單選題共計 100 分，每題 2 分，答錯倒扣 0.6 分
*注意：請於試卷上「選擇題作答區」內依序作答

Fermented Soymilk

Being a probiotic microorganism which exerts a beneficial effect on the health and well-being of the host, some of the lactic acid bacteria and bifidobacteria are commonly used in the preparation of healthy foods. On the other hand, soybean is generally considered as a food material with high nutritive quality despite its undesirable bean odor and containing stachyose and raffinose which contribute to flatulence. In an attempt to develop a probiotic diet adjunct that overcomes the disagreeable bean flavor, and to reduce the level of flatulence factor, researchers have conducted a series of studies on the fermentation of soymilk, the water extract of soybean, with the probiotic culture of lactic acid bacteria and bifidobacteria. These studies revealed that the fermented soymilk possessed a reduced content of stachyose and raffinose in addition to containing probiotic bacteria. Besides, the fermented soymilk was also found to contain a significantly higher content of the bioactive isoflavone aglycone and showed a higher effect on ascorbate antioxidation inhibition, reducing activity and superoxide anion radical-scavenging capability than its unfermented counterpart. Furthermore, it was noted that antimutagenic activity of soymilk toward 4-nitroquinoline-N-oxide (4-NQO) and 3,2'-dimethyl-4-amino-biphenyl (DMAB) was enhanced significantly after fermentation. It also revealed that the increased antimutagenicity of fermented soymilk, varying with starter organism and the type of mutagen tested.

Antimutagen is an agent that reduces the number of spontaneous or induced mutations generated in particular circumstances. Bioantimutagens suppress the effects of mutagens by modulating cellular mutagenic process, that is, by mainly acting on DNA replication and repair process after DNA is damaged by mutagen. On the other hand, desmutagens show their antimutagenicity by directly inactivating mutatens or their precursors, by suppressing the activity of metabolic enzymes. Mutagens may also exert a blocking effect, adjusting the function of bacterial cell to reduce the mutation of DNA induced by mutagen. For example, ellagic acid exerted blocking effect on the mutagenicity of 2-amino-3-methylimidazo[4,5-f] quinoline by modifying the binding site of mutagens on DNA to avoid the damage of DNA. The DNA adducts with chlorophyll and chlorophyllin, exhibiting antimutagenic activity, reduced the DNA damage induced by mutagens.

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1. (A) Lactic acid bacteria (B) Bifidobacteria (C) Protein (D) Soybean may cause flatulence.
2. (A) Some nutrient (B) Raffinose (C) Protein, (D) Aglycone makes soybean undesirable as a food material.
3. Which of the following statements is not true?
   (A) Chlorophyll may exert blocking effect.
   (B) Chlorophyll may act to repair the injured DNA.
   (C) Chlorophyll may suppress the mutagenesis induced by mutagen.
   (D) Chlorophyll may combine with DNA
4. Normally, the fermented soymilk mentioned in the above article does not contain (A) DMAB, (B) isoflavone, (C) stachyose, (D) protein.
5. "Probiotic microorganism" referred to the microorganism which may exert (A) good effect , (B) adverse effect (C) both good and bad effects (D) neither good nor bad effect on human beings.
6. (A) 4-NQO, (B) Isoflavone, (C) Stachyose (D) Raffinose may induce mutation of cells.
7. Which one of the following statements is not correct?
   (A) An enhanced ascorbate autioxidation inhibition was noted with fermented soymilk.
   (B) Fermented soymilk stimulated the mutagenicity of DMAB.
   (C) Fermentation lowered the raffinose content of soymilk.
   (D) Fermentation increased the aglycone content of soymilk.
8. The incorrect statement listed below is
   (A) An desmutagen may act to repair the injured DNA.
   (B) Desmutagen may act on mutagen.
   (C) Desmutagen may inactivate the metabolic enzyme.
   (D) Desmutagen may act on other compound outside the cells.
9. (A) Antimutagen (B) Bioantimutagen (C) Mutagen (D) Desmutagaten may injure DNA.
10. Chlorophyllin exerted antimutagenic effect by (A) repairing the injured DNA. (B) inactivating mutagen directly. (C) inhibiting the activity of metabolic enzymes. (D) exerting blocking effect.

