東京医科歯科大学　医学部　前期
歯学部

平成26年度入学者選抜個別(第2次)学力検査問題

外　国　語

注　意　事　項

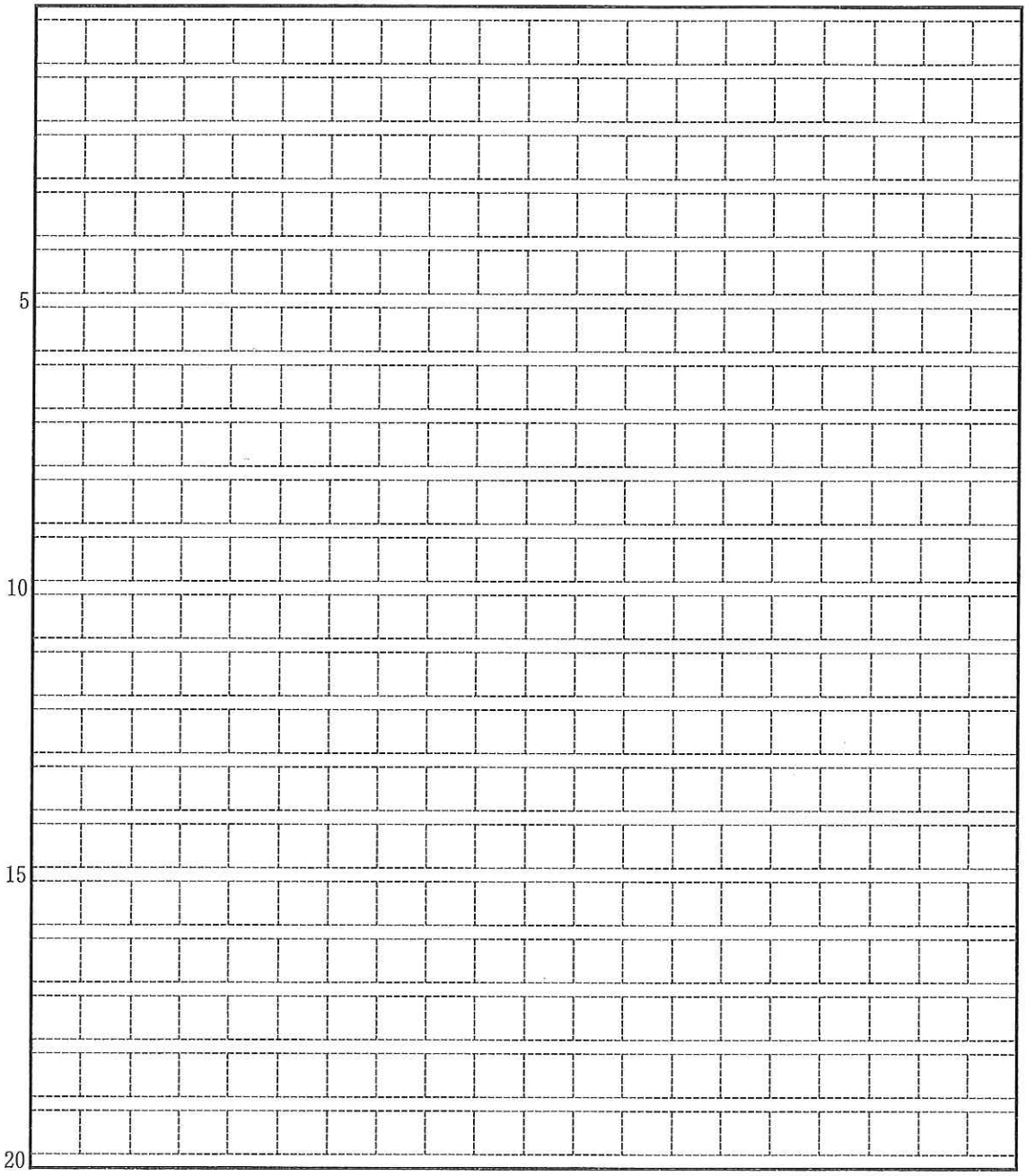
1. 監督者の指示があるまで，この冊子を開いてはいけません。
2. 問題冊子は，全部で8ページあり，第1～3ページは下書用紙です。下書用紙は切り離してはいけません。
3. 問題は，第4ページと第5ページの間に，はさみこんであります。
4. 解答用紙は，問題冊子と別に印刷されているので，誤らないように注意しなさい。
5. 解答は，必ず解答用紙の指定された欄内に**横書き**で記入しなさい。
6. 各解答用紙には，受験番号欄が2または4か所あります。それぞれ記入を忘れないこと。
7. 解答用紙は，記入の有無にかかわらず，机上に置き，持ち帰ってはいけません。問題冊子は持ち帰りなさい。
8. 落丁または印刷の不鮮明な箇所があれば申し出なさい。

