一、單選題（共 50 題，每題 2 分，答錯倒扣 0.5 分，請作答於答案卡中）

Article 1.

Development of functional fermented dairy products containing Taiwan djulis (*Chenopodium formosanum* Koidz.) in regulating glucose utilization

(Source: Fermentation, 2022, 8: 423)

Taiwan djulis (*Chenopodium formosanum* Koidz.) is a plant native to Taiwan and is a grain rich in nutrients, vitamins, and minerals with antioxidant properties. This study aimed to use appropriate processing technology and incorporate probiotics, thus combining Taiwan's high-quality milk sources to develop Taiwan djulis fermented dairy products. Later, FL83B cells have used to evaluate the glucose utilization ability after the administration of djulis. The authors first screened *Lactiplantibacillus plantarum* and combined it with the traditional yogurt strains *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus* for cultivation. Further, the fermentation process was optimized where 7.5% djulis and an inoculum of 10^7 colony forming unit/mL were fermented at 40°C for 18 h. Compared to fermented milk without djulis, the analysis of various nutrients and active ingredients showed that free radical scavenging abilities of DPPH and ABTS reached 2.3 and 2.0 times (752.35 ± 29.29 μg and 771.52 ± 3.79 μg TE/g, respectively). The free phenol content increased 2.5 times (169.90 ± 14.59 mg gallic acid/g); the total flavonoid content enhanced 4.8 times (3.05 ± 0.03 mg quercetin/g), and the gamma-aminobutyric acid (GABA) content was 3.07 ± 0.94 mg/g. Tannase activity increased after fermentation. In a co-culture of mouse liver cells with fermented products, 100 ppm ethanol extract of fermented products effectively improved glucose utilization with increased glucose transporter expression. This functional fermented dairy product can be developed into the high value added local agricultural products and enhance multiple applications including medical and therapeutic fields.

Please answer the following questions:

1. In this study, what kind of crop was used? (A) *Ganoderma formosanum* (B) *Chenopodiun quinoa* (C) *Chenopodium formosanum* (D) *Lentinus edodes*.
2. In this study, what kind of function was the authors looking for? (A) blood sugar lowering (B) anti-bacterial activity (C) glucose utilization (D) anti-tumor activity.
3. Which strain was NOT studied in this article? (A) *Clostridium botulinum* (B) *Lactiplantibacillus plantarum* (C) *Lactobacillus delbrueckii* (D) *Streptococcus thermophilus*.
4. What's the DPPH and ABTS activity after Djulis fermentation? (A) 752.35 μg and 771.52 μg GE/g (B) 752.35 μg and 771.52 μg TE/g (C) 752.35 μg and 771.52 μg SE/g (D) 752.35 μg and 775.12 μg TE/g.
5. The authors also observed the increase of enzyme activity of (A) □-amylase (B) □-glucoisomerase (C) □-galactosidase (D)□tannase.
6. What's the definition of ppm? (A) parts per billion (B) parts per mg (C) parts per million (D) parts per medium.
7. What's the meaning of ± 29.29 in this study? (A) standard deviation (B) production yield (C) concentration (D) control number.
8. What's the full name of GABA? (A) gamma-aminobutyric acid (B) gamma-acidobutyric acid (C) glyco-aminobutyric acid (D) give me a break, alright.
9. Which one is NOT discussed in this abstract? (A) Djulis (B) probiotics (C) co-culture (D) scaling-up.
10. What's the main purpose of this study? (A) to study the appearance of *Chenopodium formosanum* (B) to investigate the glucose utilization of FL83B cells (C) to investigate the scaling-up process for probiotics (D) to raise fund from industry.

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Article 2.