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Bacillus cereus

Bacillus cereus is a Gram positive, facultative anaerobic, spore-forming bacterium. It is widely distributed in nature and a common contaminant of foods such as dairy products, spices, cereals and various vegetables. In addition to being frequently found in raw milk, other dairy products including pasteurized milk, fermented milk, milk powder, ice cream and fermented flavored milk have been reported to contain various levels of *B. cereus*, ranging from 2 to 52%. The proliferation of the contaminated *B. cereus* may cause flavors to go off and induce sweet curdling, thus reducing the shelf life of dairy products. Additionally, *B. cereus* causes food poisoning leading to two relevant symptoms, the emetic and diarrhea syndromes. The diarrheic syndrome is due to the production of enterotoxin in the intestine, while the production of cereulide, an emetic toxin, in food by *B. cereus* may cause the emetic symptoms. Therefore, controlling the contamination and proliferation of *B. cereus* in food deserves attention so the quality and safety of food can be ensured.

Various foodborne pathogens such as *Salmonella, Listeria, Vibrio* and *Escherichia coli* O157:H7 have been reported to exhibit an enhanced resistance to severe acid environments after exposure to a mild acid environment. In addition, acid-adapted bacteria may also show increased resistance, or cross-protection, to other stress environments. This phenomenon has been termed acid tolerance response and has important implication in food safety.

It has been found that acid adaptation time influenced the increased tolerance of *B. cereus* in PBS (pH 4.0). The 2 h-adapted cells exhibited the highest acid tolerance in PBS. Besides, the presence of chloramphenicol during the acid adaptation reduced the extent of increased acid tolerance. At pH 4.0, 49 °C and -18 °C and in the presence of various organic acids such as acetic, propionic, citric , lactic or tartaric acid, the acid tolerance of *B. cereus* 1-4-1increased after exposure to acid adaptation treatment at pH 5.5 for 2 h. While a decreased survival was noted for the acid-adapted cells during storage at 4 °C. Additionally, the acid-adapted *B. cereus* 1-4-1 exhibited a higher survival percentage than the non-adapted cells in an acidic beverage stored at 4 or 25 °C and showed a short lag period for enterotoxin production.

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11. Among the microorganisms mentioned in the above article, which of the following organisms can produce spore
(A) *Escherichia. Coli* O157:H7
(B) *Salmonella*
(C) *B. cereus*
(D) *Vibrio*

12. Which of the following statements concerning *B. cereus* is not correct?
(A) Cells of *B. cereus* appeared blue color after Gram staining.
(B) *B. cereus* can grow only in presence of oxygen.
(C) *B. cereus* can be found in various food products.
(D) *B. cereus* can cause food-borne disease

13. The incorrect statement shown below is
(A) Acid adaptation time affects the acid adaptation response of *B. cereus* 1-4-1.
(B) Extent of acid adaptation response is influenced by chlorophenicol.
(C) Survival of the acid-adapted *B. cereus* 1-4-1 was not the same in presence of citric and lactic acid.
(D) Acid adaptation was found to enhance the survival of *B. cereus* 1-4-1 in all the other stress conditions mentioned in the above article.

14. The statement which does not coincide with the description in the above article is
(A) *Listeria* may use food as a vehicle to infect human beings.
(B) *Listeria* can cause disease.
(C) Acid adaptation may decrease the survival of *Listeria* exposure to a severe acidity when compared with the non-adapted cells.
(D)Acid-adaptation response of *Listeria* have significant implication in food safety.

15. Select the statement which does not coincide with that described in the above article
(A) Sweet curding is a defect occurred in milk products.
(B) Presence of *B. cereus* may improve the keeping quality of dairy product.
(C) Contamination of *B. cereus* should be concerned to safeguard the safety of food.
(D) *B. cereus* may cause the off-flavor of pasteurized milk.

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16. Emetic syndrome mentioned in the above article is due to
(A) the ingestion of food containing cereulide.
(B) the consumption of food containing *B. cereus* which produces cereulide in intestine.
(C) the consumption of food containing enterotoxin.
(D) the ingestion of food containing *B .cereus* which produce enterotoxin in intestine.

17. Acid adaptation treatment made cells of *E. coli* O157:H7
(A) more liable.
(B) more sensitive.
(C) more susceptible.
(D) more resistant to a severe acidic condition.

