

前期日程

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4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、4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. 下書用紙には、下書き用のマス目を書いてありますので、活用してください。
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実施年月日
27. 2. 25
富山大学

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次の文章を読み、問いに答えなさい。

Jim Allison, the director of the tumor-immunology program at **Memorial Sloan-Kettering\***, began his career as a researcher at the University of Texas Cancer Center in 1978. At the time, he was taken with the idea that the T-cell could be directed against cancers. T-cells, a potent type of white blood cell, destroy cells infected with **microbes\*** that they recognize as foreign. The immune system uses a variety of white blood cells to fight disease. Some, like **neutrophils\*** and **macrophages\***, engulf and chew up microbes. In contrast, T-cells attack the microbe from the outside, with enzymes. Cancers disarm the immune system, producing proteins that cause T-cells to either quickly become exhausted and die or carelessly overlook the tumor. Allison's research focused on why T-cells failed either to recognize cancer as being abnormal or to attack it, as they do with microbes.

Allison's mentors discouraged him from pursuing research on T-cells. "Tumor immunology had such a bad reputation," he told me when we met in December at his laboratory at Sloan-Kettering, which overlooks the East River. Allison, who is sixty-three years old, is a heavy-set man with a short beard and a gravel voice. "Many people thought that the immune system didn't play any role in cancer." Treatments like **interferon and interleukin-2\*** had led scientists on a roller coaster of hype followed by disappointment. Immune therapy was also ruined by popular claims that following a certain diet or reordering your mind could be natural immune-boosting ways to cause tumors to disappear, with none of the miserable side effects of chemotherapy and radiation.

But Allison started looking at how the immune system fights disease, using mice as study models, and capitalized on a critical discovery: T-cells require two signals to attack a target effectively. The first signal, he said, was "like the ignition switch," and the second "like the gas pedal." When working against a microbe, both signals were operative. But in the presence of cancer, "T-cells don't get those signals to attack," he explained. Allison started to wonder what it would take to reliably activate the immune system against cancer.

In 1987, researchers in France discovered a protein called cytotoxic T-lymphocyte antigen-4, or **CTLA-4\***, which projected from the T-cell's surface. "There was a real race among a number of labs to figure out its function," Allison recalled. A scientist at **Bristol-Myers Squibb\***, using results from his lab, claimed that CTLA-4 increased the activity of T-cells and the immune system. But Allison and Jeffrey Bluestone, an immunologist, obtained results from independent experiments that contradicted that conclusion. Allison and Bluestone believed that CTLA-4 actually acted as a brake on the T-cells, and Allison thought that it

(C) [immune / from / system / might / attacking / the / tumors / keeping / be]. "Jeff and I

were kind of in the wilderness for a while,” Allison said. “Before this, people just thought that T-cells died on their own.” He speculated that treatments designed to activate the immune system might have failed because the treatments were actually stimulating CTLA-4. As Allison put it, “We ought to free the immune system, so it can attack tumor cells.”

Allison’s researchers implanted cancer cells under the skin of mice, some of which were then treated with an **antibody**\* that blocked CTLA-4. After several weeks, the cancers disappeared. One of the researchers showed Allison the data in early December 1995. Allison was astounded. The lab was about to go on Christmas break, but he wanted to repeat the experiment immediately. “I told the researcher that he should inject the tumors into a new group of mice, and have a control group that didn’t get the antibody. And I’d measure the tumors myself,” Allison recalled. “So it was really a blinded experiment, because I didn’t know what was what.” A week later, Allison measured the cancers. “The tumors were still growing, and I’m starting to despair. And then, in half of the mice, the tumors just seemed to stop, but in the other half of the group they kept going. And then in the ones in which it stopped, the cancer started disappearing and just went away.” Allison added, “It immediately confirmed our original assumption that this could be good for any kind of cancer.”

For two years, as Allison continued his experiments on mice, he approached pharmaceutical and biotech companies for help in developing the treatment for patients, but he was repeatedly turned away: “People were skeptical of immunology and immune therapy. They would say, ‘Oh, anybody can treat cancer in mice.’ Sometimes they’d say, ‘You think you can treat cancer by just removing this negative signal on a T-cell?’”

Allison also learned that Bristol-Myers Squibb had filed for a patent asserting that CTLA-4 stimulated T-cell growth. “If that was the case, you would never, ever think about injecting something (G) into a cancer patient, because it would (H),” he said. “People were scared of putting that into a patient.” But Allison persisted, telling industry executives that Bristol-Myers Squibb was wrong. Finally, he persuaded a small company called **Medarex**\* to invest in the approach.

