

1-50 為單選題，每題 2 分，答錯倒扣 0.5 分 ※ 注意：請於試卷上「選擇題作答區」內依序作答。

Article 1

Fermentation is an ancestral form of food preparation developed before humans fully realized the benefits that have since been validated by scientific research. Originally, fermentation was conducted to preserve food. Fermentation also yields texture, color, and flavor modification as well as beneficial nutritional improvements. Making food more digestible and requiring less cooking time and removing undesirable and toxic food constituents is another important aspect of the fermentation process. Furthermore, fermentation has been frequently employed as an effective bioprocess to prepare healthy food or enhance the functional properties of food materials. For example, natto, a traditional Japanese fermented product of soybean, which is obtained through fermentation with *Bacillus subtilis* (natto), possesses nattokinase, a clot-dissolving agent used in the treatment of cardiovascular disease.

In an attempt to develop healthy dietary adjuncts, soymilk, the water extract of soybean, was fermented simultaneously with *Streptococcus thermophilus* and *Bifidobacterium infantis* at 37°C for 24 h. It was found that lactic fermentation reduced the content of saponins and phytates, which possess antinutritional activity, and enhanced the total phenolic content as well as antitumor cell proliferation effect of soymilk against HT-29 and Caco-2 cells. The original antitumor cell component, starter organisms, and antitumor cell bioactive principles formed in soymilk during fermentation, might all have contributed to the enhanced antitumor activity of fermented soymilk. The antiproliferative effect of the extracts varied with extraction solvent. Extracts obtained from fermented soymilk with 80% methanol exhibited the highest suppression effect on the proliferation of HT-29 and Caco-2 cells. This study further stresses the potential of developing soymilk as a healthy dietary adjunct possessing enhanced anticancer activity through the use of lactic fermentation.

1. According to the above article, fermentation of soymilk was attempted to prepare food ingredients possessing (A) good taste, (B) good texture, (C) functional properties beneficial to human health, (D) good color.
2. Saponins may (A) enhance, (B) increase, (C) demolish, (D) elevate the nutritive value of soymilk.
3. The incorrect statement shown below is (A) The phenolic content of soymilk increased after fermentation. (B) Fermentation improved the functional property of soybean. (C) Fermented soymilk contained a higher saponin content than did the un-fermented soymilk (D) Lactic fermentation reduced the phytate content in soymilk.
4. (A) *Streptococcus thermophilus*, (B) *Bifidobacterium infantis*, (C) Methanol, (D) Soymilk was not involved in the fermentation of soymilk.
5. Originally, soybean contains no (A) nattokinase, (B) phytates, (C) saponins, (D) phenolics.
6. At the beginning, fermentation was conducted to (A) improve the keeping quality of food materials. (B) enhance the nutritive value of food materials. (C) improve the flavors of food materials. (D) remove the toxic constituents of food materials.
7. Soybean fermented by (A) HT-29, (B) *Streptococcus thermophilus*, (C) *Bifidobacterium infantis*, (D) *Bacillus subtilis* can be used to treat cardiovascular disease.

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8. (A) Methanol, (B) Water, (C) *Streptococcus thermophilus*, (D) *Bifidobacterium infantis* was involved in the preparation of soymilk.
9. Fermented soybean prepared with *Bacillus subtilis* was noted to be able to (A) dissolve the blood clot. (B) suppress the growth of HT-29 cells. (C) reduce the content of phytates. (D) reduce the growth of Caco-2 cells.
10. Nattokinase existed in (A) *Bacillus subtilis*-fermented soybean, (B) *S. thermophilus*-fermented soymilk, (C) *Bacillus subtilis*-fermented soymilk, (D) *Bifidobacterium infantis*-fermented soymilk.
11. The wrong statement shown below is (A) Fermented soymilk contains antitumor cell principles similar to those in the soymilk. (B) Cells of *Streptococcus thermophilus* might show antitumor cell activity. (C) Constituents of soymilk possessed antitumor cell activity. (D) *Bifidobacterium infantis* might exhibit antitumor cell activity.
12. (A) *Bacillus subtilis*, (B) *Streptococcus thermophilus*, (C) *Bifidobacterium infantis*, (D) Caco-2 may cause harmful effect on human health.
13. Which one of the following statements is incorrect? (A) Fermentation was performed by our ancestors. (B) Fermentation has been performed long before their beneficial effects are realized. (C) Fermentation was performed only by people who possess adequate knowledge. (D) Fermentation has been performed for a long period of time.

