

令和 6 年度 東北医科薬科大学 入学試験問題

医学部 一般・外国語

《 注 意 事 項 》

1. 解答用紙左部に氏名、フリガナ、その下部に受験番号を記入し、例にならって○にマークしなさい。

(例) 受験番号 10001 の場合

フリガナ	
氏 名	

受 験 番 号				
万	千	百	十	一
1	0	0	0	1
	●	●	●	①
●	①	①	①	●
②	②	②	②	②
<hr/>				
⑨	⑨	⑨	⑨	⑨

2. この問題冊子は、16 ページまであります。
3. 試験中に問題冊子の印刷不鮮明、ページの落丁・乱丁等に気付いた場合は、手を高く挙げて監督者に知らせなさい。
4. 解答方法は次のとおりです。

- (1) 解答は解答用紙の解答欄にマークしなさい。例えば、1 と表示のある問いに対して③と解答する場合は解答番号 1 の解答欄の③にマークしなさい。

解答 番号	解 答 欄									
	1	2	3	4	5	6	7	8	9	10
1	①	②	●	④	⑤	⑥	⑦	⑧	⑨	⑩

- (2) 解答の作成にはH、F、HBの黒鉛筆またはシャープペンシル(黒い芯に限る)を使用し、○の中を塗りつぶしなさい。解答が薄い場合には、解答が読み取れず、採点できない場合があります。
- (3) 答えを修正する場合は、プラスチック製の消しゴムであとが残らないように**完全に消しなさい**。鉛筆のあとが残ったり、●のような消し方などした場合は、修正または解答したことにならないので注意しなさい。
- (4) 解答用紙は折り曲げたり、メモやチェック等で汚したりしないよう、特に注意しなさい。

(試験終了後、問題冊子は持ち帰りなさい。)

【I】 次の英文を読み、問 1～15 の解答として最も適切なものを選択肢 ①～④から一つ選び、その番号をマークせよ。なお、[1]～[10]はパラグラフ（段落）の番号を表している。

[1] Six weeks after a mild case of COVID-19 early in the pandemic, Erika Thornes started waking up every night between 2 and 3 a.m. Unable to fall back asleep, she would listen to podcasts, read, and scroll through Twitter (now called X) before finally dozing off by 4 or 5 a.m. That was more than two years ago and Thornes, a mother to three teenagers in San Diego, still struggles to sleep through the night every now and then.

[2] A similar thing happened to her husband during a recent COVID infection. He was suddenly waking up at 3 a.m. every night. His sleep improved when he stopped testing positive, but the symptom was extreme while it lasted. “He was quite shocked,” she says. “He knew I was waking up, but I don’t think he quite understood the severity of ‘awake.’”

[3] As COVID-19 has swept through the global population, so too have reports of sleep disruptions both during an infection and in the weeks and months beyond. The links between COVID and sleep are still under investigation, but studies show that bacterial and viral infections, in general, interfere with sleep through physical and psychological mechanisms. Recognizing the potential for the virus to upset sleep, experts say, can help people get the care they need.

[4] Sleep is intricately entwined with the immune system, a link both well-known and still mysterious. Getting enough rest can help prevent infections, according to evidence and observations going back thousands of years. But infections can also disrupt sleep in complicated ways.

[5] Studies in animals show that viruses and bacteria alter both the amount of time spent sleeping and the kind of sleep, says John Axelsson, director of the Sleep Laboratory at Stockholm University’s Stress Research Institute in Sweden. When researchers inject rabbits or rodents with moderate doses of bacteria or viruses, the animals sleep more. They get more non-rapid eye

movement sleep, a deep restful state thought to be important for recovery; and they spend less time in dream-filled REM (rapid eye movement) sleep.

[6] Cytokines, a category of molecules that can stimulate or slow down inflammation, appear to play a major role in these patterns, Axelsson says. When healthy animals are sleep deprived, levels of some pro-inflammatory cytokines in the brain rise, causing the animals to sleep more than usual. When scientists block these cytokines, animals don't sleep more—even when they are sleep deprived.

[7] It's harder to do the same kind of research in people, and results are mixed about how sleep changes during illnesses. But studies suggest that, at least to some extent, inflammatory molecules affect sleep in ways comparable to other animals. In studies from the 1990s and early 2000s, researcher Thomas Pollmächer and colleagues injected people with bits of bacterial cell walls, called endotoxins, and found that mild activation of the immune system increased the drive for sleep and enhanced non-REM sleep.

[8] But once the immune system revved up with increased cytokine levels and symptoms of illness, people experienced more disrupted sleep, not typically seen in animals. "The inflammatory system increases the drive for sleeping," Axelsson says. "But at the same time, it then disrupts your sleep if you get a fever."

