大学受験パス㋮ 過去問ライブラリー

浜松医科大学

英語

問題

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旺文社

1（配点率40％）
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。

All diseases begin in the gut

By Alanna Collen

Sweden is a country that takes obesity very seriously. Although ranked as only the ninetieth-fattest country on the planet, and one of the slimmest in Europe, Sweden has the highest rate of gastric bypass surgeries in the world. The Swedish have considered (1)*implementing a 'fat tax' on high-calorie foods, and doctors are able to prescribe exercise to overweight patients. Sweden is also home to a man who has made one of the biggest contributions to forwarding obesity science since the epidemic began.

Fredrik Bäckhed is a professor of microbiology at Gothenburg University, although it's not Petri dishes and microscopes you'll find in his lab, but dozens of mice. Like humans, mice play host to an impressive collection of microbes, mainly living in their guts. But Bäckhed's mice are different. Born by Caesarean section and then housed in (2)*sterile chambers, they do not have any microbes in them. Each one is a blank canvas — 'germ-free', which means that Bäckhed's team can colonise them with whichever microbes they wish.

Back in 2004, Bäckhed took a job with the world's leading expert on microbiota, Jeffrey Gordon, a professor at Washington University in St Louis, Missouri. Gordon had noticed that his germ-free mice were particularly skinny, and he and Bäckhed wondered if this was because they lacked gut microbes. Together, they realised that even the most basic studies on what microbes did to an animal's metabolism had not yet been done. So Bäckhed's first question was simple: Do gut microbes make mice gain weight?

To answer that question, Bäckhed (3)*reared some germ-free mice to adulthood, and then dotted their fur with the contents of the caecum — the chamber-like first part of the large intestine — of mice who had been born normally. Once the germ-free mice had licked the caecal material off their fur, their guts took on a set of microbes like any other mouse. Then something extraordinary happened: they gained weight. Not just a little bit, but a 60% increase in body weight in fourteen days. And they were eating less.

It seemed it wasn't only the microbes that were benefiting from being given a home inside the mice's guts, but the mice as well. Everybody knew that microbes living in the gut were eating the indigestible parts of the diet, but no one had ever looked into how much this second round of digestion contributed to energy intake. With microbes helping them to access more of the calories in their diets, the mice could get by on less food. In terms of our understanding of nutrition, it really ①rocked the boat. If the microbiota determined how many calories mice could extract from their food, did that mean they might be involved in obesity?

Microbiologist Ruth Ley — another member of Jeffrey Gordon's lab group — wondered if the microbes in obese animals might be different to those in lean animals. To find out, she used a genetically obese breed of mice known as *ob/ob*. At three times the weight of a normal mouse, these obese mice look nearly spherical, and they just will not stop eating. Although they appear to be a completely different species of mouse, they actually have just a single mutation in their DNA that makes them eat non-stop and become profoundly fat. The mutation is in the gene that makes leptin, a hormone which dampens the appetite of both mice and men if they have a decent supply of stored fat. Without leptin informing their brains that they are well-fed, the *ob/ob* mice are literally insatiable.

By decoding the DNA sequences of the 16S rRNA gene of the bacteria living in the guts of the *ob/ob* mice, and working out which species were present, Ley was able to compare the microbiotas of obese and lean mice. In both types of mice, two groups of bacteria were (4)*dominant: the Bacteroidetes and the Firmicutes. But in the obese mice, there were half the Bacteroidetes as in the lean mice, with the Firmicutes making up the numbers.

Ley, excited by the possibility that this difference in the ratio of Firmicutes to Bacteroidetes might prove to be fundamental to obesity, then checked the microbiotas of lean and obese humans. She found the same ratio — the obese people had far more Firmicutes and the lean people had a great proportion of Bacteroidetes. It seemed almost too simple — could obesity and the composition of the gut microbiota be connected in such a straightforward way? Most importantly, were the microbes in obese mice and humans *causing* the obesity or were they just a consequence of it?

It fell to a third member of Gordon's lab group to find out — PhD student Peter Turnbaugh. Turnbaugh used the same kind of genetically obese mice as Ley had, but he transferred their microbes into germ-free mice. At the same time, he transferred the microbes of normal, lean mice into a second set of germ-free mice. Both sets of mice were given exactly the same amount of food, but fourteen days later, the mice colonised with the 'obese' microbiota got fat, and those with the 'lean' microbiota did not.

