平成 23 年度

医学部医学科選抜・学士入学試験問題

(英　語)

注意事項

1. この科目の問題用紙は 12 ページ，解答用紙はマークカード 1 枚である。
2. 解答用紙(マークカード)に，氏名・フリガナ・受験番号の記入および受験番号のマークを忘れないこと。
3. マークは HB の鉛筆で，はっきりとマークすること。
4. マークを消す場合，消しゴムで完全に消し，消しくずを残さないこと。
5. 解答用紙(マークカード)は折り曲げたり，メモやチェックなどで汚したりしないように注意すること。
6. 各問題の選択肢のうち質問に適した答えを<u>1つだけ</u>選びマークすること。1 問に 2 つ以上解答した場合は誤りとする。
7. 問題用紙は解答用紙(マークカード)とともに机上に置いて退出すること。持ち帰ってはいけない。

Ⅰ 次の英文を読み，下記の設問に答えなさい。

[1] In 1997, French researchers (1) a bold experiment. They collected nacre,[1] a substance better known as mother-of-pearl, from the inside surface of the shell of the mollusk[2] *Pinctada maxima*[3] and ground it into a fine powder. Then they mixed the powder with the blood of each of eight women suffering from loss of bone in their upper jaws and injected the material (2) bone loss. Six months later, the jaw holes had filled, and the women's immune systems had not rejected the molluskan grafts.[4] But the new jaw material wasn't nacre — it was human bone. Somehow, the nacre had (3) osteoblasts[5] to secrete new bone material around the particles of molluskan material, which were slowly dissolving. Osteoclasts,[6] the cells that break down and remodel bone tissue, shaped the new bone so that it did not deform the jaw, but they did not eat away at the nacre.

[2] The researchers got the idea for this experiment from Mayan[7] skulls discovered in 1931. The skulls had teeth that were composed of nacre, yet X-ray images revealed that the roots were growing into the jawbone (4) they were normal human teeth. What did long-ago Mayan dentists know that we don't?

[3] (5), the researchers first placed chips of nacre on a layer of human osteoblasts growing in culture.[8] The bone cells divided and attached to the nacre chips, and new bone material collected at the interfaces.[9] Next, the researchers placed nacre chips and bone chips about one millimeter apart on the osteoblast layer. After a few weeks, the chips grew together, yet maintained their distinctive characteristics — the bone looked confluent,[10] but the nacre retained the bricks-and-mortar configuration[11] that it has when lining a mollusk's shell. Bone chips alone or nacre chips alone didn't grow. Clearly, the nacre and bone were interacting, (6) their origin in very different animals.

[4] A possible explanation for why and how a human accepts material from a mollusk goes back to the time just before the Cambrian[12] explosion, when the mysterious soft-bodied Ediacaran[13] animals swam in the seas. Recall that a major difference between the doomed[14] Ediacarans and the ancestors of modern animals that flourished in the Cambrian was the advent of hard parts — skeletons.[15] The undersea rain of phosphates[16] responsible (7) some of the earliest known animal fossils attests that the environment was rich in minerals that organisms could tap, if they had the molecular[17] tools to do so.

[5] For organisms to develop skeletons — either those worn on the outside or inside — required control over the deposition[18] of minerals (8) in the aquatic environment in supersaturated[19] solutions. Researchers hypothesize that animals that preceded those with hard parts had enzymes[20] that prevented minerals from forming on them, a natural tendency that would have encrusted them out of existence. Skeletons arose when molecules evolved that could turn off that control, but in a regulated manner, so that minerals could combine with organic materials, a process called biomineralization.[21]

[6] What does this scenario have to do with human jaws that accept mother-of-pearl replacement parts? Researchers were at first stymied,[22] because nacre is pure calcium carbonate,[23] (9) bone mineral is predominantly calcium phosphate.[24] The two hard materials are not the same, so they could not have been inherited from a recent shared ancestor. An alternate explanation is that *Pinctada maxima* and humans share the molecular signaling pathways[25] that enable them to incorporate[26] minerals from the environment.

[7] A larger lesson in the tale of nacre and human bone is that we never know when different aspects of the science of life will interact. This story (10) signal transduction,[27] the evolution of animals, and the skeletal system.