Food safety risk-assessment systems utilized by China, Australia/New Zealand, Canada, and the United States

(Source: Journal of Food Science, 2022, 87:4780-4795)

As with the increase of international trade, there is an increasing level of food fraud in the global market. More often than not, food fraud is a result of the economic benefit a food manufacturer may yield through the illegal practice. The major aspect of food fraud focuses on the asymmetric information, food labeling, counterfeit foods, and food adulteration. Food fraud is not easy to detect, and often subtle differences in qualities can only be discovered via DNA molecular technology; hence, sellers are tempted to take the risk and engage in food fraud. Inspection rates for food fraud by authorities are often low, and recurring offenders are not punished to a sufficient extent where repeat offending is deterred, leading to re-offences. For example, advanced inspection departments such as the FDA of the United States still only inspects around 1% of imported foods.

One of the major food fraud issues facing Australian traders involves neighboring countries, including Asia and South-East Asia countries, producing counterfeit products and labeling the products as produce of Australian origin. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is helping the government to find solutions to counteract food frauds that jeopardize products of Australian origin. One of the methods CSIRO is researching is to develop a national food provenance infrastructure to integrate data that can verify region and method of processing of a food product. CSIRO is working on generating isotopic fingerprints via the environmental markers from water and soil. These fingerprints are very specific to an agricultural region and can be used to verify claims about provenance, sustainability, and processing technologies. CSIRO is also developing real-time autonomous sensor systems, such as the rapid evaporative ionisation mass spectrometry technology, which can be applied on agricultural farms and in food manufacturing sector. Another widely committed food fraud centers around food labeling. Bimbo *et al.* developed a framework to investigate food labeling fraud that involves the collection of sales data, and the application of an empirical economic model. The framework was used in a case study to investigate the fraudulent "100 per cent Italian" claims on the Italian extra-virgin olive oil market during the period 2014–2017, suggesting that the detrimental effect on the consumers on purchasing the counterfeit products far outweighed the gain by the producer of the counterfeit products. Moreover, they suggest an effective deterrent to food fraud may involve a loss in reputation for the company involved, rather than the imposing of bigger fines.

Honey fraud in the United States in 2001 has gained massive international attention. In 2001, an antidumping tariff was imposed on two countries implicated in the fraudulent export of honey, namely, Argentina and China. Here, the honey producers evaded tariffs via fraudulent labeling of origin. The most common ways noted to evade tariffs have been through mis-manifesting and trans-shipping. Mis-manifesting refers to a trader falsely presenting to customs official a traded product upon importation that is different than its actual identity. Trans-shipping, on the other hand, involves the intentionally covering up of an export product's true origin of region by illegally shipping the product via another country to reach the final destination. In these situations, there are various ways to detect fraud relating to place of origin. Data collected from trade transaction is certainly one of the most useful sources of information that can aid in origin fraud detection. The three methods employed by the US government as described by Ferrier in detecting origin fraud are trans-shipping (the flows of the time-linked trade transactions via a third country), excess trade (the amount of exports surpasses the amount of production), and gap in the import transaction (the discrepancies between the amount of origin-reported exports and the amount of destination-reported imports).

Global statistics indicate the food fraud incidences tend to be higher in China compared to other developed countries. In Australia, food fraud incidences are for the most part, limited and controlled. In Canada, food fraud prevention will be managed over the next 5 years by the Food Policy of Canada, which has invested $3.1 million for Health Canada to sponsor the CFIA work. This initiative led to the increase in staff members in 2019–2020 in handling food fraud matters. In the United States, US FSMA actively conducts reviews of food fraud activities to implement preventive actions to reduce food fraud incidences.

Please answer the following questions:

11. Which description of food fraud is correct? (A) the crime of getting money by deceiving people. (B) the

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positive-detection rate is around 1% in the US. (C) negligible occurs in Asia and South-East Asia. (D) a state in danger or at risk.

12. Which one is **NOT** a common food fraud? (A) misrepresentation of food. (B) contaminated with pathogens. (C) *label tampering*. (D) economically motivated adulteration (EMA).

13. What kind of technology can detect "Food Fraud"? (A) WB (western blot). (B) EB (eastern blot). (C) PCR (polymerase chain reaction). (D) IHC (immunohistochemistry).