Article 2, Study: Blue Colors in Candy Pose Health Risk to Kids

BRATISLAVA, Slovakia—Two blue food colors—Brilliant Blue (E133) and Patent Blue (E131)—commonly used in candy and authorized for use in the European Union disrupt cell metabolism when they are absorbed into the bloodstream, according to a new study published in the journal Food and Chemical Toxicology.

Researchers at the Slovak University of Technology who conducted the study are asking candy makers to stop using the blue colors in lollipops and hard candies because they may pose health risks to children by having extended contact with the mucous membranes of the tongue. For the study, the researchers exposed *ex vivo* pig tongues to human saliva containing 15,000 ng/cm² of each color for 20 minutes. After 24 hours, they found 34 ng/cm² of Brilliant Blue and 86 ng/cm² of Patent Blue can be directly absorbed into the blood system.

In 2010, the European Food Safety Authority (EFSA) re-evaluated the safety of Brilliant Blue and revised the acceptable daily intake (ADI) to 10 mg/kg bw/day. The ADI for Patent Blue is 15 mg/kg bw/day.

The food industry uses certified (artificial) and "exempt" (natural) colorants to meet consumer expectations, enhance their products, and maintain consistency in the face of seasonal and regional variability of the natural ingredients. [Source: Food Product Design, Virgo Publishing, (01/11/2013) <http://www.foodproductdesign.com>]

14. What are Brilliant Blue and Patent Blue? (A) Dyes for textile. (B) Food additives for confections. (C) Inks for candy packages. (D) Color reagents for bloodstain analysis.
15. According to this news, Brilliant Blue is _____ than Patent Blue. (A) more reactive (B) more toxic (C) darker (D) absorbed slower
16. According to this news, how are Brilliant Blue and Patent Blue regulated by the European Food Safety Authority? (A) They were banned in 2010. (B) They cannot be used in lollipops. (C) They are legal food additives. (D) They can be only used for pig feed.

17. According to the news, which of the following is NOT true? (A) Natural colorants are safer than artificial colorants. (B) Colorants are widely used in the food industry. (C) Two colorants were found to interfere cell metabolism. (D) Blue colorants were absorbed through the mucous membranes of the tongue.

Article 3, Strawberries, Blueberries Slash Heart Attack Risk in Women

DALLAS—Women who eat three or more servings of blueberries and strawberries per week reduce their risk of heart attack by 32%, according to a new study published in *Circulation: Journal of the American Heart Association*. The findings the protective benefit comes from naturally occurring anthocyanins that may help dilate arteries, counter the buildup of plaque and provide other cardiovascular benefits.

Researchers from the Harvard School of Public Health and the University of East Anglia conducted a prospective study among 93,600 women ages 25 to 42 years who participated in the Nurses' Health Study II. The women completed questionnaires about their diet every four years for 18 years.

During the study, 405 heart attacks occurred. Women who ate the most blueberries and strawberries had a 32% reduction in their risk of heart attack compared to women who ate the berries once a month or less—even in women who otherwise ate a diet rich in other fruits and vegetables. The findings were independent of other risk factors, such as age, high blood pressure, family history of heart attack, body mass, exercise, smoking, caffeine or alcohol intake.

Blueberries and strawberries were part of the study because they are the most-eaten berries in the United States; therefore, it's possible that other foods could produce the same results, researchers said.

