

第1問 次の英文を読み、下の問い(問1・問2)に答えよ。

In 2003, as Angela Christiano, a professor of genetics and dermatology, and her colleagues continued to build the registry for alopecia areata (AA), the Human Genome Project was completed. This monumental international achievement [1] Christiano to conduct a much broader, more elaborate inquiry, called a genome-wide association study, in which samples from a thousand AA patients in the registry could be analyzed [2] the DNA of three thousand normal-haired counterparts.

This haystack was far bigger than any she had ever [3], and she was amazed when the first pass turned up eight distinct genetic regions that were clearly different for sufferers and non-sufferers — “an incredibly good yield [4] only a thousand patients,” Christiano says. Since it took just eight regions of the genome, and not fifty or a hundred, to explain the genetic association [5] a thousand cases of AA, Christiano surmised that those regions must contain genes that play a predominant role in causing the disease. If a drug could hit some of those genes, it should work for the majority of patients.

Christiano then compared AA genes to the genes of other diseases, looking for similarities and differences. The results were a thunderbolt. “It turns out AA genes don’t look like any other autoimmune skin diseases — not psoriasis, not eczema, not vitiligo,” Christiano says. “The autoimmune diseases they align with are type 1 diabetes, celiac disease, and rheumatoid arthritis. This was not at all what we [6].”

When she and her team looked at the literature on those diseases, they learned that all three use a similar signaling mechanism, in which wayward genes send out a “kill me” message that summons immune cells called T cells to [7] a healthy cell for destruction. Normally, when a damaged cell needs to be destroyed, the T-cell cavalry comes in, does its job, and [8]. But in patients with AA, Christiano found, the [9] that

attract the killer cells to the hair follicles don’t turn off. “They’re always a little on,” she says.

But which gene was causing this to happen specifically in the hair follicle — and nowhere else? Which gene, in other words, was the “AA gene”?

“We geneticists want to find the genes that are [10] to our disease,” explains Christiano. “There are plenty of other immune genes that are shared among diabetes and celiac and AA, but those just give you a generic susceptibility to autoimmunity.”

The team zeroed in on chromosome six, where they detected what Christiano calls “the smoking gun for AA” — a gene called *ULBP3*. “This was the gene that landed us in the hair follicle,” Christiano says.

(出典 Radical Solutions for Baldness by Paul Hond, Columbia Magazine.)

(一部改変)

(注) alopecia areata, 円形脱毛症; surmise, 推測する;

autoimmune, 自己免疫の; wayward, きまぐれな; hair follicle, 毛包; susceptibility, (病気に) かかりやすいこと

問1 英文の [1] ~ [5] に入れるのに最も適当なものを、下の①~⑦から選べ。

- ① against ② allowed ③ existed ④ for ⑤ making
⑥ searched ⑦ underlying

問2 英文の [6] ~ [10] に入れるのに最も適当なものを、下の①~⑦から選べ。

- ① expected ② know ③ led ④ signals ⑤ stops
⑥ target ⑦ unique

第2問 次に与えられた語について、1~3 ([11] ~ [13]) は下線部の発音が同じものを、4~6 ([14] ~ [16]) は第1アクセント(第1強勢)の位置が同じものを、それぞれ下の①~④から1つずつ選べ。

1. conceive [11]
① prestige ② dangerous ③ height ④ weight

2. profile [12]
① owl ② shoulder ③ sponge ④ tomb

3. devise [13]
① consequence ② consume ③ dissolve ④ wrestle

4. precise [14]
① balance ② advice ③ image ④ refuge

5. accurate [15]
① algorithm ② interrupt
③ questionnaire ④ resilient

6. apparatus [16]
① anonymous ② concatenate
③ electronic ④ sustainable

第3問 次の1~5の文の [17] ~ [21] に入れるのに最も適当なものを、それぞれ下の①~④から1つずつ選べ。

1. Jane spends [17] little free time she has reading books.
① as ② so ③ how ④ what

2. The health ministry lifted a ban on the manufacturing and sales of liquid baby formula [18] response to an increasing demand.
① at ② in ③ for ④ to

3. The purpose of sweating is [19] the body of toxins but to cool it down through evaporation.
① not to eliminate ② to eliminate
③ not to rid ④ to rid

4. After [20] I reported it to the police immediately.
① having stolen my bike ② I had my stolen bike
③ my bike had stolen ④ having my bike stolen

5. David loves the outdoors. I can't imagine [21] in an office.
① he worked ② him working
③ for him to work ④ when he works

