

令和 2 年度  
医 学 科  
外 国 語 (英語)

注意事項

1. 問題は 1 頁から 10 頁に掲載されています。
2. 解答に用いる言語(日本語あるいは英語)は各設問の指示に従って選びなさい。  
ただし、記号で答えるように求められている場合は記号で答えなさい。
3. 解答は解答用紙に記入しなさい。





次の英文を読んで、設問に日本語あるいは記号で答えなさい。

**Eye-opener: Doctor's iPS cell work providing hope**

By J. J. O'Donoghue

Science has Dr. Masayo Takahashi's mother to thank, in a way, for some of the most notable developments in regenerative medicine using stem cells.

More than 35 years ago when Takahashi was contemplating which career she would pursue once she graduated from high school in Osaka, it was her mother who stepped in to offer firm guidance. "I didn't want to be a doctor at all, but my mother told me I should join the medical department," Takahashi, 57, says with a laugh. The old adage that mothers know best rings true in this instance: Takahashi studied medicine at Kyoto University and went on to specialize in ophthalmology, a branch of medicine that treats eye disorders.

For her pioneering work in treating eye disorders and diseases Takahashi was the inaugural recipient of the \$150,000 Ogawa-Yamanaka Stem Cell Prize in 2015 from the Gladstone Institutes for her innovative research. The previous year, *Nature*, a British science journal, included Takahashi in its annual list of the 10 people who mattered in science.

For the past 25 years Takahashi's research has focused on using stem cells to treat eye diseases and disorders. In 2014, a team led by Takahashi and her colleagues at the Riken Institute's center for biological development in Kobe made global headlines when, in a world-first, they successfully transplanted cells from induced pluripotent stem cells, or iPS cells, onto a patient's eye. Dr. Paul Knoepfler, a biomedical scientist and stem cell expert who heads the Knoepfler Lab at U.C. Davis School of Medicine in California, described Takahashi's work as offering a <sup>(1)</sup>\*blueprint for others in the regenerative medicine field. "The use

of iPS cells to make retinal cells provides real hope for macular degeneration, a disease for which otherwise there isn't much that doctors can do for patients," Knoepfler wrote in an email.

Takahashi's research centers on how stem cells can be used to treat retinal diseases such as age-related macular degeneration, which causes cloudy and blurry vision and affects everything, including our ability to read, drive and recognize faces. It was at the Salk Institute in San Diego, where Takahashi was a postdoctoral researcher, in the mid-1990s that she became captivated by the medical possibilities of stem cells, which would form the basis of her clinical research work. Since 2014, Takahashi's team has carried out six clinical surgeries using stem cells derived from iPS cells. Takahashi said that in all six operations "the survival of the cells" succeeded.

Over her entire career, Takahashi has gone back and forth between clinical work and research. She attends to patients once a week at the state-of-the-art Kobe Eye Center, located near the Riken campus in the city. "It's very important to do both," Takahashi said in a recent interview, referring to her work as a scientist and a medical doctor. "Nowadays it's more difficult because the clinical demands are getting higher and higher." Through her outpatient work, Takahashi was well aware of the <sup>(2)\*</sup>enthusiasm and interest in her team's pioneering clinical operations.

Around 600,000 people in Japan suffer from age-related macular degeneration, which can cause blurred vision and in more serious cases lead to blindness. A 2014 study by *The Lancet* revealed that, by 2020, the number of people with the disease is projected to be 196 million, increasing to 288 million in 2040. "I know the suffering patients are going through," Takahashi said. "I've seen thousands of patients, I know their needs very well and their desire to get better."

In some respects Japan is an <sup>(3)\*</sup>outlier when it comes to clinical applications of stem cell research. Many countries have been slower to allow them, but the

central government has thrown its weight behind the study and application of stem cells. Much of that support is derived from the fact that iPS cells were first developed by Nobel Prize winner Shinya Yamanaka at Kyoto University in 2006. “The government loves iPS cells,” Takahashi said.