"We have shown that even at an early age, eating more of these fruits may reduce risk of a heart attack later in life," said Aedín Cassidy, Ph.D., lead author and head of the Department of Nutrition at Norwich Medical School of the University of East Anglia. [Source: Food Product Design, Virgo Publishing, (01/14/2013) <http://www.foodproductdesign.com>]

18. What is the main purpose of this news? (A) To report the benefits of consuming blueberries and strawberries. (B) To report the finding of anthocyanins in blueberries and strawberries. (C) To report 405 heart attacks in women. (D) To seek funding for proposal of Nurses' Health Study II.
19. How long was the study conducted? (A) 25. (B) 18. (C) 32. (D) 4.
20. What is the name of the publisher of *Circulation*? (A) Department of Nutrition at Norwich Medical School. (B) Harvard School of Public Health. (C) University of East Anglia. (D) The American Heart Association.
21. According to the news, which of the following is true about the results of the study reported? (A) Anthocyanins may be the active component for preventing heart attack. (B) Blueberries and strawberries are better than other fruits. (C) Women who eat one serving of blueberries per month in early age reduce their risk of cardiovascular disease. (D) A strong relationship was found between alcohol intake and heart attack.
22. According to the news, which of the following is NOT true about blueberries and strawberries? (A) They contain significant amounts of anthocyanins. (B) They are popular fruits in US. (C) They were selected fruits in the questionnaires of the study. (D) They are the most favorite fruit of US women.

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Article 4, Organic foods do not offer health advantages over conventional foods, says study

The American Academy of Pediatrics (AAP) has conducted an extensive analysis of scientific evidence surrounding organic produce, dairy products, and meat. They have found that in the long term there is currently no direct evidence that consuming an organic diet leads to improved health or lower risk of disease.

They did find that while organic foods have the same vitamins, minerals, antioxidants, proteins, lipids, and other nutrients as conventional foods, they also have lower pesticide levels. Organically raised animals are also less likely to be contaminated with drug-resistant bacteria because organic farming rules prohibit the non-therapeutic use of antibiotics.

“What’s most important is that children eat a healthy diet rich in fruits, vegetables, whole grains, and low-fat or fat-free dairy products, whether those are conventional or organic foods. This type of diet has proven health benefits,” said Janet Silverstein, a member of the AAP Committee on Nutrition and one of the lead authors of the report. “Many families have a limited food budget, and we do not want families to choose to consume smaller amounts of more expensive organic foods and thus reduce their overall intake of healthy foods like produce.”

The report outlines the research that has been conducted on organic foods, including evidence of lower exposure to pesticides and less contamination of livestock with drug-resistant bacteria.

“At this point, we simply do not have the scientific evidence to know whether the difference in pesticide levels will impact a person’s health over a lifetime, though we do know that children—especially young children whose brains are developing—are uniquely vulnerable to chemical exposures,” said Joel Forman, a member of the AAP Council on Environmental Health and one of the lead authors of the AAP clinical report.

The AAP found no individual health benefit from purchasing organic milk, but emphasizes that all milk should be pasteurized to reduce the risk of bacterial infections. Purchasing meat from organic farms that do not use antibiotics for non-therapeutic uses has the potential to reduce antibiotic resistance in bacteria that infect people. The AAP calls for large, well-designed, prospective cohort studies that directly measure environmental exposures such as estrogen at low levels to understand the impact of hormonal exposure of children through milk and meat. [Source: IFT Weekly Newsletter, October 24, 2012]

23. What is the main purpose of this passage? (A) To show the advantages of consuming organic milk and meat. (B) To promote organic foods. (C) To compare organic foods and conventional foods. (D) To discuss the impact of antibiotic resistance in bacteria.
24. According to the passage, which of the following is true of organic foods? (A) Organic foods have more nutrients. (B) Organic foods are more expensive. (C) Organic meat has no antibiotics. (D) Organic milk has less bacteria.
25. According to the passage, which of the following is a best choice for food selection? (A) Purchasing meat from organic farms that do not use any antibiotics. (B) Eating a diet rich in fruits, vegetables, whole grains, and low-fat dairy products. (C) Selecting organic fruits and vegetables without exposure to pesticides. (D) Consuming smaller amounts of organic foods to reduce chemical exposure.
26. Which of the following does the AAP propose to do? (A) Developing a method to reduce antibiotic resistance in bacteria. (B) Supporting the development of organic diet for children. (C) Conducting a study to evaluate the impact of estrogen exposure of children through milk and meat. (D) Solidifying the scientific evidences of the impact of pesticide on women.

