

## 平成19年度大学院医学研究科(2回目)

### 医学・生物学一般試験(問題用紙1枚、解答用紙2枚)

以下の4問題から2問題を選択して解答しなさい。1問題につき1枚の解答用紙を使用すること。紙面不足の場合は裏面使用も可。

1. 内因性の唯一の血糖低下因子と言われるインスリンは膵島 B 細胞から分泌される。インスリンはその前駆物質であるプレプロインスリン、プロインスリンを経て合成される事が知られている。さて、ヒトやイヌの膵島 B 細胞の分泌顆粒には大きく分けて二種類の顆粒が観察される。最も多数を占める顆粒は立体的には円板状顆粒でその断面が棒状になるので桿状顆粒と呼ばれ B 細胞の分泌顆粒の 70% を占める。この桿状顆粒はときに結晶構造を呈する事で有名である。今ひとつの B 細胞の分泌顆粒は、球状顆粒で大多数は有芯小胞と呼ばれる顆粒で占められている。この有芯小胞は、頻りに顆粒放出像(分泌顆粒が直接細胞外に放出される現象で、ホルモンや酵素など蛋白性の物質の放出のときに観察される)が観察される。一方インスリンの免疫染色では、上記二種類の顆粒の他に細胞質や粗面小胞体、ゴルジ装置に陽性反応が観察される。以上の事からインスリンとその前駆物質の関係を考察しなさい。
2. 「医療は人が人に行う不確実性の行為である」と言われています。この場合の「不確実性の行為」とはどのようなことを意味しているのか、例を挙げて説明しなさい。
3. 近年、医学および生物学の領域での重大な事件として国内外で科学論文に掲載されたデータ捏造の問題がメディアで報道され、社会問題としてクローズアップされた。この問題について、自分自信の考えを率直に 400 字前後で述べなさい。
4. 最近、大きな問題になっているメタボリック症候群の 1) 診断基準、2) 一次予防、二次予防について簡潔に述べなさい。

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受験番号

外国語試験問題・解答用紙 ( 日本人 )

以下の文章は”Preventing cancer”と題して書かれた Nature 誌の Editorial Comment である。文章を読んで、以下の設問に日本語で答えなさい。

Twenty-five years ago, a landmark study by Richard Doll and Richard Peto (1981) concluded that 75–80% of cancers diagnosed in the United States in 1970 might theoretically have been prevented by altering environmental factors such as smoking, alcohol consumption and diet. More recent work has added obesity and physical inactivity to the list of factors that increase cancer risk. Today, tobacco use accounts for 30% of cancers in the United States, obesity accounts for 15% and poor diet for up to 25%. Clearly, while avidly pursuing promising avenues of therapy, the biomedical community and policy-makers need to tackle cancer prevention with just as much zeal.

The success of campaigns to combat melanoma and lung cancer are testaments to the impact that prevention can make. For example, the Australian government's exhortation to "slip on a shirt, slop on a sunscreen, slap on a hat" has led to melanoma having less of a health impact in Australia than in cloudier countries such as Britain. The incidence of smoking-related cancers has dropped sharply since the 1990s — the delayed effects of anti-smoking campaigns started in the 1960s and 1970s.

But much still needs to be done. Tobacco remains a problem, especially in the developing world, where consumption is climbing. The next biggest threat facing the developed world is the growing epidemic of obesity. In the United States and Europe, for example, around two-thirds of the population is either overweight or obese. Research into how people form dietary and exercise habits will help to inform intervention campaigns, and research on nutrition will help to determine why a vegetable-rich, low-saturated-fat diet seems to provide protection against cancer. Studies on genetic susceptibility could one day help us all to tailor our lifestyles to suit our risk profiles.

But such research is likely to have little effect unless policy-makers are prepared to go further than just educating the public. Avoiding the Sun is straightforward and cheap. The same cannot be said of factors that affect obesity. Once associated with wealth and excess, obesity now disproportionately affects the poorer sections of society, because high-calorie, low-nutrient, processed food is often much more easily accessible than healthy alternatives. Governments need to help ensure that eating the recommended five portions of fruit and vegetables a day is a realistic aim for everyone.

Physical activity needs to be tackled too. Encouraging children and adults to take up sport is a start, but policies that encourage people to build exercise into their daily lives — town planning that makes walking to the shops or cycling to work easier and safer, for example — are likely to have a longer-lasting impact.