Takahashi recalled that when her laboratory at Riken, which has about 50 scientists and researchers, submitted its first protocol in 2012, it generated controversy and push back in the scientific community. She puts that down to an information deficit. “The ophthalmology community doesn’t know enough about iPS cells, and they think this is risky. And the basic research community doesn’t know the clinical situation — for example what kind of risk we can tolerate. So many people were against moving ahead.” One way around this, Takahashi believes, would be for greater collaboration among doctors, scientists, researchers and the pharmaceutical industry.

Although Takahashi would characterize herself as a <sup>(4)\*</sup>reluctant leader, she’s been instrumental in establishing the Kobe Eye Center, where she sees patients once a week. Even before Takahashi came to Riken 10 years ago, she had long been thinking about the concept of a next-generation eye hospital. The result is the cutting-edge Kobe Eye Center, which opened in December 2017. Although still developing, Takahashi hopes that by bringing together different but related elements all under one roof — clinics, laboratories and space for startups in the medical community — the institute will foster greater collaboration. For the design of the hospital, Takahashi had one of the most innovative companies in the world in mind: Apple. “I said to Dr. Miyake (a Riken colleague), ‘please make it like an Apple Store so that it doesn’t look like a hospital.’ I wanted it to be a place where patients wanted to come.” The centerpiece is the “Vision Park,” a white-walled open space reception area, designed by architect Kentaro Yamazaki. It features a climbing wall and a library as well as a display area where visitors can try out some of the technology used to aid people with impaired vision.

In many ways Takahashi is also an outlier in Japan, where less than 15 percent of science researchers are women. While she has never experienced any prejudice—in fact she says she has received great support throughout her career—Takahashi says that the gender imbalance could be corrected if, during the formative years of education, more was done to encourage girls to be ambitious with their careers.

When that happens, then perhaps famous Japanese scientists and researchers who have received Nobel Prizes will also start to resemble the society they are from. And perhaps here, too, Takahashi will lead the way.

Source (with changes):

*The Japan Times*, April 24, 2019

#### Notes

iPS cell : 人工多能性幹細胞

regenerative medicine : 再生医療

stem cell : 幹細胞

age-related macular degeneration : 加齢黄斑変性

pharmaceutical industry : 製薬業界

設問 1 \*印のついた語句は、本文の文脈ではそれぞれどのような意味で使われているか、最も近いものを選んで記号で答えなさい。

1. \*blueprint
  - (a) master plan
  - (b) original plan
  - (c) long-term plan
  - (d) immediate plan

2. \*enthusiasm
- (a) eagerness
  - (b) obsession
  - (c) ignorance
  - (d) significance

3. \*outlier
- (a) illegality
  - (b) exception
  - (c) advantage
  - (d) unusualness

4. \*reluctant
- (a) natural
  - (b) inspiring
  - (c) unwilling
  - (d) distinguished

設問 2 Takahashi の Riken での研究計画が最初は壁にぶつかったのはなぜか、また、その壁を回避するにはどうしたらよいと Takahashi は考えているか、本文の内容にしたがって説明しなさい。

設問 3 Takahashi が構想してきた次世代の病院とはどのようなものか、本文の内容にしたがって説明しなさい。



設問 4 本文の内容と合致するものを3つ選んで記号で答えなさい。

- (a) Takahashi regards both clinical work and research as essential.
- (b) Takahashi has suffered from gender discrimination throughout her career.
- (c) The Japanese government supports clinical applications of stem cell research.
- (d) Takahashi has been transplanting stem cells onto patients' eyes for the past 25 years.
- (e) Dr. Knoepfler invited Takahashi to his lab at U.C. Davis School of Medicine in California.
- (f) The number of people with age-related macular degeneration is expected to rise in the future.
- (g) Takahashi received a prize from the Gladstone Institutes because the British journal *Nature* chose her as one of the 10 important people in science in the previous year.