(Jerome Groopman, 2012. *The New Yorker*, slightly modified)

\*注：Memorial Sloan-Kettering メモリアルスローンケタリング癌センター(ニューヨークの  
癌治療機関)

microbe 微生物

neutrophil 好中球(白血球の1種)

macrophage マクロファージ(白血球の1種)

interferon and interleukin-2 インターフェロンとインターロイキン2(いずれも抗腫瘍  
作用に関するリンパ球分泌蛋白質)

CTLA-4 T細胞表面蛋白質の一種

Bristol-Myers Squibb ブリストル・マイヤーズ スクイブ(製薬企業名)

antibody 抗体

Medarex メダレックス(製薬企業名)

(1) 下線部(A)のような状態を引き起こす理由について、最も適切なものを一つ選び、記号を解答欄に書きなさい。

- (a) T細胞が外来異物を攻撃する機能は、他の白血球の機能と異なるから。
- (b) T細胞は細菌を飲み込むことができないから。
- (c) T細胞は本来外来異物を識別する能力を持っていないから。
- (d) T細胞が外来異物を識別する機能が発揮されないから。
- (e) T細胞の機能低下を蛋白質の補充によって回復することができるから。

(2) 下線部(B)といわれるような状況が当時存在した背景を3つ箇条書きにして日本語で説明しなさい。

(3) 下線部(C)の語を並べ替えて本文の内容に合う文を完成させなさい。

(4) 次の英文は下線部(D)の内容をまとめたものです。この文の内容が本文に合うように、空欄を指定の語数の英語で埋めなさい。

Although a scientist at Bristol-Myers Squibb claimed that CTLA-4 (a) 1語 T-cell growth, Allison and Bluestone's findings suggested that CTLA-4 (b) 1語 their activities. Thus, Allison thought that the immune system should (c) 2語 from such interference by using (d) 2語 against CTLA-4.

(5) 次の日本語は下線部 (E) の実験に至った経緯とその結果の全容をまとめたものです。本文の内容に合うように、空欄を指定の語数の日本語で埋めなさい。

- ① アリソン (Allison) の研究室の研究者が、マウスの皮下に癌細胞を移植し、そのうちの何匹かに (a)15 字前後。するとそのマウスの癌細胞が消えていた。
- ② アリソンは驚き、すぐにもう一度実験するように指示をした。その実験とは (b)15 字以上 20 字以内 状況で、(c)35 字以上 40 字以内 比較する実験だった。
- ③ 1 週間後アリソン自らが確認した時、癌細胞はまだ成長していた。ところが、(d)30 字以上 40 字以内。さらに、(e)15 字以上 20 字以内。

(6) 下線部 (F) の this が示す内容を日本語で説明しなさい。

(7) 空欄 (G), (H) に入る最も適切な英語を以下の (a)~(e) の選択肢から 1 つ選び、記号を解答欄に書きなさい。

- |                                  |                                |
|----------------------------------|--------------------------------|
| (G) (a) that activated CTLA-4    | (H) (a) acquire immunity       |
| (b) that CTLA-4 coordinated with | (b) impair internal conditions |
| (c) that blocked CTLA-4          | (c) protect the patent itself  |
| (d) that ignored CTLA-4          | (d) make things worse          |
| (e) that CTLA-4 destroyed        | (e) confuse the situation      |

(8) 本文の記述と合っているものを、以下の (a)~(e) の選択肢から全て選び、記号を解答欄に書きなさい。

- (a) Allison's study is based on the idea that T-cells can be rearmed against cancer by using microbes that make our immune system more active.
- (b) While some white blood cells engulf foreign microbes, T-cells attack them from the outside with enzymes.
- (c) Allison found that when T-cells work against cancer cells, T-cells receive specific signals that make T-cells unable to tell cancerous cells from microbes.
- (d) Allison believed that CTLA-4 prevented T-cells from becoming active, resulting in the failure to receive important signals to attack tumors.
- (e) Pharmaceutical companies were skeptical about Allison's suggestion because a reliable leading pharmaceutical company had already sold a medicine with effects contrary to Allison's results.

2 次の文章はある父親(Calvin)と精神科医(Psychiatrist)の会話です。これを読み、次頁の問いに答えなさい。

Calvin, who is a **tax attorney**\*, lost his first born son, Buck, in a sailing accident about one year ago. After the accident, Calvin, his wife, Beth, and their youngest son, Conrad, realized that there was something wrong with their family relationship, and they weren't getting along as well as they used to. Conrad has been seeing a psychiatrist for a couple of months. Now, Calvin is visiting Conrad's psychiatrist.

Calvin: I wanna be clear.

Psychiatrist: That's good.

Calvin: In the car, I was thinking, "Be clear." Well, I suppose that's what psychiatry is about, being precise and clear. And honest, of course. I'll level with you. I'm not a great believer in psychiatry.

Psychiatrist: OK.

Calvin: I know what happens here is between you and him. I like that. I respect that, and he's better, I can see that. I'm not putting you down. I just don't believe in psychiatry as a **panacea**\*.

Psychiatrist: (A)

Calvin: I wish I knew what the hell I was doing here.

Psychiatrist: You said you thought you could shed some light on some things. What did you mean by that?