14. What is the meaning of "jeopardize"? (A) something that is considered to be less important than others. (B) to make it look like the original of something. (C) the possibility of something bad happening. (D) to put something such as a plan or system in danger.

15. How could CSIRO help prevent food fraud? (A) invent a CRISPR technology for DNA molecules. (B) integrate big data for water and soil. (C) develop mass spectrometry for isotopic fingerprints. (D) legislate for bigger fines.

16. What is the "isotopic fingerprints"? (A) specific impressions of an organism. (B) characteristic markers for geographic origin. (C) a class of elements for agriculture. (D) radioactive substances of the environment.

17. How will the US government punish honey fraud in Argentina and China? (A) increased duty. (B) big fines. (C) prohibit imports. (D) break alliance.

18. How is the food industry trying to evade tariffs? (A) misdelivery of goods. (B) misdeclaration of goods. (C) excess trade. (D) smuggling contraband.

19. Which of the following descriptions of "FSMA" is **WRONG**? (A) stands for "Food Safety Modernization Act". (B) legislation to prevent food fraud. (C) a nonprofit organization to counteract food fraud. (D) Signed by President *Obama*.

20. What is "CFIA" in this article? (A) Center for Food Industry and Agribusiness. (B) China Feed Industry Association. (C) Chartered Financial International Analyst. (D) Canadian Food Inspection Agency.

Article 3.

The gut microbiome influences host diet selection behavior

(Source: PNAS, 2022, 119: e2117537119)

Proper nutrition is essential to life, and thus animals have evolved complex internal sensory systems that help maintain nutritional homeostasis by regulating macronutrient intake. The intestinal tract plays a critical role in this process by liberating dietary nutrients (e.g., essential amino acids [EAAs]) that communicate meal quality to the central nervous system by direct stimulation of enteric nerves or through postabsorptive peripheral signals. The intestinal tract also harbors trillions of microorganisms (collectively known as the gut microbiome), which have been shown to influence numerous aspects of host behavior, most likely through metabolites that interact with host sensory systems. Given the importance of dietary nutrients in the regulation of food intake and diet selection, the gut microbiome may influence host foraging behavior through metabolic processes that affect the availability of nutrients (or their derivatives) recognized by the central nervous system. For example, a recent study showed that experimental colonization of Providencia bacteria in the gut of the model organism *Caenorhabditis elegans* resulted in divergent foraging preferences through the bacterial synthesis of the neurotransmitter tyramine from the EAA tyrosine. While studies in model systems provide powerful opportunities to dissect host–microbe interactions, the microbiome field recognizes the need to address and study the complexity of these interactions in ecologically realistic scenarios in which animals can harbor thousands of microbial taxa. It has been suggested that these complex microbial communities could elicit host foraging behaviors that enrich the intestinal environment in nutrients on which they depend (i.e., promoting their own fitness), while others have posited that a positive-feedback relationship between dietary nutrients and microbial community composition eventually results in stable microbial communities and host foraging behaviors. However, these potential mechanisms operate under the assumption that the gut microbiome influences diet selection behavior-a hypothesis that has existed for years but has never been tested using complex microbial communities or within an ecological or evolutionary context.

The transplantation of intestinal microbiota into germ-free mice is a powerful approach for disentangling the effects of the gut microbiome on host phenotypes from other potentially confounding factors (e.g., host genetics). This approach has

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been successfully applied using a wide range of donor species (e.g., termites, zebrafish), demonstrating that germ-free mice are a tractable model system for understanding the function of gut microbiota in evolutionarily distant organisms. In our study, we used this approach to determine whether the gut microbiome influences diet selection behavior. The results show that germ-free mice colonized by gut microbiota from three rodent species with distinct foraging strategies differentially selected diets that varied in macronutrient composition. Specifically, we found that herbivore-conventionalized mice voluntarily selected a higher protein:carbohydrate (P:C) ratio diet, while omnivore- and carnivore-conventionalized mice selected a lower P:C ratio diet. In support of the long-standing hypothesis that tryptophan—the essential amino acid precursor of serotonin—serves as a peripheral signal regulating diet selection, bacterial genes involved in tryptophan metabolism and plasma tryptophan availability prior to the selection trial were significantly correlated with subsequent voluntary carbohydrate intake. Finally, herbivore-conventionalized mice exhibited larger intestinal compartments associated with microbial fermentation, broadly reflecting the intestinal morphology of their donor species. Together, these results demonstrate that gut microbiome can influence host diet selection behavior, perhaps by mediating the availability of essential amino acids, thereby revealing a mechanism by which the gut microbiota can influence host foraging behavior.