[9] To see how respiratory infections affect human sleep, Axelsson and colleagues recruited 100 healthy adults to keep a detailed sleep diary after experiencing the first symptoms of a respiratory infection while wearing a sleep-tracking device on their wrists. Of the 100 volunteers, 28 people got sick. Overall, those people spent longer in bed and slept more after their symptoms began, the researchers reported in 2019.

[10] (①) But this wasn't a restful sleep. Infected people had difficulty falling asleep, woke up more, and had a more restless sleep especially when they were most symptomatic. (②) Anecdotally, that's the same pattern reported by many people with COVID—a lot of sleep initially followed by

insomnia or other disruptions while sickest. (③) The physiological drive to sleep more while getting sick might be adaptive—helping the body fight off the invader, Axelsson says. (④)

問 1 According to paragraph [1], Erika ().

- ① changed her sleep schedule after recovering from COVID-19
- ② came down with COVID-19 at the beginning of the pandemic
- ③ read, listened to podcasts, and used Twitter to help to wake up
- ④ still suffers from insomnia every night

問 2 According to paragraph [2], Erika's husband ().

- ① did not understand how serious her sleeplessness was at first
- ② was shocked that he caught COVID-19 from Erika
- ③ was able to sleep well again after he stopped taking tests
- ④ knew the difficulty of recovering from COVID-19

問 3 According to paragraph [3], as COVID-19 has spread throughout the world, there has/have been () sleep disruptions not only during periods of infection, but also in the weeks and months following them.

- ① few medical reports of
- ② a development in testing methods for
- ③ an increase in reports of
- ④ an advance in the treatment of

問 4 According to paragraph [3], what have studies shown?

- ① Viruses can interfere with the brain.
- ② COVID-19 may help cure sleeping difficulties.
- ③ Bacterial and viral infections can disturb sleep.
- ④ Bacterial and viral infections interfere with each other.

問 5 According to paragraph [4], ().

- ① viral infections were fully understood thousands of years ago
- ② our bodies need adequate sleep to cure infections
- ③ getting enough sleep can keep us from getting infected
- ④ sufficient sleep might reduce immunity

問 6 According to John Axelsson in paragraph [5], studies in rabbits and rodents show that viruses and bacteria can ().

- ① determine when they wake up
- ② alter sleeping positions
- ③ be harmful to their eyes
- ④ change the type and duration of sleep

問 7 According to paragraph [5], which of the following is TRUE?

- ① Non-rapid eye movement sleep aids in recovery.
- ② The animals recover faster as REM sleep increases.
- ③ Falling into REM sleep faster is needed when recovering.
- ④ Dreams help the body go into a deep restful state.

問 8 According to John Axelsson in paragraph [6], increased levels of some pro-inflammatory cytokines can ().

- ① deprive healthy animals of sleep
- ② be blocked when animals do not get enough sleep
- ③ lead to an increased amount of sleep in sleep-deprived animals
- ④ cause animals to remain awake

問 9 According to paragraph [6], what happens to animals when their cytokines are obstructed?

- ① Their immune systems are damaged.
- ② They are not deprived of sleep.
- ③ They fall into a deep sleep.
- ④ Their amount of sleep doesn't increase.

問 10 The word “comparable” in paragraph [7] is closest in meaning to ().

- ① unequal ② contrasting ③ similar ④ evaluated

問 11 The word “enhanced” in paragraph [7] is closest in meaning to ().

- ① encouraged ② increased ③ worsen ④ decreased

問 12 Paragraph [8] can be summarized as follows: () in humans.

- ① inflammation can have both positive and negative effects on sleep
② sleep deprivation can cause inflammation and fever
③ activation of the inflammatory system can improve the immune system
④ the drive for sleeping can improve symptoms of illness

問 13 According to paragraph [9], Axelsson and colleagues ().

- ① determined what symptoms were caused by sleep deprivation
② investigated how sleep may be influenced by respiratory infections in humans
③ verified what kind of infections affect sleep
④ tried to demonstrate how dangerous respiratory infections are

問 14 According to paragraph [9], which of the following is true of their research?

- ① Slightly more than one-quarter of the volunteers became ill.
② The researchers recorded the volunteers' health daily.
③ All the volunteers slept more than usual after being infected.
④ 28 volunteers checked their wrist pulse daily.

問 15 Look at the paragraph [10]. Where would the following sentence best fit in the paragraph? Choose (①), (②), (③) or (④).

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【Ⅱ】 次の英文を読み、問 1～12 の解答として最も適切なものを選択肢①～④から一つ選び、その番号をマークせよ。なお、[1]～[6]はパラグラフ（段落）の番号を表している。

[1] Ever find a piece of plastic in your food? Even if you didn't see it, some was probably littering your meal. Scientists have found bits of plastic tainting certain foods and bottle waters. We might inhale microscopic bits of the plastic that floats in the air. But no one has known whether that plastic moved much past our gut or lungs — until now. A study has just turned up microplastics in human blood.