18. Which one of the following description is not true?
(A) *B cereus* 1-4-1 has been subjected to acid adaptation for various periods of the time.
(B) Cells of *B. cereus* 1-4-1 were acid adapted at pH 4.0.
(C) Acid adaptation of *B. ceeus* 1-4-1 has been conducted in broth containing chloramphenicol.
(D) Acid adaptation response can be found with various microorganisms.

19. Point out the statement which is not true:
(A) *B. cereus* 1-4-1 can cause foodborne outbreak leading to the diarrhea syndrome.
(B) Survival of the acid-adapted *B. cereus* 1-4-1 is more in acidic fruit juice than the non-adapted one.
(C) Acid adaptation affected the survival of *B. cereus* 1-4-1 at -18 °C.
(D) *B. cereus* 1-4-1 subjected to acid adaptation showed enhanced survival at 4 °C.

20. According to the above article, which of the following statements is not true?
(A) Susceptibility of *Salmonella* to severe acidity decreased after exposure to a mild acidity.
(B) Acid adaptation enhanced the survival of *Vibrio* to other stress conditions.
(C) Ingestion of food containing *Salmonella* may cause disease.
(D) Acid-adapted *B. cereus* survived better at 49 °C than did the non-adapted one.

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Reading test article 1 (Source: *http://www.articlesbase.com/health-articles/vxx-525486.html*):

You know that eating a vegetarian diet can decrease the incidence of heart disease and certain types of cancers. You also know that it can make you leaner and healthier. But so many of the health studies are done on men? What about women and the impact of a vegetarian diet on their health as they age?

Diets that are high in protein, especially animal protein, tend to cause the body to excrete more calcium, oxalate, and uric acid. These three substances are the main components of urinary tract stones. British researchers have advised that persons with a tendency to form kidney stones should follow a vegetarian diet. The American Academy of Family Physicians notes that high animal protein intake is largely responsible for the high prevalence of kidney stones in the United States and other developed countries and recommends protein restriction for the prevention of recurrent kidney stones.

For many of the same reasons, vegetarians are at a lower risk for osteoporosis. Since animal products force calcium out of the body, eating meat can promote bone loss. In nations with mainly vegetable diets (and without dairy product consumption), osteoporosis is less common than in the U.S., even when calcium intake is also less than in the U.S. Calcium is important, but there is no need to get calcium from dairy products.

Some studies have suggested that vegetarians may be at lower risk of osteoporosis than non-vegetarians. Bone loss is considerably less in postmenopausal women who were vegetarian than those who were non-vegetarian. The non-vegetarian diet contained higher amounts of sulphur, which derived from animal protein.

Dietary sulphur increases the acidity of urine, which results in increased urinary calcium loss. Increased urinary calcium loss is related to increased calcium loss from bone tissue. Hip fractures associated with osteoporosis have been shown to be higher in countries consuming a diet high in animal protein.

We continue to consume meat, while at the same time downing calcium supplements and prescription drugs to prevent osteoporosis, that often have drastic side effects. And most experts agree that calcium supplements are inferior to calcium derived from natural food sources. Doesn't it make more sense (and cents) to get your calcium from eating a healthier diet?

What are some good vegetarian sources of calcium? Orange juice is one example. Dry beans, such as black-eyed peas, kidney beans and black beans are another good source, as are dark leafy vegetables such as broccoli and kale. Tofu is also a good source of calcium.

Please choose the best answer according to the above article

21. Why vegetarians are at lower risk of osteoporosis than non-vegetarians? (1) they have more calcium intake (2) they drink more orange juice (3) meat contain more sulphur (4) they take calcium supplements.
22. What can be decreased by eating vegetarian diets? (1) all of the followings (2) blood pressure (3) urinary tract stones (4) body weight.
23. Which is an inferior source of calcium? (1) bean curd (2) cabbage (3) calcium supplements (4) orange juice.

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24. What is a main component of urinary tract stones? (1) oxalate (2) calcium (3) uric acid (4) all of the above.
25. Why does it make more cents to get calcium from eating vegetarian diets? (1) vegetarian diets provide more calcium (2) vegetarian diets are more economic (3) vegetarian diets have calcium supplements (4) all of the above.
26. What is the title of this paper? (1) Vegetarian diets for preventing osteoporosis (2) The benefits of vegetarian diets (3) The causes of osteoporosis (4) none of the above.