In this study, we found that conventionalized germ-free mice harboring distinct gut microbiota exhibited significant differences in diet selection behavior, providing support for our core hypothesis that microbiota can influence foraging decisions. Specifically, our study provides evidence that variation in the gut microbiota alters host nutrient availability and can yield significant differences in the diet selection of conventionalized mice in just 11 d, likely through differential bacterial metabolism and downstream availability of EAAs, especially tryptophan. These findings are largely consistent with recent mechanistic work in model systems but address the natural variation in microbial communities that exist among individuals and across species. Therefore, this study not only represents a contribution to a large body of work showing that the gut microbiome is a key player in host physiology and performance but also more broadly supports the hypothesis that the gut microbiota can influence ecological and evolutionary processes shaping animal behavior. Foraging strategies and feeding behaviors can influence many aspects of an animal's ecology [e.g., the need to obtain specific nutrients while also avoiding predators], and animal feeding can also shape the structures of entire plant and animal communities. Thus, there may be an underexplored role for gut microbes in influencing far-reaching aspects of animal and ecosystem ecology through influencing the feeding behavior of their hosts.

Please answer the following questions:

21. What is the meaning of the "foraging" behavior? (A) to go from place to place searching for things or food (B) to find a way to prevent aging (C) the behavior of gut microbial communities (D) an internal system to maintain the balance of gut microbiota.

22. According to the article, host behavior can be affected by (A) host genetics (B) natural selection (C) gut microbiome (D) ecosystem.

23. According to the article, which description is not true? (A) the authors used transplantation techniques to study the effects of the gut microbiome on host phenotypes (B) 3 genetically different mice were compared (C) the germ-free mice were fed with same diet composition (D) bacterial genes and metabolites were collected and analyzed.

24. According to the article, which answer is not correct? (A) tryptophan is the essential amino acid (B)tryptophan is the precursor of serotonin (C) the levels of serotonin can regulate diet selection (D) bacterial genes involved in tryptophan metabolism and plasma tryptophan availability prior to the selection trial were significantly correlated with subsequent voluntary protein intake.

25. To understand the correlation between tryptophan metabolism and microbiome, what kind of experiments is not to be performed essentially in this study? (A) plasma tryptophan availability (B) bacterial tryptophan metabolism (C) nutrient intake (D) fecal tryptophan.

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Article 4.

Adhesion mechanism and biofilm formation of *Escherichia coli* O157:H7 in infected cucumber (*Cucumis sativus* L.)

(Source: Food Microbiology, 2022, 105: 103885)

Diseases caused by vegetables contaminated with food-borne pathogens have attracted widespread attention. Cucumbers act as a vehicle in the spread of food-borne pathogens at all stages of the food supply chain, including cultivation, harvest, post-harvest handling, transport, processing, distribution, storage, packaging, and final preparation. *Escherichia coli* O157:H7 (*E. coli* O157:H7) is one of the food-borne pathogens that infect cucumber. *E. coli* O157:H7 was found attached to the cucumber epidermis (especially the wrinkles) and around the stomata. Once the epidermis was damaged, *E. coli* O157:H7 would internalize into the internal tissues of the vascular system.

