

科目 外国語(英語)

医学部医学科

注 意

1. 開始の合図があるまで、この問題冊子を開いてはいけません。
2. 問題は1ページから9ページにわたっています。問題冊子に不備がある場合は、直ちにその旨を監督者に申し出てください。
3. 解答用紙は3枚で、問題冊子とは別になっています。解答は、すべて解答用紙の所定の欄に記入してください。指定された解答用紙以外に記入した場合は、評価(採点)の対象としません。
4. 受験番号は、3枚の解答用紙のそれぞれの上部の欄に記入してください。
5. 解答用紙は持ち帰ってはいけません。
6. 下書き用紙(1枚)がありますので、活用してください。
7. 問題用紙と下書き用紙は持ち帰ってください。

1

Read the following article and answer the questions that follow. All questions must be answered in English. Words marked with an asterisk * are defined at the end of this article in the note section.

著作物引用箇所のため非公表

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(Jim Kozubek, 2019, *Nautilus Magazine*, extracted and slightly modified.)

*Notes:

epigenetic: the adjective form of epigenetics

epigenetics: the study of the way in which the expression of heritable traits is modified by environmental influences or other mechanisms without a change to the DNA sequence

Johns Hopkins: Johns Hopkins University, a private research university in Baltimore, Maryland, USA

Nature: one of the leading science magazines in the world

information theory: the mathematical theory concerned with the content, transmission, storage, and retrieval of information

methylation: the process of replacing a hydrogen atom with a methyl group

genome: a full set of chromosomes (染色体); all the inheritable traits of an organism
ゲノム in Japanese

immune: relating to the production of antibodies (抗体) or lymphocytes (リンパ球) that can react with a specific antigen (抗原)

lineage: the line of descendants of a particular ancestor

dinucleotide: a molecule composed of two nucleotide subunits

cytosine: a base, $C_4H_5N_3O$, that is one of the fundamental components of DNA

guanine: a base, $C_5H_5N_5O$, that is a fundamental component of DNA

phosphate: リン酸 in Japanese

double-helix: the spiral arrangement of the two complementary strands of DNA

enzyme: 酵素 in Japanese

hallmark: a typical feature or quality

entropy: a measure of uncertainty or randomness

double-strand break: a serious DNA damage of breaking a double-strand due to internal and external factors

WNT1 gene: a gene that is considered to be responsible for making a protein, WNT1, which controls cell fates during development

Colorectal: concerning colon (大腸) and rectum (直腸)

intestine: 腸 in Japanese

(1) Why can the author say that (A)he was onto something? Answer the question based on the article.

(2) Put the words in the square brackets of (B), (C) and (D) into correct orders.

(3) The following questions are about “(E)energy potential.”

(a) Put the words in the square brackets of (F) into the correct order.

(b) List all the factors that determine the methylation status.

(c) How do energy potential and methylation status correspond to each other?

(4) The following questions are about (G)The cellular machinery that regulates this epigenetic code. Answer them based on the article.

(a) Why has the cellular machinery become a rapidly developing research area?

(b) What biological processes have been involved in the cellular machinery? Itemize your answers in a full sentence form.

(5) The following questions are about “(H)entropic sensitivity.” Answer them based on the article.

(a) What does “(I)plastic” mean? Choose the closest phrase in meaning from the list below and write the corresponding number on the answer sheet.

- | | | |
|-------------------|---------------------|---------------------|
| ① easy to break | ② easy to shape | ③ hard to bend |
| ④ hard to rebound | ⑤ easy to be formal | ⑥ hard to be formed |

(b) How are the aging cells described in this article with regard to entropic sensitivity? Complete the sentence on the answer sheet with all the features that are described in the article.

(c) Fill in the blank of (J) with the most appropriate word from the list below.

think	judge	sing	draw	listen	construct
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(d) How can aging cells be described in contrast with cancer cells in view of entropic sensitivity? To answer the question, complete the following sentences by filling in each blank with an appropriate word or phrase.