学科によって解答すべき問題が異なります。
説明に従って解答しなさい。

下　書　用　紙　（切り取ってはいけない）

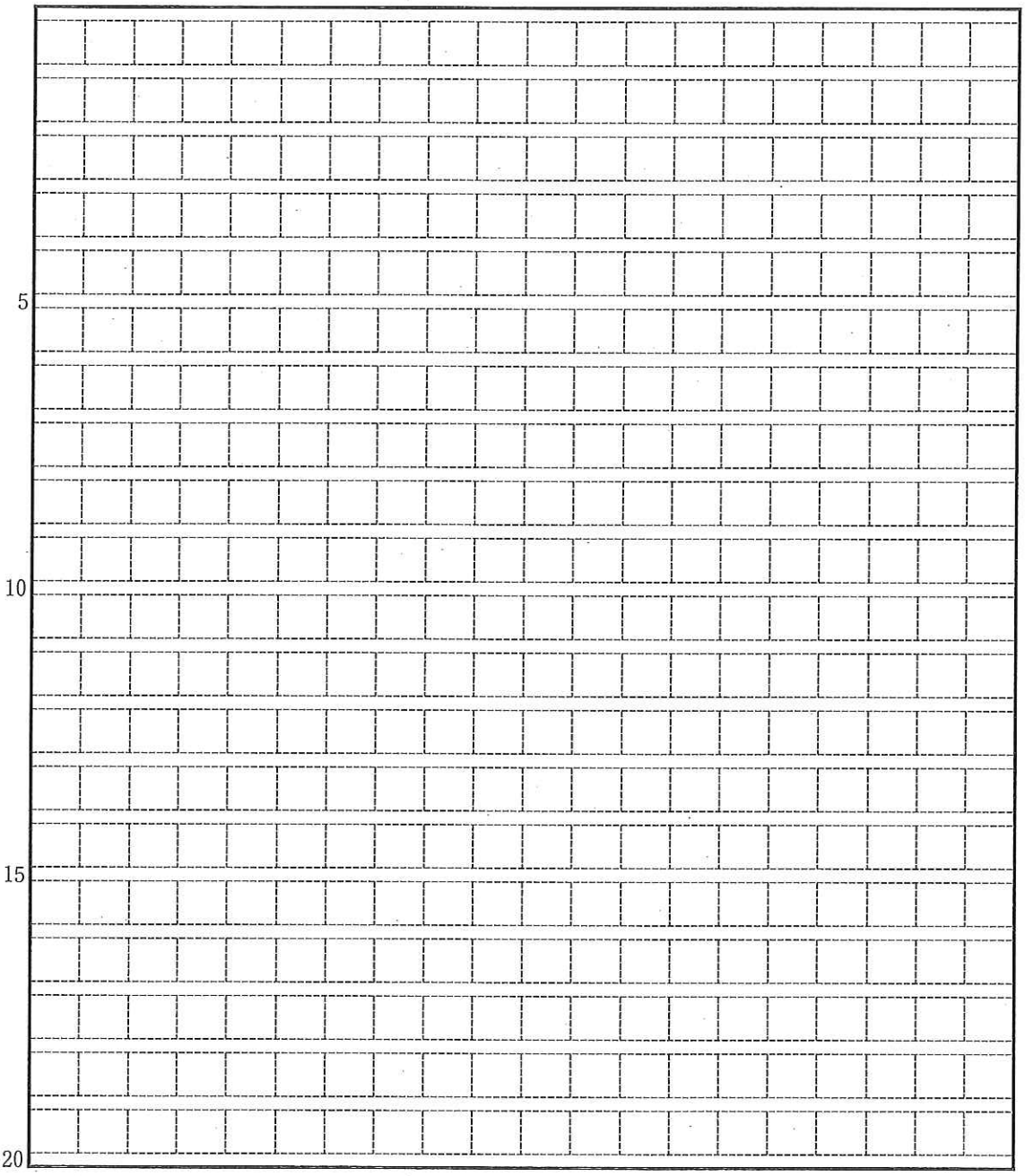
◇M4(438—48)

下　書　用　紙　（切り取ってはいけない）



(20×20)

下　書　用　紙　（切り取ってはいけない）



（20×20）

外　国　語

次の英文は The New York Times 新聞(2010年12月27日)に掲載された "Trying to Estimate Cancer Rates in Ancient Times: Unearthing Prehistoric Tumors, and Debate" (George Johnson)の記事を一部改変したものです。この文章をよく読んで，医学科と歯学科の受験者は問題[3]，[4]，[5]，[6]に答えなさい。保健衛生学科と口腔保健学科の受験者は問題[1]，[2]，[3]，[5]，[6]に答えなさい。解答は解答用紙の指定された欄に記入すること。

＊印のついている語句の注は本文のあとに示されています。

When they excavated a Scythian burial mound in the Russian region of Tuva about 10 years ago, archaeologists struck gold. Crouched on the floor of a dark inner chamber were two skeletons, a man and a woman, surrounded by royal garb from 27 centuries ago.