Turnbaugh's experiment showed not only that gut microbes could make mice fat, but also that they could be passed between individuals. The implications go far beyond moving bacteria from obese mouse to lean mouse. We could be doing it the other way round — taking microbes from lean people and putting them into obese people — weight loss with no dieting required. The therapeutic — and money-making — potential was not lost on Turnbaugh or his collaborators, who have patented the concept of

altering the microbiota as a treatment for obesity.

Excerpted from Alanna Collen (2015), *10% Human: How your body's microbes hold the key to health and happiness*, HarperCollins (with changes).

Note　obesity：fatness　Caesarean section：delivery of a baby through a surgical operation
microbiota：the microorganisms at a particular site
mutation：a change in the genetic structure of an animal or plant that makes it different from others of the same kind
insatiable：always wanting more and more of something　Bacteroidetes：a type of bacteria
Firmicutes：a type of bacteria　make up the numbers：adding more to reach the required level

設問 1　*印のついた語は，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．*implement
(a) pay　(b) reduce　(c) impose　(d) increase

2．*sterile
(a) dry　(b) clean　(c) fruitless　(d) unproductive

3．*rear
(a) train　(b) raise　(c) educate　(d) support

4．*dominant
(a) effective　(b) important　(c) controlling　(d) subordinate

設問 2　下線部①はどのようなことを指しているか，本文の内容にしたがって説明しなさい。

設問 3　Turnbaugh の実験結果はどのような意味を持つか，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) Sweden suffers from a serious epidemic of obesity.
(b) Gordon's mice lacked gut microbes because they were skinny.
(c) Ley transferred the microbes of obese mice into germ-free mice.
(d) The microbiota in obese humans is different from that in lean humans.
(e) In the *ob/ob* mice, the ratio of the Firmicutes was higher than that of the Bacteroidetes.
(f) Bäckhed is a leading researcher who has made the biggest contributions to founding obesity science.
(g) Researchers use germ-free mice because they can introduce whichever microbes they wish into them.

2 （配点率30％）

Reading A

Read the passage, then follow the instructions below.

Love is the best medicine: Why strong relationships are good for our health

There's a reason why we go to visit friends and family when they're ill, and it isn't just to bring a gift. We all intrinsically know that good relationships make us feel better.

Well, now there is evidence that this isn't purely an emotional reaction; good (①) can actually help to prevent illness, help us recover more quickly or (②) deterioration of health conditions. The phrase 'laughter is the best medicine' may technically not be (③), but it seems it should at least be part of the prescription.

This is all the more important in the context of the challenges faced by our National Health Service (NHS). Fifteen million of us in the UK are affected by long term health (④) such as cancer, dementia and depression, and these make up the bulk of the (⑤) on the health service. This demand, combined with an ageing population, rising costs of social care and financial pressures has (⑥) in an estimated funding gap of £30 billion a year.

It's clear we need to find new and different ways of preventing and (⑦) health conditions, and a growing (⑧) of evidence suggests that relationships with friends, family and (⑨) may hold some of the answers. For example, those of us with strong relationships are 50% more likely to (⑩) life-threatening illness than people with weaker ones. However, just when we need them most, the effects of living with a health condition can put our relationships under (⑪): around 1 in 4 people with a life-limiting health condition or who are disabled said that their condition has impacted negatively on relationships they have or have had with partners (24%), friends (25%), family (23%) or colleagues (33%).

Living with a long term health condition can change the (⑫) of our relationships, the effects of a condition and treatment can shape our sex lives, change our lifestyles and lead to anger, guilt, grief and anxiety. But health conditions can also (⑬) people close together, reminding us what's (⑭) and giving those around us a chance to show, in some very practical ways, just how much they care. The key to managing a long term condition is often about making the (⑮) to your new normality, whether that's (⑯) an illness yourself or as a partner, family member or friend to someone who is.

'The Best Medicine' is a new report reviewing the evidence and making clear recommendations for local and national government that would put relationships at the heart of the NHS, making relationship support more (⑰) at the point of diagnosis and beyond.

If you're coping with the effects of a long term health condition on your relationships, here are five top tips for keeping your relationships rich:

Don't bottle it up: It can be tempting to avoid the issue with friends and family because people get upset, but open (⑱) is really important.