Aging cells often have (①). They can be (②) the machinery normally regulating their methylation and thus, unable to be (③) enough to respond to various environmental stimuli. And then, they also tend to be (④) to very serious damages and this can cause to change aging cells to cancerous ones.

(6) Put the words in the square brackets of (K) into the correct order.

(7) Fill in the parentheses (L) through (P) with the most appropriate word or phrase from the list below.

deviation	high energy potential	low
more	high	low energy potential
less	deletion	addition

(8) What does (Q) information lost mean in terms of aging of cells and DNA methylation? Write your answer in between 30 and 50 English words, starting with 'It means that'.

2 The following article describes a former professional American football star: Carson Palmer's new life in Ketchum, Idaho. Read the article and answer the questions. Words marked with an asterisk * are defined at the end of this article in the note section.

著作物引用箇所のため非公表

* * *

著作物引用箇所のため非公表

(Sam Farmer, 2019, *Los Angeles Times*, truncated and slightly modified)

***Notes:**

KETCHUM: a town in the state of Idaho

Heisman Trophy: the award for the most outstanding college football player of the year

quarterback: the player who leads the team's offense, and usually throws the ball

USC: University of Southern California

NFL: National Football League, professional sports league for American football

the Cincinnati Bengals, Oakland Raiders and Arizona Cardinals: NFL teams

sprawling: spreading in an untidy way

a color analyst: a sports commentator

Fox: a television network in the U.S.A.

gridiron: another name for American football field

flag football: a version of American football where the defensive team must remove a flag

or flag belt from the ball carrier, instead of tackling players to the ground

alma mater: the school/college/university one went to

(1) Select the most appropriate sentence for each blank (from [(A)] to [(E)]) from the list below. Write the letter corresponding to the sentence on the answer sheet.

(a) He keeps up on what's happening in the NFL because he still does a handful of weekly interviews for radio and podcasts.

(b) Somewhere along those 15 years, it becomes a job.

(c) He does light lifting to strengthen his shoulder joint and maintain his flexibility, all to prepare for the season.

(d) For those who know Carson, this is his most natural environment.

(e) That wasn't just when he was traveling but also while he was studying video, meeting with teammates and getting physical therapy.

(f) Everyone thought he was going to be the best quarterback.

(2) Write an essay of about 200 to 250 words in English, responding in your own words to both the following questions (a) and (b):

(a) What did Carson value when he decided to retire from his professional career? And why did he do so?

(b) If you have had a successful career, do you think you would like to continue working in the same field or to take a very different path of life like Carson? Discuss your ideas. You can refer to your experiences and/or future plans, if it is necessary for your discussion.

受 験 番 号

外国語 (英語) (3-1)	合計点

教 科	外国語 (英語)
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(3枚中の 第1枚)

志望学部・学科	受 験 番 号
医学部・医学科	

- 注 意
- (1) 受験番号は、2か所に記入すること。
 - (2) 試験終了後、下書き用紙は持ち帰ること。
 - (3) 下線から上部、および裏面には解答を書かないこと。

1

(1) _____

(1)

(2) (B) _____

(C) _____

(D) _____

(2)

(3) (a) _____

(b) _____

(3)(a)

(c) _____

(3)(b)

(3)(c)

(4) (a) _____

(b) _____

(4)(a)

(4)(b)

採 点

受 験 番 号				

外 国 語 (英 語) (3-2)	合 計 点

教 科	外 国 語 (英 語)
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志望学部・学科	受 験 番 号
医学部・医学科	

- 注 意
- (1) 受験番号は、2か所に記入すること。
 - (2) 試験終了後、下書き用紙は持ち帰ること。
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(3枚中の 第2枚)

(5) (a) _____ (5)(a)

(b) Aging cells are _____

_____ than stem cells and adult cells. (5)(b)

(c) _____ (5)(c)

(d) ① _____

② _____

③ _____

④ _____ (5)(d)

(6) _____

_____ (6)

(7) (L) _____

(M) _____

(N) _____

(O) _____

(P) _____ (7)

(8) It means that _____

_____ (8)

2

(1) (A) _____ (B) _____ (C) _____ (D) _____ (E) _____ 2(1)

採 点