But for paleopathologists — scholars of ancient disease — the richest treasure was the ***abundance*** of tumors* that had riddled almost every bone of the man's body. The diagnosis: the oldest known case of metastasizing* prostate* cancer.

The prostate itself had ***disintegrated*** long ago. But malignant* cells from the gland had migrated according to a familiar pattern and **they**[1)] left identifiable scars. Proteins extracted from the bone tested positive for PSA, prostate specific antigen.

Often thought of as a modern disease, cancer has always been with us. Where scientists disagree is on how much it has been ***amplified*** by the sweet and bitter fruits of civilization. Over the decades archaeologists have made about 200 possible cancer sightings dating to prehistoric times. But considering the difficulties of extracting statistics from old bones, is **that**[2)] a little or a lot?

A recent report by two Egyptologists in the journal *Nature Reviews: Cancer* reviewed the literature, concluding that there is "a ***striking*** rarity of malignancies" in ancient human remains.

問　題

保健衛生学科と口腔保健学科のみ

1 ***The following words appear in bold italics in the text. On the answer sheet, circle the letter indicating the best definition for each word (based on how the word is used in the text).***

abundance

a) amount　b) collection　c) diversity
d) multitude　e) presence

disintegrated

a) been examined　b) been removed　c) decomposed
d) flourished　e) weakened

amplified

a) caused　b) counteracted　c) detected
d) increased　e) undermined

striking

a) demonstrated　b) mysterious　c) noticeable
d) probable　e) proven

unequivocal

a) certain　b) fearful　c) important
d) impressive　e) sensational

fundamental

a) analytical　b) basic　c) mathematical
d) remarkable　e) unsolvable

vast

a) large　b) prehistoric　c) primary
d) scary　e) senior

refutes

a) contradicts　b) explains　c) leads to
d) modifies　e) supports

minuscule

a) archaeological　b) available　c) careful
d) precious　e) tiny

scrutinized

a) discovered　b) examined　c) gathered
d) grounded　e) recorded

保健衛生学科と口腔保健学科のみ

2 ***What do the following words, which are underlined in the text, refer to? Answer using one to five English words that can replace the underlined text.***

1) they　　2) that　　3) it

4) those　　5) they

全学科

3 ***According to the text, decide whether the following statements are true (T) or false (F). For each statement circle the correct answer on the answer sheet.***

1. The gold treasures in the burial mound would never have been discovered without the efforts of paleopathologists.
2. One of the skeletons found in the Scythian burial mound was unique in that it contained an intact prostate.
3. While some scientists claim that sweet fruits can increase the danger of cancer, others claim that bitter fruits are more to blame.
4. In *Nature Reviews: Cancer*, A. Rosalie David and Michael R. Zimmerman suggest that factors related to modern lifestyles may be responsible for the difference in cancer rates between ancient and modern societies.
5. The article implies that news reports oversimplified the conclusions in David and Zimmerman's study.
6. The cancer researcher Robert Weinberg believes that cancer was less common in ancient times because people often died earlier from other causes.
7. Weinberg believes improvements in medical technology unfortunately resulted in producing many new kinds of cancer.
8. The article implies that since few instances of ancient cancer have been discovered, this is strong evidence that cancer rates in ancient times were lower than they are now.

9. One problem with examining bones to estimate cancer rates in ancient societies is that tumors can destroy some bones, leaving no evidence.

10. Based on Anne Grauer's estimate, it is reasonable to believe that more than 50,000 of the 100,000 skeletons available for research have been X-rayed.

11. Heather Edgar implies that archaeologists once valued collecting skulls more than other human bones.

12. The article implies that an ancient human skull can give modern scientists information about malignant tumors in a person's leg.

13. The article implies that most cases of cancer in ancient remains will never be found, as nearly all cancers begin in softer organs, not bone.

14. Scientists are not sure whether Ferrante I had adenocarcinoma or colorectal cancer, but he must have died of one or the other.

15. Evidence from South American mummies suggests that children in Chile who lived between A.D. 300 and 600 often developed rhabdomyosarcoma.