Reading test article 2 (Source: Montville R., Schaffner D.W. 2004. *J Food Prot*, 67:758-765(8)):

Consumption of raw sprouts has caused many food borne illness outbreaks in the last decade, and most outbreaks have been linked to contaminated seeds. Many seed sanitization treatments have been studied as a means to reduce the risk of illness associated with sprouts. Published data on seed sanitization were analyzed collectively to identify factors that influenced the efficacy of seed sanitization and to determine the variability associated with various sanitization processes. Temperature and duration of the sanitization treatment were found to produce a negligible effect on log microbial reductions. *Salmonella*, *Escherichia coli* O157:H7, and total aerobic microorganisms were all inactivated at similar rates. Data were fit to triangular or uniform distributions for 16 different chemical treatments. Among the most effective treatments were 8% hydrogen peroxide (uniform distribution [2.5, 4.5]), 20,000 ppm of chlorine (triangular distribution [1, 2.5, 6.5]), and 1% $Ca(OH)_2$ (triangular distribution [0.5, 4, 5]). Chemical treatments where more published data were available showed more variability.

Please choose the best answer according to the above article

27. What is a major factor that influenced the efficacy of seed sanitization? (1) type of chemicals (2) temperature (3) time (4) all of the above.
28. What is an important cause of food borne illness outbreaks caused by eating raw sprouts? (1) sprout cultivating environment (2) type of sprouts (3) seed contamination (4) none of the above.
29. What is a uniform distribution? (1) a statistical model (2) a graph (3) a mathematical equation (4) all of the above.
30. What is the title of this article? (1) a study on sanitization of sprout seeds (2) an analysis of published sprout seed sanitization studies (3) comparisons on sanitization methods of sprout seeds (4) none of the above.

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Processing and Storage Effects on Monomeric Anthocyanins, Percent Polymeric Color, and Antioxidant Capacity of Processed Blueberry Products

This study evaluated the effects of processing and 6 mo of storage on total monomeric anthocyanins, percent polymeric color, and antioxidant capacity of blueberries that were canned in syrup (CS), canned in water (CW), pureed, and juiced (clarified and nonclarified). Total monomeric anthocyanins, percent polymeric color, and oxygen radical absorbing capacity (ORAC) assay using fluorescein (ORACFL) were determined postprocessing after 1 d, and 1, 3, and 6 mo of storage. Thermal processing resulted in marked losses in total anthocyanins (28% to 59%) and ORACFL values (43% to 71%) in all products, with the greatest losses occurring in clarified juices and the least in nonclarified juices. Storage at 25 °C for 6 mo resulted in dramatic losses in total anthocyanins, ranging from 62% in berries CW to 85% in clarified juices. This coincided with marked increases in percent polymeric color values of these products over the 6 mo storage. The ORACFL values showed little change during storage, indicating that the formation of polymers compensated for the loss of antioxidant capacity due to anthocyanin degradation. Methods are needed to retain anthocyanins in thermally processed blueberries. (Brownmiller et al., 2008, Journal Food Sci. 73(5): **H72-H79)**

31. Which of the following ones is used for oxygen radical absorbing capacity assay? (A) high-performance liquid chromatography (B) ion-exchange chromatography (C) fluorescein (D) gas chromatography
32. Which of the following ones is not the samples used in this study? (A) blueberries juice (B) blueberries puree (C) blueberries canned in syrup (D) blueberries powder
33. Which of the following items is not the evaluated effects of processing and 6 mo of storage on blueberries in this study? (A) total monomeric anthocyanins (B) flavanone glycosides (C) antioxidant capacity (D) percent polymeric color
34. Thermal processing resulted in marked losses in total anthocyanins (28% to 59%) and ORACFL values (43% to 71%) in all products, which of the following products is with the highest losses? (A) clarified juices (B) canned in syrup (C) nonclarified juices (D) pureed
35. According to the article stated above, which of the following statements is not correct? (A) Total monomeric anthocyanins, percent polymeric color, and oxygen radical absorbing capacity (ORAC) assay using fluorescein (ORACFL) were determined postprocessing after 1 d, and 1, 3, and 6 mo of storage. (B)

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Storage at 25 °C for 6 mo resulted in dramatic losses in total anthocyanins, ranging from 62% in berries CW to 85% in clarified juices. (C) Methods are needed to retain anthocyanins in thermally processed blueberries. (D) The ORACFL values showed little change during storage, indicating that the degradation of polymers compensated for the loss of antioxidant capacity due to anthocyanin degradation.