第4問 次の対話文の [22] ~ [24] に入れるのに最も適当なものを、それぞれ下の①~⑨から1つずつ選べ。

Simon: So, it's been a week since the upgrade to the system. [22]
 Alison: I think so. Most have got the hang of it, but they're still feeling a bit snowed under.
 Simon: You mean it's too much for them to handle?
 Alison: No, I don't think so. But it takes time to adapt to change, and it's only been a week, so you just need to be patient until everyone gets used to the new way of doing things.
 Simon: I know what you mean, but all our rivals have already upgraded, and we're playing catch-up. We'll get left behind if we're not careful.
 Alison: I know. [23] They're making some mistakes as a result, but I'm sure things will settle down soon.
 Simon: That's understandable. [24] But time is of the essence, so I need everyone to double down on their efforts.

- ① I expected there'd be a few bumps in the road.
- ② You can't teach an old dog new tricks, though.
- ③ Is this the icing on the cake?
- ④ There's no such thing as a free lunch.
- ⑤ Is everyone getting to grips with it okay?
- ⑥ But some of the staff are struggling to take it all in.
- ⑦ Is this the calm before the storm?
- ⑧ You can't judge a book by its cover.
- ⑨ We'll cross that bridge when we come to it.

問3 [27]

A baby's body has about 300 bones at birth. These eventually fuse to form the 206 bones that adults have. ①There are different types of bones in the spine and each does a different kind of job. ②Some of a baby's bones are made entirely of a special material called cartilage, which is soft and flexible. ③Other bones in a baby are partly made of cartilage. ④During childhood, as you are growing, the cartilage grows and is slowly replaced by bone, with help from calcium. By the time you are about 25, this process will be complete.

(出典 Your Bones. KidsHealth.org. (c) 1995-2020. The Nemours Foundation/ KidsHealth (R). Reprinted with permission.) (一部改変)

問4 [28]

We all have an image of Nightingale as a nurse. But she was also a data journalist. ①After the disasters of the Crimean War, Florence Nightingale returned to become a passionate campaigner for improvements in the health of the British army. ②She developed the visual presentation of information, including the pie chart, first developed by William Playfair in 1801. ③Nightingale also used statistical graphics in reports to Parliament, realising this was the most effective way of bringing data to life. ④Graphics are terribly trendy at the moment, and it's good to know that it's an entirely new invention.

(出典 Florence Nightingale, datajournalist: information has always been beautiful by Simon Rogers. The Guardian. August 13, 2010. (c) Guardian News & Media Ltd 2020) (一部改変)

第5問 次の問い (問1~4) のパラグラフ (段落) には、まとまりをよくするために取り除いた方がよい文が一つある。取り除く文として最も適当なものを、それぞれ下線部①~④のうちから1つ選べ。

問1 [25]

Dogs' impeccable sense of smell is well known, making them ideal for locating bombs and drugs. ①However, they are also able to smell cancer, low blood sugar, and even depression. ②In addition, dogs are sometimes employed to alert their owners to upcoming epileptic seizures, though researchers are uncertain if seizure dogs are responding to smells or subtle behavioral changes. ③Not only do dogs possess a natural ability to guide, they have a calm nature and are not easily distracted. ④Regardless of how they are able to do it, dogs prove that they really are man's best friend.

(出典 Working Like a Dog : 7 Animals with Jobs by Amy Tikkanen. Reprinted with permission from Encyclopædia Britannica, (C) 2015 by Encyclopædia Britannica, Inc.) (一部改変)

問2 [26]

When you visit a website that has adverts, the ads that you see will probably be different to the ones someone else sees. ①The line between humans and machines is already unclear on the Internet. ②That's because the ads have been selected especially for you. ③As soon as you load a webpage, the page lets the internet's ad-brokers know who is visiting and a high-speed bidding war kicks off. ④It typically involves around 100 advertisers, with the winners getting to show you their ads. The whole process is over in 100 milliseconds, faster than the blink of an eye.

(出典 The world's most prolific writer is a Chinese algorithm by Douglas Heaven. BBC Future. August 30, 2018. (c) BBC Future) (一部改変)

第6問 次の1~3の文において、それぞれ下の①~⑦の語句を並べ替えて空所を補い、最も適当な英文を完成させよ。解答は [29] ~ [37] に入れるものの番号のみを答えよ。文頭に来る語も小文字で始まっている。

1. After seeing a school counselor, _____ [29] _____ [30] _____ [31] _____ counseling.

- ① a ② for ③ clinical psychologist
- ④ referred ⑤ the student ⑥ to ⑦ was

2. Some institutions consider _____ [32] _____ [33] _____ [34] _____ significant that they now include modules on literature.