Article 5

Research on the bioactives from seaweeds has increased in recent years. Antioxidant activity is one of the most studied, due to the interest of these compounds both as preservatives and protectors against oxidation in food and cosmetics and also due to their health implications, mainly in relation to their potential as functional ingredients. Brown algae present higher antioxidant potential in comparison with red and green families and contain compounds not found in terrestrial sources. *In vitro* antioxidant chemical methods, used as a first approach to evaluate potential agents to protect from lipid oxidation in foods, confirmed that the brown algae crude extracts, fractions and pure components are comparatively similar or superior to synthetic antioxidants. Particular emphasis on the fucoidan and phlorotannin polymeric fractions is given, considering variations associated with the species, collection area, season, and extraction and purification technologies. [Source: Food chemistry 2013, 138:1764]

27. Which of the following seaweeds has the best antioxidant activity (A) brown algae (B) red algae (C) green algae (D) not mentioned in this article
28. Which of the followings is a cosmetic product (A) insecticide (B) lipstick (C) probiotics (D) kimchi
29. Which description is correct (A) seaweeds have been increasingly studied because it is a good preservative (B) brown algae has unique compounds that only exist in the ocean creatures (C) fucoidan should be emphasized because it varies with species (D) none of the above
30. Which of the followings might not affect the bioactivity of brown algae (A) the method for extraction (B) the chemical methods used to investigate the activity (C) collection season (D) none of the above
31. Which of the following materials might not be employed in this study (A) seaweeds (B) brown algae (C) red algae (D) terrestrial materials
32. Which of the followings might be a suitable title for this article (A) Antioxidant properties of compounds from brown algae (B) Brown algae serves as good food and cosmetics sources (C) Fucoidan and phlorotannin are the major components of brown algae (D) The development of chemical methods for analyzing the antioxidant effect of brown algae

Article 6

Changes occurring in phenolic compounds and purine alkaloids, during the growth of seeds of cacao (*Theobroma cacao*) cv. Trinitario, were investigated using HPLC-MS/MS. Extracts of seeds with a fresh weight of 125, 700, 1550, and 2050 mg (stages 1–4, respectively) were analyzed. The phenolic compounds present in highest concentrations in developing and mature seeds (stages 3 and 4) were flavonols and flavan-3-ols. Flavan-3-ols existed as monomers of epicatechin and catechin and as procyanidins. Type B procyanidins were major components and varied from dimers to pentadecamer. Two anthocyanins, cyanidin-3-*O*-arabinoside and cyanidin-3-*O*-galactoside, along with the *N*-phenylpropenoyl-L-amino acids, *N*-caffeoyl-L-aspartate, *N*-coumaroyl-L-aspartate, *N*-coumaroyl-3-hydroxytyrosine (clovamide), and *N*-coumaroyltyrosine (deoxyclovamide), and the purine alkaloids theobromine and caffeine, were present in stage 3 and 4 seeds. Other purine alkaloids, such as theophylline and additional methylxanthines, did not occur in detectable quantities. Flavan-3-ols were the only components to accumulate in detectable quantities in young seeds at developmental stages 1 and 2. [Source: JAF 2013, 61:427]

33. In developmental stage 3, which of the following phenolic compounds reveals highest concentration (A) Flavan-3-ols(B) cyanidin-3-*O*-arabinoside (C) cyanidin-3-*O*-galactoside (D) no conclusion in this article
34. In developmental stage 1, which of the following phenolic compounds reveals highest concentration (A) Flavan-3-ols (B) flavonols (C) cyanidin-3-*O*-galactoside (D) no conclusion in this article
35. Which of the following compounds could be detected in developmental stage 4 (A) theophylline(B) *N*-phenylpropanoyl-L-amino acids(C) methylxanthines (D)none of the above
36. Which of the followings is not a purine alkaloid(A)theophylline (B)epicatechin(C) caffeine (D) theobromine
37. Which of the following is a kind of assay method(A) Trinitario(B) HPLC-MS/MS (C) Theobroma (D) none of the above
38. "Fresh weight" indicates (A) the first data from weight measurement (B) the weight for plants in young stage (C) the weight without removing water (D)none of the above