E. coli O157:H7 infection in cucumber is a complicated process involving colonization, proliferation, and biofilm formation. Colonization is achieved through specific appendages (flagella, fimbriae, type III secretion system [T3SS], adhesin intimin) and/or the production of extracellular polymeric substances (EPS; especially capsular polysaccharides that affect cell adhesion), using which *E. coli* O157: H7 can adhere to host cells. Flagella allow bacteria to move to a specific attachment site during early colonization and they are encoded by the fliC subunit; the role of flagella gradually decreases after proliferation. Laminin-binding fimbriae YCBQ, type-I fimbriae-like pili, which may be related to the initial adhesion of *E. coli* O157:H7. The *ycbR* gene may participate in encoding putative fimbrial chaperone YCBR protein required for the biogenesis of the YCBQ fimbria. T3SS is a complex multi-protein organelle that allows bacteria to directly transport effectors across the bacteria envelope into the cytosol of eukaryotic cells, thereby promoting bacterial colonization in the host cells. It is encoded by a ca. 35 kb chromosomally located pathogenicity island (PAI) named the locus of enterocyte effacement (LEE). Intimin is an outer membrane adhesin that mediates the intimate attachment of *E. coli* O157:H7 to vegetables. It is encoded by the *eaeA* gene on the LEE pathogenicity island of the *E. coli* O157:H7 genome. In addition, the presence of capsules helps the adhesion and changes the hydrophobicity (surface free energy) of bacteria. Colonization is followed by internalization into the internal tissues of cucumber and proliferation. Proliferating *E. coli* O157:H7 produce extracellular material to form a cell surface layer called biofilm. Curli fimbriae and EPS are conducive to the formation of biofilms.

However, different types of vegetables have different nutritional composition and tissue morphological characteristics; the time of expression and level of activity of adhesion factors in the pathogens also differ. The regulation of *E. coli* O157:H7-related factors during colonization and proliferation in cucumber remains unclear. Furthermore, the knowledge about all stages of *E. coli* O157:H7 biofilm formation in cucumber remains limited. In this study, the time points and key factors affecting colonization and proliferation were studied, and the characteristics of biofilm formation in different tissues of cucumber were compared. The results will provide a theoretical basis for the study of the interaction between cucumber and *E. coli* O157:H7.

Please answer the following questions:

26. According to this article, *E. coli* O157:H7 infection in cucumber is originally from (A) the root of the cucumber plant (B) the stem of the cucumber plant (C) the leaf of the cucumber (D) the cucumber epidermis.
27. According to the article, which protein is essential for the initial attachment of *E. coli* O157:H7 to the surface of cucumber? (A) flagella (B) fimbriae (C) T3SS (D) intimin.
28. Which structure or protein is not associated with the motility of *E. coli* O157:H7 (A) capsule (B) flagella (C) fimbriae (D) pili.
29. Which description related to biofilm formation is not true? (A) fimbriae can promote the formation of biofilms (B) biofilm formation starts at cell proliferation stage (C) Once biofilm is formed, all the *E. coli* O157:H7 cells will be fixed in the biofilm (D) EPS is part of the biofilm.
30. What is the major difference between *E. coli* and *E. coli* O157:H7? (A) microbial taxonomy (B) virulence genes (C) cell

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membrane structure (D) flagella structure.

Article 5.

Biological factors controlling starch digestibility in human digestive system

(Source: Food Science and Human Wellness, 2023, 12: 351)

Starch is the main macronutrient in our daily foods, which supplies 50% of our daily energy. Its digestion and absorption in our multi-compartmental gastrointestinal tract (GIT) are initiated from mouth and continuously through the stomach, small and large intestine. The starch digestion rate and location in the GIT have critical impacts on the postprandial metabolism and human health. If the starch portion passes the small intestine and enters the colon, it could be fermented by the inhabited gut microbiota into short-chain fatty acids (SCFAs), which are the energy source for the colonocytes and beneficial for a healthy gut. This starch portion is commonly referred as resistant starch (RS). On the other hand, the starch portion digested rapidly in the duodenum could be referred as rapidly digestible starch (RDS). It contributes to the large fluctuation of postprandial blood glucose level and should be avoided by patients with obesity and type 2 diabetes. Compared to the RDS, the starch portion that is digested and absorbed slowly through the duodenum to ileum is normally referred as slowly digestible starch (SDS). SDS can provide more sustainable energy supply and has a relatively moderate influence on the postprandial glycemic response compared to the RDS. In this respect, SDS is an ideal starch portion for the type 2 diabetic patients.