- ① be ② effects ③ reading fiction ④ of
- ⑤ the ⑥ so ⑦ to

3. _____ [35] _____ [36] _____ [37] _____ to reconcile work and family life.

- ① child care ② it ③ lack ④ hard
- ⑤ of ⑥ facilities ⑦ makes

第7問 次の英文を読み、下の問い(問1・問2)に答えよ。

We are too quick to assume that meaningless patterns are meaningful when they are presented as evidence of the consequences of a government policy, the power of a marketing plan, the success of an investment strategy, or the benefits of a food supplement. Our vulnerability comes from a deep desire to make sense of the world, and it's notoriously hard to shake off.

Even highly educated and presumably dispassionate scientists are susceptible to being seduced by patterns. In the cutthroat world of academic research, brilliant and competitive scientists perpetually seek fame and funding to sustain their careers. This necessary support, in turn, depends on the publication of interesting results in peer-reviewed journals. "Publish or perish" is a brutal fact of university life.

Sometimes, the pressure is so intense that researchers will even lie and cheat to advance their careers. Needing publishable results to survive, frustrated that their results are not turning out the way they want, and fearful that others will publish similar results first, researchers sometimes take the shortcut of manufacturing data. After all, if you are certain that your theory is true, what harm is there in making up data to prove it?

One serious example of this kind of deception is the vaccine scare created by the British doctor Andrew Wakefield. His 1998 coauthored paper in the prestigious British medical journal *The Lancet* claimed that twelve normal children had become autistic after being given the measles, mumps, and rubella (MMR) vaccine. Even before the paper was published, Wakefield held a press conference announcing his findings and calling for the suspension of the MMR vaccine.

Many parents saw the news reports and thought twice about what was previously a de rigueur procedure. The possibility of making their children autistic seemed the minute chances of contracting diseases that had

diagnosed as such, and three had no autism at all. Wakefield reported that the twelve children were "previously normal" before the MMR vaccine, but five of them had documented developmental problems.

Most of Wakefield's coauthors quickly disassociated themselves from the paper. *The Lancet* retracted the article in 2010, with an editorial comment: "It was utterly clear, without any ambiguity at all, that the statements in the paper were utterly false." *The British Medical Journal* called the Wakefield study "an elaborate fraud," and the UK General Medical Council barred Wakefield from practicing medicine in the UK. Unfortunately, the damage was done. Hundreds of unvaccinated children have died from measles, mumps, and rubella to date, and thousands more are at risk. In 2011, Deer received a British Press Award, commending his investigation of Wakefield as a "tremendous righting of a wrong." We can only hope that the debunking of Wakefield will receive as much press coverage as his false alarms, and that parents will once again allow their children to be vaccinated.

(出典 From STANDARD DEVIATIONS by Gary Smith. Text copyright (c) 2014 Gary Smith. Used by permission of Harry N. Abrams, Inc., New York. All rights reserved.) (一部改変)

(注) vulnerability, 弱さ、もろさ: susceptible, 影響を受けやすい;
seduce, 引きつける: autistic, 自閉症の;
MMR vaccine, はしか、おたふく風邪、風しん混合ワクチン;
de rigueur, 必要な: eradicate, 根絶する: contagious, 伝染性の;
immunization, 予防接種: replicate, 再現する: lucrative, 利益になる;
pharmaceutical company, 製薬会社: taint, 汚す;
damning, (証拠などが) 有罪を示唆する;
developmental, 発育上の、発達上の: retract, 撤回する;
debunk, 虚偽をあばく

been virtually eradicated from Britain. More than a million parents refused to allow their children to be given the MMR vaccine.

I live in the United States, but my wife and I read the news stories and we worried, too. We had sons born in 1998, 2000, and 2003, and a daughter born in 2006, so we had to make a decision about their vaccinations. We did our homework and talked to doctors, all of whom were skeptical of Wakefield's study. They pointed out that there is no evidence that autism has become more commonplace, only that the definition of autism has broadened in recent years and that doctors and parents have become more aware of its symptoms. On the other hand, measles, mumps, and rubella are highly contagious diseases that had been effectively eliminated in many countries precisely because of routine immunization programs. Leaving our children unvaccinated would not only put them but other children at risk as well. In addition, the fact that this study was so small (only twelve children) and the author seemed so eager for publicity were big red flags. In the end, we decided to give our children the MMR vaccine.