[2] Researchers in the Netherlands reported the discovery in *Environment International*. Plastic that enters the lungs or gut hasn't technically crossed into the body. That only happens once it gets into the bloodstream. Blood can then move the little bits throughout the body. And that's what makes the new discovery worrisome, the Amsterdam-based researchers say. If microplastics are circulating inside us, there's no telling where they might end up. Or what type of harm they might do. "Microplastics can cause inflammation in various body systems," says Atanu Sarkar. He's an environmental health specialist in Canada at Memorial University in St. John's, Newfoundland. He did not take part in the new study. Any plastic bits may also carry toxic chemicals, he adds, "These toxic chemicals can affect our hormonal and reproductive system." They've already been shown to harm some wildlife and ecosystems.

[3] Heather Leslie and Marja Lamoree were part of a team at Amsterdam's Free University. As ecotoxicologists, they look for substances in the environment that may have the potential to cause harm. (①) No one had measured plastic in human blood before. (②) Finding microscopic plastic particles in blood isn't easy. You can't just look through a microscope and count them. So the researchers took a chemical approach. They collected blood from 22 adults and processed the sample to remove big cells. (③) This left a liquid. They then filtered out particles bigger than 700 nanometers (0.00003 inch) across. For perspective, the width of a human hair is more than 100 times that size. (④)

[4] Afterward, the researchers looked for polymers that make up five different types of plastic. These represented the most common plastics in use. Measurable amounts of four polymers turned up in the blood of 17 people — more than three in every four. (Polymers are the basic building blocks of plastic.) Some blood samples had two or more polymers. One in every four samples of tested blood had polyethylene. It's a particularly common plastic used in a very broad range of products, from shopping bags and bottles to toys and laminate coatings. Half of the people sampled PET in their blood. That's short for polyethylene terephthalate. It's used in polyester fabrics and plastic bottles.

[5] Polystyrene appeared in one-third of the samples. It's the basis of some types of insulating foam, computer cases, scientific labware, plastic forks, hair combs and more. Just one sample had poly(methyl methacrylate), or PMMA (also known as acrylic). This transparent, heat-molded plastic is used in dental work, plexiglass and more. The team also looked for polypropylene but didn't find any. If it was present, they say, it likely was at levels too low to detect.

[6] "Humans are frequently in contact with microplastics," says Kam Sripada. She is a neuroscientist at the Norwegian University of Science and Technology in Trondheim. She was not involved with this study. But in a January 26 paper, she was part of a team that reviewed potential concerns about children's exposure to plastic. The data are so limited that "we don't really know what their impact is on health," she cautions. "It's challenging to study microplastics," she adds. Partly, she notes, it's "because scientists can't easily separate the effects of exposure to microplastics, larger plastics and plastic chemicals."

問1 The word "tainting" in paragraph [1] is closest in meaning to ().

① contaminating ② purifying ③ emitting ④ absorbing

問 2 According to paragraph [1], scientists have found that ().

- ① no plastic particles get through the gut or lungs
- ② microplastics are present in the human bloodstream
- ③ microplastics used in plastic bottles pollute the environment
- ④ microplastics are broken down in human bodies

問 3 According to paragraph [2], technically, it is considered that ().

- ① plastic has gotten into the body if it is in the bloodstream
- ② plastic in the bloodstream can damage the lungs or gut
- ③ plastic in the body will leave via the lungs or gut
- ④ plastic sometimes harms the body fatally

問 4 According to the researchers in paragraph [2], once microplastics enter the bloodstream, ().

- ① we cannot know where they settle
- ② we never know when the cycle will end
- ③ it is impossible to prevent them from entering the lungs or gut
- ④ we cannot locate their hiding places

問 5 Look at the paragraph [3]. Where would the following sentence best fit in the paragraph? Choose, (①), (②), (③) or (④).

問 6 The phrase “For perspective” in paragraph [3] is closest in meaning to ().

- ① In other words
- ② To minimize the size
- ③ From another viewpoint
- ④ To provide a sense of scale

- 問 7 According to paragraphs [3] and [4], polymers were found in the blood of ().
- ① more than 17 out of 22 people
 - ② a little over 70% of people
 - ③ over 75% of people
 - ④ a little less than 70% of people
- 問 8 According to paragraphs [3] and [4], how many people were found to have polyethylene terephthalate in their blood?
- ① 5 or 6 ② 11 ③ 17 ④ 22
- 問 9 In paragraph [5], which of the following is NOT cited as a polystyrene product?
- ① Plastic laboratory instrument.
 - ② Containers of computers.
 - ③ Plastic wrap.
 - ④ Plastic tableware.
- 問 10 According to paragraph [5], which of the following is true of the polypropylene in their investigation?
- ① The amount of polypropylene in the samples seemed to be too little to catch.
 - ② Polypropylene was discovered in most of the samples.
 - ③ Polypropylene was detected using another method.
 - ④ Polypropylene was undetectable because of its weakness against heat.
- 問 11 According to paragraph [6], which of the following is true of Kam Sripada?
- ① She is convinced that plastic is harmful to health.
 - ② She is worried about children's radiation exposure.
 - ③ She investigated neurological responses in the brains of adults.
 - ④ She is among those who studied the potential dangers of plastic to children.