(Adapted from R. Lewis et al., *Life*, fifth edition, McGraw-Hill, 2004, pp. 673-674)

Notes:

1 nacre 「真珠層」　2 mollusk 「軟体動物」(形容詞 molluskan)
3 *Pinctada maxima* 「白蝶貝」　4 graft 「移植片」　5 osteoblast 「造骨細胞」
6 osteoclast 「破骨細胞」　7 Mayan 「マヤ族(中米の先住民族)の」
8 culture 「培養」　9 interface 「接合部分」　10 confluent 「融合性の」
11 bricks-and-mortar configuration 「レンガ造りのような形態」
12 Cambrian 「カンブリア紀(の)」
13 Ediacaran 「エディアカラ紀(の)」(Ediacarans 「エディアカラ紀の生物」)
14 doomed 「破滅する運命にある」　15 skeleton 「骨格」　16 phosphate 「リン酸塩」
17 molecular 「分子的」(名詞 molecule)　18 deposition 「沈着」
19 supersaturated 「過飽和状態の」　20 enzyme 「酵素」
21 biomineralization 「生体鉱物化作用」　22 stymied 「行き詰った」
23 calcium carbonate 「炭酸カルシウム」　24 calcium phosphate 「リン酸カルシウム」
25 signaling pathway 「シグナル伝達経路」　26 incorporate 「組み入れる」
27 signal transduction 「シグナル伝達」

問 1　本文中の(1)～(10)の空欄に入る最も適切なものを，それぞれ①～⑤の中から一つずつ選びなさい。

(1)　① roared　② exerted　③ penetrated
④ attempted　⑤ conformed

(2)　① at the cost of　② by virtue of　③ at the sites of
④ in spite of　⑤ by way of

(3)　① hindered　② startled　③ prescribed
④ acknowledged　⑤ stimulated

(4)　① until　② in case　③ as if　④ unless　⑤ although

(5)　① To find out　② Out of the question　③ In all respects
④ As regards　⑤ At will

(6)　① in charge of　② but for　③ on behalf of
④ besides　⑤ despite

(7)　① in　② on　③ at　④ for　⑤ to

(8)　① barren　② present　③ earnest　④ flexible　⑤ spontaneous

(9)　① what　② whatever　③ how　④ which　⑤ whereas

(10)　① offends　② fascinates　③ unites　④ restricts　⑤ distorts

問 2 下記の(11)～(14)の各問の答えとして最も適切なものを，それぞれ①～④の中から一つずつ選びなさい。

(11) Which of the following is NOT consistent with the content of the paragraphs [1] and [2]?

① Nacre from the mollusk *Pinctada maxima* was successfully used as a material for oral surgery conducted in 1997.

② The defective areas in jaw bones of eight patients were reconstructed using powdered nacre from *Pinctada maxima*.

③ Mayans used nacre to make false teeth.

④ The 1997 French researchers' experiment with nacre was unproductive.

(12) Which of the following is NOT consistent with the content of the paragraphs [1], [2], and [3]?

① Nacre from the *Pinctada maxima* initiated bone formation by human osteoblasts.

② When implanted in a living human system, nacre started causing negative immune responses.

③ The Mayan people realized that nacre was medically useful.

④ An experiment was conducted using ground mother-of-pearl from *Pinctada maxima*, mixed with the blood of patients who had bone loss in the upper jaws.

(13) Concerning the paragraphs [4] and [5], which of the following does NOT match the content?

① The discovery of the cell biology underlying biomineralization reveals little about how our skeletal system evolved.

② The difference between animals of the Ediacaran period and those of the Cambrian is that the former did not have skeletons.

③ Findings of research on prehistoric animals can help us understand why humans can take in molluskan material.

④ Evolution of molecules which regulated incorporation of minerals by sea animals played an important role in the formation of skeletons.

(14) Which of the following is NOT consistent with the content of the paragraphs [6] and [7]?

① As to the types of minerals, similarities between nacre and human bone were found to be astonishing.

② Findings from the study of evolution, formation of bone system and molecular biology, all combined together, can explain the underlying biological mechanisms of bone formation triggered by nacre placed in human jaws.

③ Some scientists hypothesize that there are molecular signaling pathways which are common in *Pinctada maxima* and humans.