Article 7

Isoflavone, a well-known phytoestrogen, is a unique subgroup of flavonoids found most abundantly in cotyledon and hypocotyls of soybeans and soy derived foods. The studies of isoflavone have recently drawn tremendous attention due to its potential health-enhancing benefits, including reduction in cardiovascular disease, cancer prevention, osteoporosis prevention, and high in antioxidant activities. A catalytic system for deglycosylation of isoflavone in black soybean milk was established. β -glucosidase which was covalently immobilized onto the glass microspheres exhibited a significant efficiency for the conversion of 4-Nitrophenyl β -D-glucuronide (*p*NPG) to *p*-nitrophenol over other carriers. The optimum temperature for *p*NPG hydrolysis was 40°C, and complete reaction can be reached in 30 min. Operational reusability was confirmed for more than 60 batch reactions. Moreover, the storage stability verification demonstrated that the glass microsphere catalytic system was capable of sustaining its highest catalytic activity for 40 days and remained around 80% for another 60 days. The kinetic parameters including rate constant (K) at which isoflavone glycosides deglycosylation were determined, the time (τ_{50}) in which 50% of isoflavone glycosides deglycosylation was reached, and the time ($\tau_{complete}$) required to achieve complete isoflavone glycosides deglycosylation, were ($0.35 \pm 0.04 \text{ min}^{-1}$, $2.04 \pm 0.25 \text{ min}$, 30 min) for daidzin and ($0.65 \pm 0.03 \text{ min}^{-1}$, $1.19 \pm 0.08 \text{ min}$, 20 min) for genistin, respectively. HPLC results revealed that this enzyme system took only 30 min to reach complete isoflavone deglycosylation and the aglycone content (daidzein and genistein) in the total isoflavones in black soymilk was enriched by $51.42 \pm 0.17\%$ under a 30 min treatment by the glass microsphere enzymatic system.

39. According to above article, what is β -glucosidase made of? (A) DNA (B) protein (C) polysaccharide (D) RNA.
40. The WRONG statement concerning isoflavone, which has demonstrated many bioactivities is (A) the main ingredient in soybeans. (B) an unique subgroup of flavonoids. (C) reduction in cardiovascular disease. (D) most in the glycoside form in nature.

41. The optimal operation temperature for isoflavone conversion is (A) 60°C, (B) 50°C, (C) 40°C, (D) 15°C.
42. As mentioned in this article, (A) HPLC, (B) FPLC, (C) UPLC, (D) TLC was adopted to determine isoflavone content in soybean milk in this article.
43. As mentioned in this article, the immobilized β -glucosidase can retain its activity for (A) 30 min, (B) 40 days, (C) 60 days, (D) 100 days.
44. What types of isoflavone mentioned in the article are in the aglycone forms (A) daidzein and genistin. (B) daidzein and genistein. (C) daidzein and daidzein. (D) genistin and genistein.
45. What is the full name of *p*NPG mentioned here? (A) 4-Nitrile β -D-glucuronide, (B) 4-Nitrophenyl β -D-glucuronidase, (C) 4-Nitrophenyl β -D-glucuronide, and (D) 4 pizzas, and no pigs.
46. The main purpose of this article is to investigate the isoflavone conversion by (A) immobilized β -glucosidase (B) β -glucosidase, (C) α -glucosidase (D) β -amylase.
47. (A) *q*NPG, (B) *p*NPG, (C) *p*MPG, (D) *p*NBG was used as an indicator for conversion efficiency of β -glucosidase.
48. Which statement mentioned below is TRUE? (A) Enzyme immobilization will adversely decrease isoflavone conversion. (B) HPLC can detect the isoflavone content in soybean milk. (C) The immobilized enzyme system cannot be stored for a month. (D) Isoflavone is the most abundant macromolecule in black soybean.
49. Glass microspheres, nylon pellets, cellulose beads, and PAN beads _____ separately utilized as solid carriers for enzyme immobilization. (A) is, (B) have, (C) being, (D) were
50. Operational reusability was confirmed for more than 40 batch reactions. _____, the storage stability verification demonstrated that the glass microsphere catalytic system was capable of sustaining its highest catalytic activity for 40 days. (A) However. (B) Controversially. (C) Unfortunately. (D) In addition

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