In vivo biological factors related to the starch digestibility still remain elusive. This is mainly because that conducting human clinical trials is ethically and technically challenging. In vivo studies are also relying on expensive instruments such as nuclear magnetic resonance and ultrasonic scanner. Invasive techniques such as gastric barostat and intraluminal manometry are sometimes needed. Therefore, there are still many "unknowns" that are determining starch digestion from the GIT. It is noted that some starch digestion patterns have been learnt from in vitro digestion models, which are efficient, cheap and without ethical restrictions compared to human clinical studies. However, there are significant differences between these in vitro models with actual human conditions, in terms of GIT morphologies, biochemical conditions, and hormonal controls. These factors are playing critical roles in determining the starch digestion rate and location. Thus, reliable predictions of the extent and rate of starch digestion in human are still extremely difficult and often deficient by in vitro digestion models.

Understanding the in vivo starch digestion process is important in terms of developing starchy foods with low glycemic index values. Although substantial knowledge has been learnt, it is still challenging to fully understand all the factors controlling the in vivo starch digestibility. This is due to the complexity of human GIT, such as the anatomy, peristaltic movements, hormonal/nervous feedback, local immune system, and biochemical conditions. The following are few recommendations for the future work in order to better understand the biological factors related to the in vivo starch digestibility.

1) The collection and storage of in vivo digesta samples for further characterizations are still challenging. As mentioned, fecal samples are commonly obtained to investigate the interaction of resistant starch with gut microbiota. However, this may not reflect the realistic situation in human's colon. In addition, it is almost impossible to extract starch digesta from the small intestine of healthy individuals. Healthy ileostomy participants have been recruited for the 358investigation of the starch bio-accessibility in wheat endosperm. Whereas, the disadvantage is that it may not reflect the situation in a healthy individual in terms of investigating its starch digestion pattern. The feedback regulation of starch digestibility through the gut microbiota-brain axis is also lack in these ileostomates.

2) More advanced and economic techniques are needed to conduct future in vivo studies. Currently, many clinical studies have to rely on some advanced and expensive instruments, including ultrasonic scanner, scintiscanner and nuclear magnetic resonance. Sometimes, invasive procedures including aspiration from the stomach or small intestine have to be applied. This kind of study is however not always technically and financially feasible.

3) The human GIT should be taken as a whole in order to fully understand the overall in vivo digestion behavior of starch. As summarized, each digestion step in the GIT is critical while considerably complex in determining the overall digestion rate of

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starchy foods. Connections among these compartments towards controlling the in vivo starch digestibility as a whole should be further explored. The interpretation of starch digestion results based on only a single or few digestion compartments should always be careful.

4) In addition to in vivo biological factors, starch digestibility is also regulated by the food properties ingested. Food properties could include moisture content, cooking/preparation procedure, particle size, texture and sensory attributes. Factors from both sides should thus be considered in order to fully understand the nature of in vivo starch digestibility.

Please choose the best answer according to the above article

31. What is the energy source for the colonocytes? (A) rapidly digested starch (B) slowly digested starch (C) resistant starch (D) short-chain fatty acids.

32. Which is NOT the factor to control the in vivo starch digestibility? (A) peristaltic movements (B) hormonal/nervous feedback (C) body temperature (D) immune system.

33. How to extract starch digesta from the small intestine of healthy individuals? (A) almost impossible (B) ileostomy (C) ultrasonic scanning (D) x-ray.

34. Which food property can NOT regulate starch digestibility? (A) particle size (B) freezing processing (C) moisture content (D) cooking.

35. What is the advantage to study starch digestibility through in vitro tests? (A) without ethical restrictions (B) accuracy (C) concordance with in vivo data (D) related to gender.