Expect change: Realize that the dynamics of your relationships may change, particularly if a partner or family member is taking on the role of 'carer'. Don't make assumptions about how this will make you both feel.

Make time and space for intimacy: In a couple relationship, try to (⑲) yourself from the patient/carer role now and again to allow time for intimacy with your partner. Perhaps create a special room in the house where these roles no longer exist and you can spend quality time together.

Remember everyone is different: Health conditions affect people in different ways and what works for somebody may not be the same for everyone.

Consider counselling: It's tempting to keep your feelings inside, but talking to somebody impartial about how you feel and putting mechanisms in place can help you (⑳) with the changes in your relationship.

Source (with changes): http://www.independent.co.uk/life-style/health-and-families/features/love-is-the-best-medicine-why-strong-relationships-are-good-for-our-health-10129754.html

Use the following words to complete the text.

accessible	adjustment	body	bring	communication
conditions	cope	demand	dynamics	facing
important	managing	partners	prevent	relationships
resulted	separate	strain	survive	true

Reading B

Read the passage, then answer the following questions in English.

Weight loss can slow down knee joint degeneration

Overweight and obese people who lost a substantial amount of weight over a 48-month period showed significantly lower degeneration of their knee cartilage, according to a new study published

online in the journal *Radiology*.

According to the National Institute of Health, obesity is a risk factor for osteoarthritis. Being overweight or obese can place extra pressure on joints and cartilage, causing them to wear away. In addition, people with more body fat may have higher blood levels of substances that cause inflammation in the joints, raising the risk for osteoarthritis.

"For this research, we analyzed the differences between groups with and without weight loss," said the study's lead author, Alexandra Gersing, MD, from the Department of Radiology and Biomedical Imaging at the University of California, San Francisco. "We looked at the degeneration of all knee joint structures, such as menisci, articular cartilage and bone marrow."

The research team investigated the association between weight loss and the progression of cartilage changes on MRI over a 48-month period in 640 overweight and obese patients (minimum body mass index [BMI] 25) who had risk factors for osteoarthritis or MRI evidence of mild to moderate osteoarthritis. Data was collected from the Osteoarthritis Initiative, a nationwide research study focused on the prevention and treatment of knee osteoarthritis. Patients were categorized into three groups: those who lost more than 10 percent of their body weight, those who lost five to 10 percent of their body weight, and those whose weight remained stable.

The results showed that patients with 5 percent weight loss had lower rates of cartilage degeneration when compared with stable weight participants. In those with 10 percent weight loss, cartilage degeneration slowed even more.

Not only did the researchers find that weight loss slowed articular cartilage degeneration, they also saw changes in the menisci. Menisci are crescent-shaped fibrocartilage pads that protect and cushion the joint.

"The most exciting finding of our research was that not only did we see slower degeneration in the articular cartilage, we saw that the menisci degenerated a lot slower in overweight and obese individuals who lost more than 5 percent of their body weight, and that the effects were strongest in overweight individuals and in individuals with substantial weight loss," Dr. Gersing said.

Light to moderate exercise is also recommended to protect against cartilage degeneration in the knee.

"Our study emphasizes the importance of individualized therapy strategies and lifestyle interventions in order to prevent structural knee joint degeneration as early as possible in obese and overweight patients at risk for osteoarthritis or with symptomatic osteoarthritis," Dr. Gersing said.

Source (with changes): https://www.mdlinx.com/nursing/top-medical-news/article/2017/05/11/7161414

Notes　osteoarthritis：変形性関節症　cartilage：軟骨　inflammation：炎症　degeneration：変性
bone marrow：骨髄

1. In this article, what conclusions have the researchers found about the relationship between weight loss and cartilage degeneration?
2. What are two ways to protect against cartilage degeneration in the knees?

3 (配点率30%)

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.

In the past, Japanese doctors had a reputation of not being transparent in their actions and holding back pertinent information about their patients' health. Some doctors argued that informing them of a terminal illness (such as cancer) would cause unhealthy psychological stress to the patient (Viet Hoang 2012). Do you think you could deliver bad news to a patient or would you withhold the truth for some reasons? If you were the patient with a terminal illness, would you prefer to know the truth or not? Your essay should include your answers to these questions.

Source (with changes): Viet Hoang, Tofugu.com (March 29, 2012), "Why Japanese doctors lie：It's okay to lie if you're a doctor!" https://www.tofugu.com/japan/japanese-doctor-problems/