

Name: _____

Date: _____

Answer questions 1–4 according to the passage below.

Gene therapy is a medical technology that seeks to produce a therapeutic effect by manipulating gene expression or by altering the biological properties of living cells. The first attempt to modify human DNA was made in 1980, but the first successful nuclear gene transfer in humans, approved by the National Institutes of Health, was not carried out until May 1989; the first therapeutic use of gene transfer, and with it the first direct insertion of human DNA into the nuclear genome, followed in a trial begun in September 1990. Between 1989 and December 2018 more than 2,900 clinical trials were conducted, over half of them at phase I, and in 2003 Gendicine became the first such therapy to obtain regulatory approval. Most approaches have relied on adeno-associated viruses and lentiviruses to perform gene insertions. Adeno-associated viruses are valued for their stable capsid, their lower immunogenicity, their ability to transduce both dividing and non-dividing cells, and their capacity for long-term expression. Not every procedure that alters a patient's genetic makeup counts as gene therapy, however: bone marrow and organ transplants also introduce foreign DNA into the recipient.

1. According to the passage, what distinguishes gene therapy from an organ transplant?

- A) A transplant introduces foreign DNA, yet it is not classed as gene therapy
- B) A transplant alters gene expression while gene therapy does not
- C) Gene therapy has never received approval from any regulatory body
- D) Only transplants are able to reach non-dividing cells
- E) Gene therapy was developed several decades before transplantation

2. It is stated in the passage that the first successful nuclear gene transfer in humans ----.

- A) took place in 1980 under the direction of Martin Cline
- B) was the same procedure as the first therapeutic use of gene transfer
- C) led immediately to the regulatory approval of Gendicine
- D) was performed in May 1989 with the approval of the National Institutes of Health
- E) involved more than 2,900 patients in a single trial

3. It can be inferred from the passage that the field was still at an early stage in 2018 because ----.

- A) no gene therapy had yet obtained regulatory approval anywhere
- B) adeno-associated viruses had only just been discovered
- C) the technology had not been applied to human beings at all
- D) clinical trials had been abandoned after the first attempt in 1980
- E) over half of the trials conducted since 1989 remained at phase I

4. Which of the following is given in the passage as an advantage of adeno-associated viruses?

- A) They provoke a strong immune response that clears the infection quickly
- B) They can be produced without any laboratory equipment
- C) They can transduce cells whether or not those cells are dividing
- D) They insert genes only into cells that are actively dividing
- E) They eliminate the need for any clinical trial before approval

Answer questions 5–8 according to the passage below.

Epidemiology is the study and analysis of the distribution, patterns and determinants of health and disease within a defined population, together with the application of that knowledge to the prevention of disease. It is a cornerstone of public health: by identifying risk factors and targets for preventive healthcare it shapes both policy decisions and evidence-based practice. Epidemiologists contribute to study design, to the collection and statistical analysis of data, and to the interpretation and dissemination of results. The major areas of the discipline include disease causation and transmission, outbreak investigation, disease surveillance, environmental and occupational epidemiology, screening and the comparison of treatment effects in clinical trials. The field is unavoidably dependent on others: biology to understand disease processes, statistics to draw appropriate conclusions from data, the social sciences to identify distant as well as immediate causes, and engineering to assess exposure. Although the word derives from Greek roots meaning the study of what is upon the people, and although the distinction between epidemic and endemic conditions was first drawn by Hippocrates, the term itself appears to have been used in its modern sense only in 1802. Since the twentieth century the discipline has extended well beyond infectious disease to chronic conditions such as diabetes and cancer.

5. According to the passage, epidemiology is described as a cornerstone of public health because it ----.

- A) restricts itself to the investigation of infectious outbreaks
- B) identifies risk factors and so informs policy and practice
- C) replaces the need for statistical analysis in clinical research
- D) was the first medical discipline to be founded in ancient Greece
- E) concentrates on individual patients rather than populations

6. It can be understood from the passage that epidemiology ----.

- A) has remained unchanged in scope since the time of Hippocrates
- B) avoids collaboration with disciplines outside medicine
- C) is applied exclusively to human rather than animal populations
- D) regards engineering as irrelevant to the assessment of exposure
- E) cannot be practised without drawing on several other fields

7. It is stated in the passage that the term epidemiology in its modern sense ----.

- A) came into use only in 1802, long after Hippocrates
- B) was coined by Hippocrates together with the term endemic
- C) originally referred to the study of plant populations
- D) has never been applied to conditions other than epidemics
- E) derives from a Latin phrase meaning the study of people

8. Which of the following best describes how the scope of the discipline has changed?

- A) It has narrowed to the surveillance of outbreaks alone
- B) It has abandoned the study of transmission in favour of screening
- C) It has been absorbed entirely into the field of clinical statistics
- D) It has widened from infectious disease to chronic conditions as well
- E) It has withdrawn from policy questions to remain purely descriptive