16. According to Dr. Zimmerman, many people in ancient Egypt, particularly wealthy people, lived long enough to develop cancer. However, they didn't — at least not at the rate they do today.

17. Dr. Zimmerman believes that features of cancer can be well-preserved by mummification.

18. It is implied in the article that lung cancer was not as common a cause of death in Britain between 1901 and 1905 as it was later in the century.

19. A study by Tony Waldron indicates that evidence of cancer is likely to be found in 6 to 9 percent of all skeletons.

20. According to the article, the results of studies led by Andreas Nerlich on two groups of remains support Waldron's predictions concerning cancer rates.

21. According to Nerlich and his colleagues, the fact that people today live longer than those in the past is more responsible for the increase in tumor frequencies than other factors.

22. Arthur Aufderheide believes that cancer likely occurred at a lower rate in ancient times than it does today.

23. According to the article, further research will improve the accuracy of frequency estimates for prehistoric cancers.

24. Dr. Weinberg suggests that in the future everyone will get cancer, no matter what we do to prevent it.

医学科と歯学科のみ

4 ***Briefly (in 10 to 25 words) answer the following questions in your own words, using complete English sentences. Base your answers on the information presented in the article.***

1) Why does Robert A. Weinberg believe that cancer is not a new disease?

2) The article describes the estimated "100,000 skeletons in the world's osteological collections" as "minuscule" in number and incomplete to a degree. Why?

3) The article implies that Tony Waldron made a good choice when he decided to analyze British mortality reports from 1901 to 1905 for the purposes of his study. What are the reasons why his choice might have been a good one?

全学科

5 下線部(ア)と(イ)を日本語に訳しなさい。

全学科

6 有史以前のがんの発生率に関する論争について，次のキーワードを用いて日本語で400字以内にまとめなさい：環境("environment")，平均寿命("average life span")，医療技術("medical technology")。

"The rarity of cancer in antiquity suggests that [carcinogenic environmental] factors are limited to societies that are affected by modern lifestyle issues such as tobacco use and pollution resulting from industrialization," wrote the authors, A. Rosalie David of the University of Manchester in England and Michael R. Zimmerman of Villanova University in Pennsylvania. Also on the list would be obesity, dietary habits, sexual and reproductive practices, and other factors often altered by civilization.

Across the Internet, news reports made the matter sound ***unequivocal***: "Cancer Is a Man-Made Disease." "Cure for Cancer: Live in Ancient Times." But many medical experts and archaeologists were less impressed.

"There is no reason to think that cancer is a new disease," said Robert A. Weinberg, a cancer researcher at the Whitehead Institute for Biomedical Research in Cambridge, Massachusetts, and the author of the textbook *The Biology of Cancer*. "In former times, **it**[3] was less common because people were struck down in midlife by other things."

Another consideration, he said, is the revolution in medical technology: "We now diagnose many cancers — breast and prostate — that in former times would have remained undetected and been carried to the grave when the person died of other, unrelated causes."

Even with all of that taken into account, there is a ***fundamental*** problem with estimating ancient cancer rates. Two hundred suspected cases may not sound like much. But sparsity of evidence is not evidence of sparsity. Tumors can remain hidden inside bones, and **those**[4] that dig their way outward can cause the bone to crumble and disappear. For all the efforts of archaeologists, only a fraction of the human bone pile has been picked, with no way to know what lies hidden below.

Anne L. Grauer, president of the Paleopathology Association and an anthropologist at Loyola University of Chicago, estimates that there are roughly 100,000 skeletons in the world's osteological collections, and a ***vast*** majority have not been X-rayed or studied with more modern techniques.

According to an analysis by the Population Reference Bureau, the cumulative total of everyone who had lived and died by A.D. 1 was already approaching 50

billion, and had nearly doubled by 1750. (The analysis ***refutes*** the oft-made assertion that more people are alive today than have ever lived on earth.) If those figures hold, the number of skeletons in the archaeological database would represent barely one ten-thousandth of 1 percent of the total.

Within that ***minuscule*** sample, not all of the remains are complete. "For a long time archaeologists only collected skulls," said Heather J. H. Edgar, curator of human osteology at the Maxwell Museum of Anthropology at the University of New Mexico. "For the most part, there's no way to know what the rest of those people's skeletons might have said about their health."

(ア) So how are scientists to evaluate, for example, the significance of the handful of fossilized examples of osteosarcoma*, a rare bone cancer that mostly affects young people? (What may be the oldest case was found in 1932 by the anthropologist Louis Leakey in a prehistoric relative of man.) Today the incidence of osteosarcoma among people younger than 20 is about five cases per million per year.