④ Surveying the way molecules of animal cells send signals can be helpful in explaining why human jaws accepted nacre implants.

Ⅱ 下記は，Obama 米国大統領の 2009 年 4 月 5 日に行われた演説からの抜粋です。 15 ～ 21 の各空欄に入る最も適切なものを，それぞれ①～⑦の中から一つずつ選びなさい。ただし，文頭にくる語もすべて小文字の書き出しになっています。

The existence of thousands of nuclear weapons is the most dangerous legacy of the Cold War. No nuclear war was fought between the United States and the Soviet Union, but generations lived with the knowledge that 15 .

Today, the Cold War has disappeared, but thousands of those weapons have not. In a strange turn of history, the threat of global nuclear war has gone down, but the risk of nuclear attack has gone up. More nations have acquired these weapons. Testing has continued. 16 . The technology to build a bomb has spread. Terrorists are determined to buy, build, or steal one.

Some argue that the spread of these weapons cannot be stopped, cannot be checked, and that we are destined to live in a world where more people possess the ultimate tools of destruction. 17 . For, if we believe that the spread of nuclear weapons is inevitable, then, in some way, we are admitting to ourselves that the use of nuclear weapons is inevitable.

And just as we stood for freedom in the 20th century, we must stand together for the right of people everywhere to live free from fear in the 21st century. And as the only nuclear power to have used a nuclear weapon, 18 . We cannot succeed in this endeavor alone, but we can lead it; we can start it.

So, today, I state clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons. I'm not naive. This goal will not be reached quickly, perhaps not in my lifetime. 19 . But now we, too, must ignore the voices who tell us that the world cannot change. We have to insist, "Yes, we can."

Now, let me describe to you the trajectory[1] we need to be on. First, the United States will take concrete steps towards a world without nuclear weapons. To put an end to Cold War thinking, we will reduce the role of nuclear weapons in our national security strategy and urge others to do the same. To achieve a global ban on nuclear testing, my administration will immediately and aggressively pursue U.S. ratification[2] of the Comprehensive Test Ban Treaty.[3] After more than five decades of talks, 20 . That's the first step.

Second, together we will strengthen the Nuclear Non-Proliferation Treaty[4] as a basis for cooperation. 21 : Countries with nuclear weapons will move towards disarmament,[5] countries without nuclear weapons will not acquire them, and all countries can access peaceful nuclear energy. To strengthen the treaty, we should embrace several principles. We need more resources and authority to strengthen international inspections. We need real and immediate consequences for countries caught breaking the rules or trying to leave the treaty without cause.

Notes:

1 trajectory 「道筋」　　2 ratification 「批准」

3 the Comprehensive Test Ban Treaty 「包括的核実験禁止条約」

4 the Nuclear Non-Proliferation Treaty 「核不拡散条約」　　5 disarmament 「軍縮」

① such fatalism is a deadly adversary

② it will take patience and persistence

③ black-market trade in nuclear materials abounds

④ the basic bargain is sound

⑤ the United States has a moral responsibility to act

⑥ the world could be erased in a single flash of light

⑦ it is time for the testing of nuclear weapons to finally be banned

Ⅲ　次の(22)～(26)の各組の単語の中で最も強いアクセントのある音節の位置が，他と異なるものをそれぞれ①～④の中から一つずつ選びなさい。

(22)　① an-tic-i-pate　② pho-tog-ra-phy
③ mo-not-o-nous　④ ad-mi-ra-ble

(23)　① con-tin-ue　② thor-ough-ly
③ dip-lo-mat　④ in-ter-val

(24)　① ad-van-ta-geous　② o-rig-i-nal
③ dem-o-crat-ic　④ su-per-sti-tion

(25)　① cru-el-ty　② pro-ce-dure
③ suf-fi-cient　④ me-chan-ic

(26)　① sat-is-fac-to-ry　② in-tol-er-a-ble
③ pop-u-lar-i-ty　④ rep-re-sent-a-tive

Ⅳ　次の(ア)と(イ)の各会話が成立するように，(27)～(32)の空欄に入る最も適切なものを，それぞれ①～④の中から一つずつ選びなさい。

(ア)　Kate:　Hello, this is Kate speaking.