Effect of Heat Treatment on the Phenolic Compounds and Antioxidant Capacity of Citrus Peel Extract

This paper reports the effects of heat treatment on huyou (*Citrus paradise* Changshanhuyou) peel in terms of phenolic compounds and antioxidant capacity. High-performance liquid chromatography (HPLC) coupled with a photodiode array (PDA) detector was used in this study for the analysis of phenolic acids (divided into four fractions: free, ester, glycoside, and ester-bound) and flavanone glycosides (FGs) in huyou peel (HP) before and after heat treatment. The results showed that after heat treatment, the free fraction of phenolic acids increased, whereas ester, glycoside, and esterbound fractions decreased and the content of total FGs declined ($P < 0.05$). Furthermore, the antioxidant activity of methanol extract of HP increased ($P < 0.05$), which was evaluated by total phenolics contents (TPC) assay, 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonate) ($ABTS^{\bullet+}$) method, and ferric reducing antioxidant power (FRAP) assay. The correlation coefficients among TPC, ABTS, FRAP assay, and total cinnamics and benzoics (TCB) in the free fraction were significantly high ($P < 0.05$), which meant that the increase of total antioxidant capacity (TAC) of HP extract was due at least in part to the increase of TCB in free fraction. In addition, FGs may be destroyed when heated at higher temperature for a long time (for example, 120 °C for 90 min or 150 °C for 30 min). Therefore, it is suggested that a proper and reasonable heat treatment could be used to enhance the antioxidant capacity of citrus peel. (Xu et al., 2007, J. Agric. Food Chem. 55: 330-335)

36. Huyou peel is one kind of ? (A) apple peel (B) pear peel (C) citrus peel (D) melon peel
37. According to the article stated above, which of the following ones was not used for the evaluation of the antioxidant activity of methanol extract of HP? (A) 2,2'-azinobis(3-ethylbenzothiazoline-6-sulfonate) method (B) 2,2-diphenyl-1-pycrylhydrazyl test (C) total phenolics contents assay (D)

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FRAP assay

38. High-performance liquid chromatography (HPLC) coupled with a photodiode array (PDA) detector was used in this study for the analysis of phenolic acids. How many fractions were divided from phenolic acids? (A) one (B) two (C) three (D) four

39. According to the article stated above, which of the following statements is not correct? (A) FGs may be destroyed when heated at lower temperature for a long time. (B) The correlation coefficients among TPC, ABTS, FRAP assay, and total cinnamics and benzoics (TCB) in the free fraction were significantly high ($P < 0.05$). (C) It is suggested that a proper and reasonable heat treatment could be used to enhance the antioxidant capacity of citrus peel.. (D) The increase of total antioxidant capacity (TAC) of HP extract was due at least in part to the increase of TCB in free fraction.

40. After heat treatment, which of the following results is not correct in this study? (A) content of total FGs decreased (B) ester fraction of phenolic acids decreased (C) glycoside fraction of phenolic acids increased (D) the free fraction of phenolic acids increased

Resveratrol and novel potent activators of SIRT1: effects on aging and age-related diseases

Resveratrol (3,5,4′-trihydroxystilbene) is a polyphenol that belongs to the stilbene family of phytoalexins, which are antibiotic compounds produced by plants in response to infection. Resveratrol has been detected in at least 72 plant species[1] but is present in only a limited number of common foods. Grapes, grape juice, red wine, and peanuts represent the richest dietary sources of resveratrol.[2] Cranberries, blueberries,[3] and tomato skin[4] also contain this polyphenol, though at levels <10% of those reported for grapes. Dietary resveratrol exists as the free *trans*- or *cis*-isomer or conjugated with glucose (known as resveratrol glucoside or piceid). Although *trans*-resveratrol is absorbed efficiently by humans, the gut and liver metabolize it extensively, resulting in exceedingly low systemic bioavailability.[5]