The doctors we talked to weren't the only skeptics. Several attempts to replicate Wakefield's findings found no relationship at all between autism and the MMR vaccine. Even worse, a 2004 investigation by a London *Sunday Times* reporter named Brian Deer uncovered some suspicious irregularities in the study. It seemed that Wakefield's research had been funded by a group of lawyers envisioning lucrative personal-injury lawsuits against doctors and pharmaceutical companies. Even more alarmingly, Wakefield himself was evidently planning to market an alternative vaccine that he could claim as safe. Were Wakefield's conclusions tainted by these conflicts of interest?

Wakefield claimed no wrongdoing, but Deer kept digging. What he found was even more damning: the data in Wakefield's paper did not match the official National Health Service medical records. Of the nine children who Wakefield reported to have regressive autism, only one had actually been

問1 本文の内容に合うように、次の1～5の文の ～ に入れるのに最も適当なものを、それぞれ下の①～④から1つずつ選べ。

1. The author asserts that .
 - ① we are likely to ignore meaningful patterns when we are presented with meaningless patterns
 - ② evidence presented by the authorities is so hard to interpret that we easily accept it
 - ③ scientists are less likely to assume that meaningless patterns are meaningful than the general public
 - ④ we tend to assume that there is a cause-effect relationship when we see patterns presented as evidence
2. According to the doctors to whom the author of this passage talked, .
 - ① Wakefield's study has drawn more doctors' attention to autism than before
 - ② there is no evidence that the definition of autism has changed in recent years
 - ③ doctors and parents should watch out for the symptoms of autism
 - ④ it is advisable that parents allow their children to be given the MMR vaccine
3. A 2004 investigation by Brian Deer suggests that .
 - ① Wakefield was to be sued by pharmaceutical companies
 - ② Wakefield had a hidden motive to make up data
 - ③ Wakefield was going to research the safety of the vaccine
 - ④ Wakefield had conflicts with doctors and pharmaceutical companies

4. Further investigation by Brian Deer found that .
- ① eight children were falsely reported to have regressive autism in Wakefield's paper
 - ② only one child actually had autism as opposed to the twelve Wakefield claimed in his paper
 - ③ three of the twelve children in Wakefield's paper had no official medical records
 - ④ five children, instead of twelve, became autistic after receiving the MMR vaccine
5. Thanks to Brian Deer's investigation, .
- ① Wakefield and his coauthors withdrew the paper from *The Lancet*
 - ② *The British Medical Journal* turned down Wakefield's paper
 - ③ Wakefield could not work as a medical doctor in the UK any longer
 - ④ Wakefield received a prestigious award for his work

問2 次の1～5の文について、～の答えとして最も適当なものを、それぞれ下の①～④から1つずつ選べ。

1. Which is closest in meaning to the underlined part "researchers sometimes take the shortcut of manufacturing data"? .
- ① researchers sometimes invent data to save time and effort
 - ② researchers sometimes go to the trouble of collecting data
 - ③ researchers sometimes speed up the process of producing data
 - ④ researchers sometimes use very little data for quick analysis

2. What caused "the vaccine scare created by the British doctor Andrew Wakefield"? .
- ① Wakefield prevented autistic children from getting the MMR vaccine.
 - ② Wakefield warned that the MMR vaccine was becoming scarce.
 - ③ Wakefield connected autism to the MMR vaccine.
 - ④ Wakefield found some of the MMR vaccine was contaminated.

3. Which best fits the blank ? .
- ① as reassuring as
 - ② more reassuring than
 - ③ less worrisome than
 - ④ more worrisome than

4. What did the doctors to whom the author of this passage talked find problematic about Wakefield? .
- ① He examined only small children and had his paper published in a British medical journal.
 - ② He cited only 12 cases and it looked like he was seeking public attention.
 - ③ Twelve normal children became autistic because he experimented with the MMR vaccine on them.
 - ④ He made sure that people would not notice that his study was too small.

Windom

5. Which best summarizes the passage? .
- ① Scientists are pressured to publish interesting results, which leads them to lie and cheat.
 - ② Investigating scientific medical fraud is so complicated that it took twelve years to reveal it.
 - ③ A doctor deceived people with false data, which inflicted serious damage to society.
 - ④ Parents in the UK were more susceptible to false alarms than those in the US, which cost hundreds of lives.