"You would need to screen 10,000 individuals to find a case," said Mel Greaves, a professor of cell biology at the Institute of Cancer Research in England, and the author of *Cancer: The Evolutionary Legacy*. Not enough teenage remains have been ***scrutinized***, he said, to draw a meaningful conclusion.

There is a further complication: more than 99 percent of cancers originate not in bone but in softer organs, which quickly decay. Unless they spread to bone, **they** will most likely go unrecorded.

Ancient mummies would seem to be an exception. But here, too, the pickings have been slim.

Only on rare occasions can pathologists get their hands on a comparatively recent mummy like Ferrante I of Aragon, king of Naples, who died in 1494. When his body was examined five centuries later, adenocarcinoma, which begins in glandular tissues, was found to have spread to the muscles of his small pelvis.

A molecular study revealed a typographical error in a gene that regulates cell division — a G had been flipped to A — which pointed to colorectal cancer. The cause, the authors speculated, might have been gluttonous consumption of red meat.

Over the years hundreds of Egyptian and South American mummies have turned up a few other cases. A rare tumor called a rhabdomyosarcoma was found on the face of a Chilean child who lived sometime between A.D. 300 and 600.

Dr. Zimmerman, co-author of the recent review, discovered a rectal carcinoma in a mummy dated between A.D. 200 and 400, and he confirmed the diagnosis with a microscopic analysis of the tissue — a first, he said, in Egyptian paleopathology.

"The fact remains that there are only a minute number of truly ancient mummies and skeletons that show evidence of cancer," he said. "We just don't find anything like the modern incidence of cancer."

Although average life span was lower in ancient Egypt than it is today, Dr. Zimmerman argues that many individuals, especially the wealthy, lived long enough to get other degenerative diseases. So why not cancer?

Other experts have suggested that most tumors would have been destroyed by the invasive rituals of Egyptian mummification. But in a study published in 1977, Dr. Zimmerman showed it was possible for the evidence to survive.

In one experiment, he took the liver from a modern patient who had succumbed to metastatic colon cancer, dried it out in an oven and then rehydrated it — demonstrating, he said, that "the features of cancer are well preserved by mummification and that mummified tumors are actually better preserved than normal tissue."

But as with skeletons, the problem remains: Given the small sample size, just how much cancer should scientists expect to see?

To get a rough idea, Tony Waldron, a paleopathologist at University College London, analyzed British mortality reports from 1901 to 1905 — a period late enough to ensure reasonably good records and early enough to avoid skewing the data with, for example, the spike in lung cancer caused in later decades by the popularity of cigarettes.

Taking into account variations in life span and the likelihood that different malignancies will spread to bone, he estimated that in an "archaeological assemblage" one might expect cancer in less than 2 percent of male skeletons and 4 to 7 percent of female skeletons.

Andreas G. Nerlich and colleagues in Munich tried out the prediction on 905 skeletons from two ancient Egyptian necropolises. With the help of X-rays and CT

scans they diagnosed five cancers — right in line with Dr. Waldron's expectations. And as his statistics predicted, 13 cancers were found among 2, 547 remains buried in southern Germany between A.D. 1400 and 1800.

For both groups, the authors wrote, malignant tumors "were not significantly fewer than expected" when compared with early-20th-century England. They concluded that "the current rise in tumor frequencies in present populations is much more related to the higher life expectancy than primary environmental or genetic factors."

With so little to go on, archaeology may never have a definitive answer. "We can say that cancer certainly existed, and probably in somewhat lower frequency than it does today," said Arthur C. Aufderheide, emeritus professor of pathology at the University of Minnesota and co-author of *The Cambridge Encyclopedia of Human Paleopathology*. That may be as certain as we ever can be.

(イ) As scientists continue to investigate, there may be comfort in knowing that cancer is not entirely civilization's fault. In the normal course of life a creature's cells must be constantly dividing — millions of times a second. Sometimes something will go wrong.

"Cancer is an inevitability the moment you create complex multicellular organisms and give the individual cells the license to proliferate," said Dr. Weinberg of the Whitehead Institute. "It is simply a consequence of increasing entropy, increasing disorder."

He was not being fatalistic. Over the ages bodies have evolved formidable barriers to keep rebellious cells in line. Quitting smoking, losing weight, eating healthier diets and taking other preventive measures can stave off cancer for decades. Until we die of something else.

"If we lived long enough," Dr. Weinberg observed, "sooner or later we all would get cancer."

注

tumor　腫瘍

metastasize　転移する

prostate　前立腺(の)

malignant　(病気・腫瘍などが)悪性の

osteosarcoma　骨肉腫