平成１５年１月期論文博士外国語試験
問題・解答用紙　（日本人）

受験番号
論

問1.　次の文章を読み、以下の設問に答えなさい。

The most robust intervention for slowing aging and maintaining health and function in animals is dietary caloric restriction (CR). Although most studies of this phenomenon have been conducted in rodents and lower animals, data accumulating from rhesus monkeys suggest that CR may also be relevant for primates, including humans. These findings include CR-induced attenuation of age changes in plasma triglycerides and melatonin as well as oxidative damage and glucose tolerance. Current mortality data from our ongoing studies in rhesus monkeys, although not yet statistically significant, reveal that mortality in CR monkeys is about half (1) that observed in controls (15% compared (2) 24%, respectively).

Moreover, because we have already demonstrated that two of the most robust biomarkers of CR in rodents, reduced body temperature and plasma insulin, also occur in rhesus monkeys on CR, it became important to assess their association (3) human survival. CR also slows the rate of decline in serum dehydroepiandrosterone sulfate (DHEAS) such that restricted monkeys maintain more youthful levels of this adrenal steroid. DHEAS, which declines in both rhesus monkeys and humans during normal aging, may be important in health maintenance and may serve as another potential longevity marker. All three biomarkers indicate that CR causes a fundamental shift in metabolic processes.

Figure 1, A to C, shows the effects of CR on body temperature, insulin, and DHEAS in male rhesus monkeys, and Fig.1, D to F, compares survival of healthy men in the Baltimore Longitudinal Study of Aging (BLSA) who are in the upper and lower halves of the distributions for the corresponding markers. Consistent (4) the beneficial effects of CR on aging and lifespan in other animals, men with lower temperature and insulin and those maintaining higher DHEAS levels have greater survival than respective counterparts.

Because all analyses are corrected (5) initial subject age, any differences between upper and lower halves for the respective markers would not influence interpretation of survival differences. In fact, only subjects in the DHEAS study exhibited a significant difference in initial age for upper and lower halves. Moreover, if subsets of these individuals with identical initial age distributions or subject pairs matched (6) initial age from the upper and lower halves are examined, significant survival differences persist, as would be expected from age-adjusted analyses. It should also be noted that DHEAS sampling times were comparable between comparison groups, so that data might alternatively be expressed as rates of change or slopes. In this case, however, because insulin and temperature measures refer (7) actual values, rather than rates of change, the DHEAS data are expressed accordingly for more relevant comparison.

(8) our knowledge, the BLSA men are not CR. However, whatever environmental or genetic factors result in CR-like effects on the physiological markers examined here would appear to be related (9) longevity and therefore worthy (10) further investigation. Moreover, the fact that monkeys on CR exhibit reduced insulin, body temperature, and decline in DHEAS further supports the likelihood that this nutritional treatment will enhance survival in these primates.　(Cited from Roth, G.S. *et al.* Science, 297: 811, 2002.)

設問1.　Figure 1 に関する設問に答えなさい。

(1) のカラムはCR群ですか。対照群ですか。(　　)
(2) のカラムはCR群ですか。対照群ですか。(　　)
(3) のカラムはCR群ですか。対照群ですか。(　　)
(4) のカラムはCR群ですか。対照群ですか。(　　)
(5) のカラムはCR群ですか。対照群ですか。(　　)
(6) のカラムはCR群ですか。対照群ですか。(　　)

(7) のカーブは高値群ですか。低値群ですか。(　　)
(8) のカーブは高値群ですか。低値群ですか。(　　)
(9) のカーブは高値群ですか。低値群ですか。(　　)
(10) のカーブは高値群ですか。低値群ですか。(　　)
(11) のカーブは高値群ですか。低値群ですか。(　　)
(12) のカーブは高値群ですか。低値群ですか。(　　)

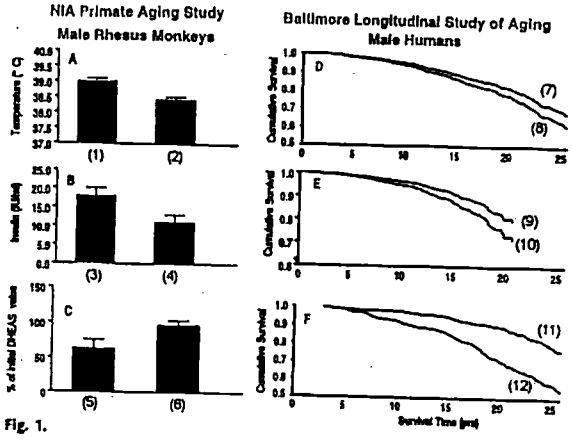

Fig. 1.