Calvin: I think I meant in terms of Conrad. You see, I knew something was wrong even before he tried to kill himself, but I thought that. . . . [pause]

(B) He's always been an "A" student, and naturally I thought that intelligent people could work out their own problems.

Psychiatrist: But you still feel responsible.

Calvin: Yeah, sure I do. It's hard not to. It was just luck that I happened to be there when he tried it. I could have been at a meeting. We both could have been away. It was luck.

Psychiatrist: So you think of yourself as a lucky man.

Calvin: No. No. I used to. I used to think that I was a lucky person before . . . the accident. (C) What happens to you, what you do with it.

Psychiatrist: That sounds more like the philosophy of a drifter than a tax attorney.

Calvin: Maybe I am drifting a little. I can see myself and I can see the two of them <sup>(D)</sup> drifting away from me, and I just stand there watching.

Psychiatrist: What do you want to do about that?

Calvin: Something. I've got to do something about it. I feel like I'm sitting on a fence and I don't like it.

Psychiatrist: And you see them as on opposite sides of this fence?

Calvin: Yeah. No. I don't know. (E)

Psychiatrist: For what?

Calvin: I don't know exactly. Being too much like her. People always think that she and Buck are... were alike. But it's really she and Conrad. They were the only two that didn't cry at the funeral, you know?

It's not easy for me to admit this, but she didn't... [pause] His mother doesn't show him a great deal of affection. I'm not trying to put her down in any way at all. She is a wonderful woman.

Psychiatrist: (F)

Calvin: Oh, God, yes! She loved Buck. Buck got so much... I think what she felt for him was special. He was her first-born. That's not unusual, is it?

Psychiatrist: And you?

Calvin: Me, I loved Buck.

Psychiatrist: What I mean is, your wife's affection.

Calvin: (G)

Psychiatrist: Yes.

Calvin: Well, she's very... No, there's no problem with her for me. We've been married nearly 21 years. Everybody loves Beth. But for Conrad it's been difficult. He didn't talk about that? We don't know what happens here. <sup>(H)</sup> It doesn't come up... [pause] I guess that's what it is. It's private here, isn't it?

Psychiatrist: Very private.

Calvin: (I) I think I came here to talk about myself.

Psychiatrist: OK. Why don't we?

(Ronald L. Schwary (Producer), & Robert Redford (Director), *Ordinary People* (1980), USA: Paramount)

\*注：tax attorney 税理士 panacea 万能薬

(1) 空欄 (A), (B), (C), (E), (F), (G), (I) に当てはまる最も適切な文を以下の (a)~(i) の選択肢から一つずつ選び、記号を解答欄に書きなさい。各項目 1 回のみ使用しなさい。

- (a) It's clear that he's very smart.                      (b) I think I know why I came here.  
(c) Did she give much affection to Buck?              (d) Was she distant toward Buck, too?  
(e) I guess life's nothing but an accident.              (f) For me, you mean?  
(g) I see her not being able to forgive him.              (h) Do you mean her affection for Conrad?  
(i) Neither do I.

(2) 会話の内容に基づいて、次の質問に指定された語数の英語で答えなさい。ただし、カンマ(,)やピリオド(.)などは語数には含めません。

- (a) When Calvin says the underlined part (D), what does he mean? Describe it within 15 words.  
  
(b) According to Calvin, what was the relationship between Conrad and his mother like? Describe it within 20 words.  
  
(c) In the underlined part (H), what does Calvin mean? Describe it within 25 words. Specify who is "we" and what "what happens here" means.



**3** は、次のページから始まります。

- 3 次の文章の下線部の個所を英語に訳しなさい。尚、注には本文中の日本語の語彙が英語で示してあります。

メディアは、ハリウッド製のセンセーショナルなサイエンスストーリーや「世界の終り」で満ち溢れている。このため、広範な人々を説得しようとしても難しいかもしれないが、2008年の経済危機がそうだったように、予測できないリアルな破滅がやってきて、しかもそれが、はるかに甚大な影響をもたらすことは、ありうることなのだ。社会は、既存の、もしくはこれからの数十年に現れる技術の誤使用により、壊滅的な打撃を受ける可能性がある。すでに予想されているシナリオのうちのいくつかは、正にサイエンスフィクションであるかもしれないが、他のものは不安になるほど現実的なものと言ってよい。私は、これらの「存続の危機」はより真剣な研究に値すると考えている。先進国に暮らす幸運に恵まれた人々は、めったに起こらないような航空機事故や食物中に存在する発がん物質\*、低レベルの放射線など、日常生活にひそむ日々の危険について極端に気を使っている。しかし、わたしたちは、まだ起こってはいないが、もしいったん起こったならば世界の荒廃を引き起こしかねないような出来事に、もっと関心をいさぐべきなのだ。

(マルティン・リース「大災害リスクの否定」、『サイエンス』2013年3月8日339号より抄訳)

\*注：発がん物質 carcinogens