問 12 According to Kam Sripada in paragraph [6], why is it challenging to study microplastics?

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- ① Exposure to microplastics affects all living things.
- ② It is difficult to separately collect plastic waste and so forth.
- ③ A new method of investigation is needed to effectively examine microplastics.
- ④ It is difficult to distinguish the effects of exposure to plastics when the plastics vary in type.

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【Ⅲ】 次の問 1～10 に示された英文は“Cultural Perspectives on Knowledge”

と題する一続きの文章の冒頭である。各問いにおいて、下線を付した語句
①～④のうち、文法・語法上または文脈上の誤りを含むものを一つずつ選
び、その番号をマークせよ。

問 1 28

①One of the things that ②makes human beings unique is that ③addition to our biological inheritance, we are also ④shaped by culture.

問 2 29

Culture consists of those ①beliefs and practices that are ②passed on one generation to ③another and ④it is closely connected with language.

問 3 30

If we think of the brains and bodies we are ①born with as the hardware, we might say that culture is the software which formats our minds and ②incline us ③to think and behave in one way ④rather than another.

問 4 31

This suggests ①that the answer to the philosophical question ‘How do you know?’ may depend in part ②who you are and ③the culture you ④belong to.

問 5 32

While we often identify cultures ①with countries and ②speak of, say, Japanese culture, French culture, or Argentinian culture, there are ③much more cultures in the world than ④there are countries.

問 6 33

An ①estimating 350 million people ②belong to indigenous cultures, ③that is, cultures ④which have deep historical links with a particular geographical territory.

問 7 34

Historically, indigenous groups have varied in size and complexity ①ranging from *bands* of nomadic hunter-gatherers ②make up of one or more extended families to chiefdoms ③consisting of thousands, or even ④tens of thousands, of individuals living under a hereditary chief.

問 8 35

We might also describe as 'indigenous' various peasant communities ①around the world and the ②descendants of people who ③belongs to once-mighty empires ④such as the Inca empire of South America or the Mali empire of West Africa.

問 9 36

You are doubtless to celebrate cultural diversity. ①Nevertheless, there are difficult questions lurking beneath the surface, ②such as: Are all cultural ③perspectives equally valid? Do we have the right to judge other cultures? ④Which are the limits of acceptable diversity?

問 10 37

①As usual, there are no simple ②answers to these questions, and you will need to ③think them over and draw ④their own conclusions.

【IV】 次の和文の下線部 (1)～(4) の意味に合うように問 1～4 の [] 内の語句を並べ替えて英文を作り、空欄 ([38])～([45])に入るものを一つ選び、その番号をマークせよ。

責任ある研究活動を進める上で、(1) 研究責任者および参加する科学者は、真摯に、公正な研究を行うことが求められており、それは科学者としての義務と言えるでしょう。 この義務を果たすことにより、研究の機会とその資金を提供する社会と科学者コミュニティとの信頼関係が維持され、研究の自由が保証されるのです。

(2) 特に研究が人を対象とする場合には、科学者としての「責任」についての十分な理解が必要です。 人を対象とする研究には、医学の研究だけではなく、歴史学や社会学などの人文・社会科学から、情報工学や自動車技術などの工学的なものまで、さまざまな領域での研究があります。 (中略)

(3) 医学の臨床研究は最も厳しい規範を持つ分野です。 (4) 他の領域の科学者にとってもこれらを考慮することは有益でしょう。 「医学や臨床研究など私の研究に関係はない」などとはせず、科学者として理解しておくべきものと考えてみてください。

問 1 (1) The principal investigator and other participating [() () ([38]) () () ([39]) () () integrity],

[① researchers ② with ③ to ④ research ⑤ expected ⑥ are
⑦ conduct ⑧ fair]

問 2 (2) When a research project requires human subjects, scientists [() () ([40]) () () ([41]) () ()].

[① possess ② scientists ③ understanding ④ must
⑤ “responsibilities” ⑥ a full ⑦ of their ⑧ as]

問 3 (3) Clinical [() () ([42]) () () ([43]) () ()].

[① rigorous ② in medicine ③ having ④ standards ⑤ the field
⑥ research ⑦ the most ⑧ is]

問 4 (4) It would be [() () (

44

) () () (

45

)
() ()].

[① in ② standards ③ scientists ④ to consider ⑤ helpful ⑥ these
⑦ other fields ⑧ for]