Our modern lifestyles are increasingly at odds with the environment in which our physiology originally evolved. Finding a truce between the two would go a long way to reducing the burden of diseases, such as cancer, that result.

( Nature 442, 720 (17 August 2006)より抜粋 )

平成19年度大学院医学研究科(2回目)

受験番号

外国語試験問題・解答用紙(日本人)

問題 1. (A)Melanomaを予防するのにオーストラリア政府が出した勧告は何か?(B)その結果はどうだったか?

問題 2. 著者は、“Growing epidemic of obesity”を抑制するためにどのような研究が必要であると述べているのか?

問題 3. 著者は、“Growing epidemic of obesity”を抑制するために“政府”は何をすべきだと述べているか?

次の 2 節の英文を読み、以下の問に答えなさい。

About 60% of the adult human body is fluid, mainly a water solution of ions and other substances. Although most of this fluid is inside the cells and if called *intracellular fluid*, about one third is in the spaces outside the cells and is called *extracellular fluid*. This extracellular fluid is in constant motion throughout the body. It is transported rapidly in the circulating blood and then mixed between the blood and the tissue fluids by diffusion through the capillary walls. In the extracellular fluid are the ions and nutrients needed by the cells to maintain cell life. Thus, all cells live in essentially the same environment – the extracellular fluid. For this reason, the extracellular fluid is also called the *internal environment of the body*, a term introduced more than 100 years ago by the French physiologist Claude Bernard.

The extracellular fluid contains large amounts of sodium, chloride, and bicarbonate ions plus nutrients for the cells, such as oxygen, glucose, fatty acids, and amino acids. It also contains carbon dioxide that is being transported from the cells to the lungs to be excreted, plus other cellular waste products that are being transported to the kidneys for excretion. The intracellular fluid differs significantly from the extracellular fluid; specifically, it contains large amounts of potassium, magnesium, and phosphate ions instead of the sodium and chloride ions found in the extracellular fluid. Special mechanisms for transporting ions through the cell membrane maintain the ion concentration differences between the extracellular and intracellular fluids.

問 1 . 最初の 1 節を和訳しなさい。

問 2 . 細胞内液と細胞外液との差異を述べなさい。

# 成 1 9 度大学院医学研究科 ( 2 回目 )

受 験 番 号

## 外国語試験問題・解答用紙 ( 外国人-英 語 )

The following is Editorial Comment appeared in “Nature” concerning preventing cancer. Reade this and answer the questions.

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外国語試験問題・解答用紙 ( 外国人-英語 )

Question 1. (A) What is the campaign's phrase given by Australian government to prevent "Melanoma"? (B) What happened after this campaign?

Question 2. What are the Editor's idea(s) for Researchers to prevent "Growing epidemic of obesity"?

Question 3. What are the Editor's idea(s) for the "Government" to prevent "Growing epidemic of obesity"?

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外国語試験問題・解答用紙 ( 外国人-英語 )

Most control systems of the body act by negative feedback, which can best be explained by reviewing some of the homeostatic control systems of the body. In the regulation of carbon dioxide concentration, a high concentration of carbon dioxide in the extracellular fluid increases pulmonary ventilation. This, in turn, decreases the extracellular fluid carbon dioxide concentration because the lungs expire greater amounts of carbon dioxide from the body. In other words, the high concentration of carbon dioxide initiates events that decrease the concentration toward normal, which is negative to the initiating stimulus. Conversely, if the carbon dioxide concentration falls too low, this causes feedback to increase the concentration. This response also is negative to the initiating stimulus. In the arterial pressure-regulating mechanisms, a high pressure causes a series of reasons that promote a lower pressure, or a low pressure causes a series of reactions that promote an elevated pressure. In both instances, these effects are negative with respect to the initiating stimulus. Therefore, in general, if some factor becomes excessive or deficient, a control system initiates negative feedback, which consists of a series of changes that return the factor toward a certain mean value, thus maintaining homeostasis.

Question 1. In many types of equipment found in our living system, the negative feedback mechanism is adopted for the function of machine. Find an example of such equipments and interpret its mechanism briefly.

Question 2. The positive feedback system is also known to take an important role for the control of body mechanisms. Discuss the difference between the negative feedback system and positive feedback system.