Resveratrol has generated intense scientific and public interest in recent years, mainly because of its widely reported ability to delay aging and prevent age related diseases. As a result, a multitude of different resveratrol supplements have now appeared on the market. A cross- sectional study found that supplemental resveratrol is taken by

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two-thirds of individuals who routinely consume multiple dietary supplements.[6] The salutary effects of resveratrol were originally thought to derive from its antioxidant properties.[7] Indeed, the high concentration of resveratrol in red wine is frequently cited to account for the "French paradox," the observation that the French have relatively low rates of cardiovascular disease despite consuming diets rich in saturated fat.[8] Recent research, however, is converging on a different molecular mechanism that underlies the pleiotropic effects of this compound. Studies in a variety of species indicate that resveratrol seems to exert benefit by activating SIRT1, a member of the sirtuin family of nicotinamide adenine dinucleotide (NAD+)-dependent deacetylases. Much research effort is now directed at identifying more potent, and more bioavailable, activators of SIRT1 in an effort to combat aging and associated diseases. (Knutson and Leeuwenburgh 2008 Nutrition Review 66(10): 591-596

41. Which kind of foods does not contain resveratrol? (A) red wine (B) tomato skin (C) red meat (D) peanuts.
42. Which is the best description about the "French paradox" ? (A) the French like meat and live longer (B) the French believe that "more wine, less meat" is a paradox (C) French scientists propose that alcohol consumption promote health (D) the French consume high amount of saturated fats and have relative low coronary heat disease.
43. Which description about resveratrol is NOT true? (A) is a plant phenol (B) has good bioavalibility (C) is an antioxidant (D) is an antibiotic produced by plant.
44. According to this article, which is NOT the salutary effects of resveratrol? (A)delay aging (B) reduce oxidation damage in kidney (C) prevent CHD (D) can activate SIRT1.
45. Which type of resveratrol can be absorbed efficiently (A) *trans* isomer (B) *cis*-isomer (C) resveratrol glucoside (D) both *trans*- and *cis*- isomers.
46. According to this article, which description about resveratrol and SIRT1 is NOT true? (A) SIRT1 is an NAD+-dependent enzyme (B) the activation of SIRT1 may result in extending life span (C) resveratrol analogs may be a future pharmaceutical interest to combat aging (D) resveratrol can activate SIRT1 through oxidation.

Caloric restriction and genomic stability

Caloric restriction (CR) reduces the incidence and progression of spontaneous and induced tumors in laboratory rodents while increasing mean and maximum life spans. It has been suggested that CR extends longevity and reduces age-related pathologies

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by reducing the levels of DNA damage and mutations that accumulate with age. This hypothesis is attractive because the integrity of the genome is essential to a cell/ organism and because it is supported by observations that both cancer and immunological defects, which increase significantly with age and are delayed by CR, are associated with changes in DNA damage and/or DNA repair. Over the last three decades, numerous laboratories have examined the effects of CR on the integrity of the genome and the ability of cells to repair DNA. The majority of studies performed indicate that the age-related increase in oxidative damage to DNA is significantly reduced by CR. Early studies suggest that CR reduces DNA damage by enhancing DNA repair. With the advent of genomic technology and our increased understanding of specific repair pathways, CR has been shown to have a significant effect on major DNA repair pathways, such as NER, BER and double-strand break repair.
(Heydari et al. 2007 Nucleic Acids Research 35(22): 7485-7496)

47. According to the abstract, which description about caloric restriction is NOT true? (A) increase genome instability (B) reduce DNA damage (C) increase DNA repair (D) extend life span.
48. What is the main focus of this article? (A) the beneficial effects of calorie restriction (B) caloric restriction and aging process (C) caloric restriction and DNA repair (D) caloric restriction and genome technology.
49. What is "caloric restriction"? (A) low carbohydrate diet (B) low protein diet (C) limited dietary energy intake (D) limited dietary intake results in malnutrition.
50. According to the abstract, which description about "genome integrity" is NOT true? (A) it is essential to cells (B) increases significantly with age (C) is associated with DNA repair (D) CR may protect it.

試題隨卷繳回