE that best fits into the passage.

Patients and tumors are 1. The conceptual design is great. Identifying the genetic variants underlying phenotype can lead to personalized medicine. 2 the best medical intervention to the right individual or patient can dramatically improve health.

The use of personalized medicine to improve both the prevention and cure of disease is potentially achievable through: predicting both the disease 3 among healthy individuals in the general population and the therapeutic response among patients. Genomic information from individuals or patients can substantially 4 to biomarker-based guided personalized prevention and treatment. The first strategy to use personalized medicine, in the prevention setting, 5 identifying high-risk individuals that may develop major common diseases, such as cardiovascular disorder, diabetes and cancer, and then 6 the most appropriate preventive intervention to protect them from these diseases. This strategy can substantially reduce disease 7 and it is particularly important for 8 disorders, such as cancer. In the second strategy, in the treatment 9, efforts by academia and industry have been focused on how to improve diagnostics and prognosis of diseases and how, through the development of predictors of drug response and adverse 10, to improve the safety and efficacy of drugs.

- |     |                        |                 |                   |                  |
|-----|------------------------|-----------------|-------------------|------------------|
| 1.  | A. same                | B. special      | C. unique         | D. different     |
| 2.  | A. Obtaining           | B. Tailoring    | C. Treating       | D. Targeting     |
| 3.  | A. risk                | B. sign         | C. symptom        | D. incidence     |
| 4.  | A. attend              | B. attribute    | C. distribute     | D. contribute    |
| 5.  | A. involves            | B. involving    | C. involved       | D. is involved   |
| 6.  | A. selects             | B. selecting    | C. selected       | D. have selected |
| 7.  | A. severity            | B. happening    | C. accident       | D. incidence     |
| 8.  | A. being hard<br>treat | B. hard treated | C. hardly treated | D. hard-to-treat |
| 9.  | A. ward                | B. clinic       | C. setting        | D. option        |
| 10. | A. efficiency          | B. effect       | C. efficacy       | D. proficiency   |