**Read the passage, then follow the instructions below.**

**Depression higher in rich countries, study suggests**

By Rachael Rettner

People who live in ( ① ) countries are slightly more likely to be depressed than those in low- to middle-income countries, a new study of global depression rates ( ② ). In the study, close to 15 percent of people in high-income countries said they experienced depression at some ( ③ ) in their lives. That compares with 11 percent in low- and middle-income countries.

However, ( ④ ) nations, women were twice as likely as men to suffer from depression, the researchers said. And no matter where a depressed person lived, the condition ( ⑤ ) his or her ability to function in everyday life, the researchers said.

“In every single country, depression was related to impairment,” said study researcher Evelyn Bromet, a professor of psychiatry and behavioral science at the State University of New York at Stony Brook. “What this says is that, ( ⑥ ) depression means across the world, it has an ( ⑦ ) on people’s lives,” Bromet said. About 121 million people worldwide ( ⑧ ) from depression, and the condition is the fourth leading cause of ( ⑨ ), according to the World Health Organization.

Bromet and colleagues ( ⑩ ) interviews of about 89,000 people from 18 countries: 10 high-income countries, including France, Germany, Japan and the United States, and 8 low- and middle-income countries, such as Brazil, India, China and Mexico. The researchers asked ( ⑪ ) questions about their symptoms, and diagnosed major depressive episodes according to ( ⑫ ) in the Diagnostic and Statistical Manual of Mental Disorders.

Depression was estimated to have its highest ( ⑬ ) in high-income countries, including France (21 percent) and the United States (19 percent). Some of the lowest rates were in low- to middle-income countries, including Mexico (8 percent) and China (6.5 percent). However, some high-income countries had low rates of depression, such as Japan (6.6 percent), and some low- to middle-income countries had high rates, such as Brazil (18 percent).

When asked if they had ( ⑭ ) depression within the last year, the numbers were more similar: 5.5 percent of those in high-income countries had, and 5.9 percent in low- and middle-income countries had.

The effect of age on depression ( ⑮ ) across countries. In the United States and some European countries, depression rates went down with age. “People get ( ⑯ ) as they get older,” Bromet said. But in some of the low- and middle-income countries, such as Ukraine, the opposite was true, she said. It’s not clear why high-income countries have higher rates of depression. Rich countries tend to have greater income ( ⑰ ) between the very rich and very poor, which could play a role in the development of depression, the researchers said. It’s also possible that the study ( ⑱ ) depression rates in low-and middle-income countries, the researchers said. People in these countries have a lower life expectancy, and those with depression may die even earlier. The study also included only one country in Africa.

Unlike previous estimates of global depression rates, the researchers of the new study ensured that the study ( ⑲ ) were conducted exactly the same in all cases. However, the study used a definition of depression developed in Western countries. Creating diagnostic criteria for depression based on the culture ( ⑳ ) of each country may increase the ability to detect depression cross-culturally, the researchers said.

Source (with changes):

<https://www.livescience.com/35792-global-depression-rates.html>

設問 1 Use the following words to complete the text.  
Use each word once.

across	affected	criteria	differed
disability	disparities	experienced	happier
impact	nuances	participants	point
prevalence	protocols	reviewed	suffer
suggests	underestimated	wealthy	whatever

設問 2 Answer the following questions in English.

1. According to the article, what were the results regarding Japan's depression rates among the high-income countries included in the study?
2. What were the findings relating to gender differences among people with depression?

**Write an essay on the following topic.**

Your essay should be written in your own words and:

1. be a minimum of 150 words in English,
2. be written using paragraph form,
3. have a minimum of three paragraphs,
4. have a clear introduction, body and conclusion,
5. leave a one-line space between each paragraph.

Do not double-space your essay; write on every line.

In your essay, your ideas should be clearly expressed.

Imagine looking down beside your desk now and finding a magic lantern that will grant one wish within the next minute. You can make one wish for anything you desire and it will be given to you immediately. What would you wish for? Explain the reasoning for the wish you make.