設問2.　貴方はこの文章にどのような英語のタイトルをつけますか。

設問3.　括弧のなかに適当な英語の語句を答えなさい。

1 (　　), 2 (　　), 3 (　　), 4 (　　), 5 (　　)
6 (　　), 7 (　　), 8 (　　), 9 (　　), 10 (　　)

設問4.　この文章を日本語（200字以内）で要約しなさい。

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受験番号	
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問２　以下の文章を読んで設問に答えなさい。

The technique of near infrared spectroscopy (NIRS) relies upon two important phenomena, (i) the fact that biological tissue is relatively transparent to light in the near infrared region of the spectrum and (ii) that in tissue, there are compounds whose absorption of light is oxygenation status dependent. Light in the visible region of the spectrum (with wavelength between 450-700nm) is strongly attenuated in tissue and therefore fails to penetrate more than approximately 1cm of tissue. However at near infrared wavelengths (A), the absorption of light is significantly lower, and with sensitive instrumentation it is possible to detect light which has traversed up to 8cm of tissue. This means that NIR light can be used to interrogate substantial regions of tissue. The technique can monitor the changes in concentration of those compounds which are present in tissue in significant concentration and whose absorption characteristics in the NIR region of the spectrum have been well defined. Within this subset of (1) compounds there are absorbers whose concentration over a reasonable measurement period are fixed and whose presence merely adds to the total light attenuation. Of more interest are the absorbing compounds whose concentration (and therefore light absorption) vary with time or with oxygenation status. These compounds are oxyhaemoglobin (HbO_2), deoxyhaemoglobin (Hb), and oxidized cytochrome oxidase (CtOx). It is the measurement of these compounds which can be used provide information on tissue oxygenation status. Light interaction with tissue involves scatter and absorption; the amount of each depending upon the wavelength of the light and the type of tissue illuminated. Both of these phenomena must be considered in NIRS measurement, first in isolation and then in term of their combined effect.

Within the 'window' of transparency the most important absorbers are the haemoglobin group. The specific extinction coefficients of oxygenated haemoglobin (HbO_2) and deoxyhaemoglobin (Hb) in the wavelength range 450-1000nm are shown in Figure. The difference in the absorption levels between the two compounds in the visible part of the spectrum can clearly be seen. This difference explains the well recognized phenomena of arterial blood (containing approximately 98% HbO_2) having a bright red appearance while venous or deoxygenated blood appears more purple or blue. In many ways NIRS is an extension of this crude technique of colour coding tissue according to its oxygenation status. In the near infrared region of the spectrum, the absorption of both chromophores decreases significantly compared to that observed in the visible region. (2)However the absorption spectra of Hb and HbO_2 remain significantly different in this region allowing spectroscopic separation of the compounds to be possible using only a few sample wavelengths. An isobestic point where the specific extinction coefficients of the two compounds are equal can be seen at around (B)nm, which can be used to calculate haemoglobin concentration independent of oxygen saturation. (from "A practical users guide to Near Infrared Spectroscopy", Hamamatsu Photonics, 1995)

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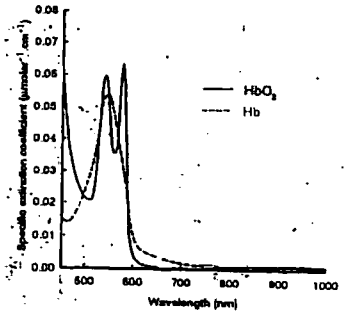
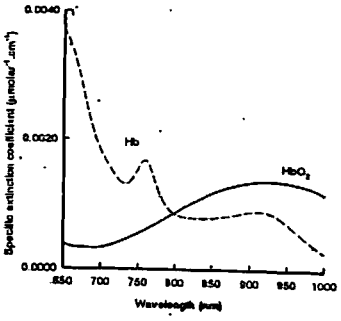
問題・解答用紙　（日本人）2/2

受験番号
論





設問１　(A) の部分に入る周波数として最も適切なものを○印で示しなさい。

(　　) 600 – 700nm

(　　) 700 - 1000nm

(　　) 1000 - 1500nm

(　　) 1500 – 2000nm

設問２　下線(1)で示した compounds として、Hb や HbO_2 の他にどのような物が考えられるか、例を挙げなさい。

1

2

3

設問３　図を参考に、(B) に入る最も相応しい数値を選びなさい。

(　　) 750

(　　) 800

(　　) 920

設問４　下線部(2)の特徴を利用してパルスオキシメーターという酸素飽和度の測定器が開発されたが、その臨床上の利点について述べなさい。

平成１５年１月期論文博士外国語試験
問題・解答用紙　（外国人-英語）

受験番号
論

Problem 1. Read the following sentences and answer the questions below in English or Japanese.

The most robust intervention for slowing aging and maintaining health and function in animals is dietary caloric restriction (CR). Although most studies of this phenomenon have been conducted in rodents and lower animals, data accumulating from rhesus monkeys suggest that CR may also be relevant for primates, including humans. These findings include CR-induced attenuation of age changes in plasma triglycerides and melatonin as well as oxidative damage and glucose tolerance. Current mortality data from our ongoing studies in rhesus monkeys, although not yet statistically significant, reveal that mortality in CR monkeys is about half (1) that observed in controls (15% compared (2) 24%, respectively).