Nancy:　Oh, hi, Kate. (27)

Kate:　I just wanted to know if Ann is still in the hospital.

Nancy:　Well, she left the hospital last week. She gave me a telephone call and(28)

Kate:　Did she? Good news. Both Ann and I used to enjoy working as volunteers at the St. Mary's Child Day-care Center. We are going to have a charity party there next week. I've been just wondering if I should call her or not.

Nancy:　You don't need to hesitate to invite her to the party. (29)

Kate:　That's true. I hope she's recovered her strength well enough to attend the party.

Nancy:　In any case, I'm sure she'll be pleased to hear from you.

Kate:　Thank you. I'll call her today. Can I have her number?

(Adapted from M. Hirano and H. Hishida, *Nursing topics on the Internet*, Medical View, 2003, p. 47)

(27)　① How about you?
② What's up?
③ How come?
④ What about?

(28)　① she was in critical condition.
② she has had a renewed attack of her disease.
③ she looked fine.
④ she sounded all right.

(29)　① She might feel like joining you.
② She will become embarrassed.
③ She can sink into despair.
④ She may be really overwhelmed by your invitation.

(イ) Jack: Hi, Tom. I'm surprised to see you at the library. (30)

Tom: I'm under pressure to finish up my term paper within two days. I tried to write last night, but I got sidetracked when I started reading articles about extraterrestrial creatures.

Jack: What! Really? We have only a few days before examinations. How many exams do you have to take this semester?

Tom: I'm going to take nine. In addition, I must write three papers.

Jack: Cheer up! Failing one or two exams will not be(31).

Tom: Don't jump to the conclusion that I will fail the exams. (32), but I'm a genius at overnight cramming for exams.

(Adapted from N. Aoki and H. Erikawa, *Let's talk and communicate*, Kinseido, 2005, p. 70)

(30) ① You might as well tell me the news.
② Aren't you exhausted?
③ What has brought you here?
④ Have you ever visited the website of this library?

(31) ① an excellent judgment
② an issue of education
③ classroom breakdown
④ the end of the world

(32) ① I might not look like it
② It was a tough question
③ That's beside the point
④ That's exactly what I'm doing

V 次の(33)～(36)の各英文の①～⑤の下線部の中で誤っているものを，それぞれ一つずつ選びなさい。

(33) Many of the cognitive bases of the anger①, hatred, and violent② individuals exhibit③ in their behavior toward④ others can also be applied to⑤ the study of collective aggression in large groups.

(34) There is not① way by which the peoples of the world② can③ be divided into④ neat ethnic categories⑤.

(35) While Wisconsin is thought of① as② one of the dairy states, they're③ production of precision instruments④ is among the highest in⑤ the United States.

(36) Prehistoric marine animals were① as diverse in appearance② and habits such as③ are land④ creatures of today⑤.

Ⅵ 次の(ア)～(ウ)の日本語の文の意味を表すように，空欄にそれぞれ①～⑩の語を入れて英文を完成させ，(37)～(42)に入るものを一つずつ選びなさい。ただし，文頭にくる語も小文字の書き出しになっています。

(ア) あらゆることを前もって計画すると，私たちは自分の時間を最大限に活用することができる。

(　　)(　　)(　　)(37) time (　　)(　　)(38)(　　)(　　)(　　).

① to	② of	③ planning	④ us
⑤ our	⑥ everything	⑦ maximize	⑧ time
⑨ allows	⑩ ahead		

(イ) 我々は常に機会をとらえて自分の仕事から少し離れ，人生を全体として考える時間を持つべきである。

We should always (　　) the (　　) to (　　)(39)(　　) our work and (　　) ourselves (　　)(40)(　　) about life (　　) general.

① from	② in	③ to	④ give
⑤ step	⑥ time	⑦ take	⑧ think
⑨ back	⑩ opportunity		

(ウ) 歴史の勉強は，過去に人々が犯した過ちを学生達が認識するのを手助けするという点で，有意義である。

Studying history (　　)(　　)(　　)(41)(　　)(　　) students (　　) the (　　)(42)(　　) in the past.

① that	② people	③ significant	④ helps
⑤ mistakes	⑥ is	⑦ recognize	⑧ made
⑨ it	⑩ in		