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Q1. Answer the questions related to the Figure 1.

Is (1) column CR group or comparison group? (　　)
Is (2) column CR group or comparison group? (　　)
Is (3) column CR group or comparison group? (　　)
Is (4) column CR group or comparison group? (　　)
Is (5) column CR group or comparison group? (　　)
Is (6) column CR group or comparison group? (　　)

Is (7) curve Higher group or Lower group? (　　)
Is (8) curve Higher group or Lower group? (　　)
Is (9) curve Higher group or Lower group? (　　)
Is (10) curve Higher group or Lower group? (　　)
Is (11) curve Higher group or Lower group? (　　)
Is (12) curve Higher group or Lower group? (　　)

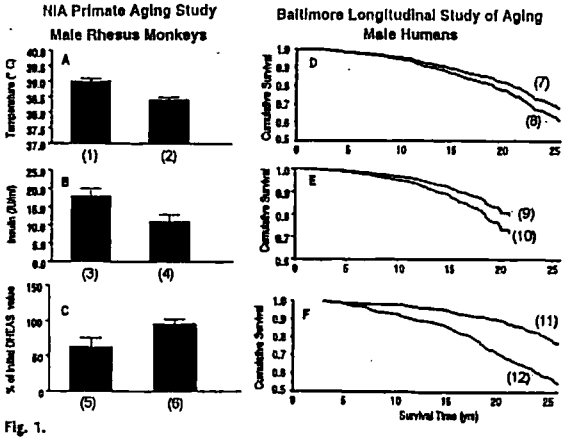

Fig. 1.

Q2. What title do you give to these sentences?

Q3. Answer appropriate word/words for the parentheses.

1 (　　), 2 (　　), 3 (　　), 4 (　　), 5 (　　)
6 (　　), 7 (　　), 8 (　　), 9 (　　), 10 (　　)

Q.4. Summarize these sentences within 100 words.

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受験番号	
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2 Read the following sentences and answer the questions below in English or Japanese.

The technique of near infrared spectroscopy (NIRS) relies upon two important phenomena, (i) the fact that biological tissue is relatively transparent to light in the near infrared region of the spectrum and (ii) that in tissue, there are compounds whose absorption of light is oxygenation status dependent. Light in the visible region of the spectrum (with wavelength between 450-700nm) is strongly attenuated in tissue and therefore fails to penetrate more than approximately 1cm of tissue. However at near infrared wavelengths (A), the absorption of light is significantly lower, and with sensitive instrumentation it is possible to detect light which has traversed up to 8cm of tissue. This means that NIR light can be used to interrogate substantial regions of tissue. The technique can monitor the changes in concentration of those compounds which are present in tissue in significant concentration and whose absorption characteristics in the NIR region of the spectrum have been well defined. Within this subset of (1) compounds there are absorbers whose concentration over a reasonable measurement period are fixed and whose presence merely adds to the total light attenuation. Of more interest are the absorbing compounds whose concentration (and therefore light absorption) vary with time or with oxygenation status. These compounds are oxyhaemoglobin (HbO_2), deoxyhaemoglobin (Hb), and oxidized cytochrome oxidase (CtOx). It is the measurement of these compounds which can be used provide information on tissue oxygenation status. Light interaction with tissue involves scatter and absorption; the amount of each depending upon the wavelength of the light and the type of tissue illuminated. Both of these phenomena must be considered in NIRS measurement, first in isolation and then in term of their combined effect.

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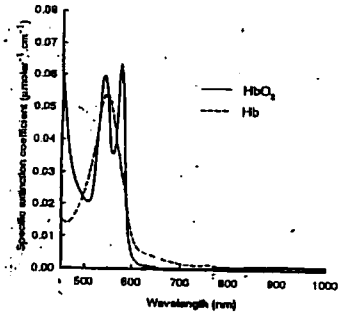
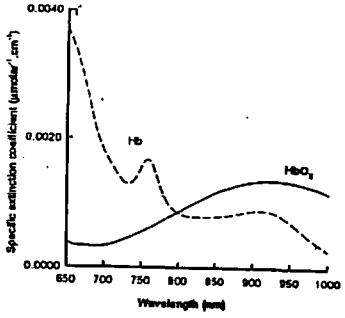
平成１５年１月期論文博士外国語試験
問題・解答用紙　（外国人-英語）2/2

受験番号	
論	





Question 1　Which is the most proper wave length for (A)?

(　　) 600 – 700nm

(　　) 700 - 1000nm

(　　) 1000 - 1500nm

(　　) 1500 – 2000nm

Question 2　What are the examples for (a)compounds other than Hb and HbO2?

1

2

3

Question 3　Which is the most proper number for (B)?

(　　) 750

(　　) 800

(　　) 920

Question 4 Using characteristics shown in underlined sentence (2), Pulse Oximeter was developed for the measurement of oxygen saturation in the patients. What are the clinical benefits and advantages of this device?