Article 6.

Encapsulation of β-carotene in oleogel-in-water Pickering emulsion with improved stability and bioaccessibility

(Source: International Journal of Biological Macromolecules, 2020, 164, 1432).

Carotenoids comprise a group of natural lipid-soluble pigments, which are found in high levels in many colored fruits and vegetables (carrots, tomatoes, mangoes, peppers, and kale). They are popular as flavorings, food pigments, and nutritional supplements. β-carotene (BC) with high pro-vitamin A activity and strong antioxidant ability is one of themost commonly used carotenoids. High-level consumption of BCmay improve human health by reducing the risk of breast cancer, cardiovascular disease, and certain chronic diseases. BC has to be obtained from the diet because it cannot be synthesized in the human body. However, the low oxidative stability and limited bioavailability of hydrophobic BC limit its utilization as supplements in functional foods and pharmaceutical products. Thus, BC is widely encapsulated in lipid-based delivery systems to improve its stability and bioavailability.

Several structured lipid-based delivery systems have been designed to increase the stability and bioavailability of lipophilic bioactive compounds, such as oil-soluble vitamins, carotenoids, nutraceuticals, and lipids: conventional emulsions (oil-in-water, O/W emulsions); multiple emulsions (water-in-oil-in-water emulsions, W/O/W emulsions); multilayer emulsions; solid lipid particles (SLPs); liposomes; colloidosomes; filled hydrogel particles; oleogels. Among these, SLPs are emulsions with dispersed oil phase partially or fully solidified. The advantages of using SLP to encapsulate the hydrophobic compounds, such as BC, are low toxicity, low cost, high capacity, the possibility of controlling, excellent biocompatibility, and biodegradability. However, comparedwith liquid lipid particles, the chemical stability of encapsulated BCwasworse in SLP. Besides, solid lipids generally have high levels of unhealthy trans and saturated fats, and nutritional guidelines recommend substituting the solid fats with unsaturated fats (usually liquid vegetable oils).

O/W Pickering emulsions (OPEs-1) have also been considered to be potential delivery systems for encapsulating BCwith excellent chemical stability and higher bioavailability. Freezing treatment is commonly used to extend the shelf life of nutraceuticals and pharmaceuticals by improving their chemical stability and inhibiting the growth of microorganisms. Hence, the freeze-thaw process is inevitable for delivery systems. However, O/W emulsions are extremely unstable during

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freezing-thawing processes, and it is associated with significant challenges to improve the freeze-thaw stability of emulsions. Nowadays, a new type of emulsion (oleogel-in-water Pickering emulsion, OPE-2), which is similar to SLP, has been designed: instead of using partially or fully solidified fat, oleogels are used as dispersed oil phases for Pickering emulsions. Here, the OPE-2 showed high freeze-thaw stability.

Oleogels are three-dimensional gel systems that entrap a large volume of liquid oils, such as vegetable oils,mineral oils, or organic solvents. Previous studies showed that the oleogel delivery systems would not only improve solubility and chemical stability of BC but also control its release rate and enhance its bioavailability. Oleogels are considered to be an effective delivery system for the following reasons. First, oleogels can improve the chemical stability of entrapped nutraceuticals and pharmaceuticals during long-term storage. Besides, oloegels can control and prolong the release of entrapped nutraceuticals and pharmaceuticals because the gel network can provide a physical barrier and delay the release rate. Moreover, oleogels can also improve the bioavailability of nutraceuticals and pharmaceuticals due to its potential to load more fat-soluble compounds. However, previous research showed that the novel OPE-2 could result in the improved bioaccessibility of hesperidin when compared with oleogel. Except for this study, no report has been found on using OPEs-2 as delivery systems.

Please choose the best answer according to the above article

36. Which attribute is irrelevant to BC? (A) pro-vitamin A (B) antioxidant (C) pigment (D) hydrophilic.
37. For an emulsion constructed by a dispersed phase of oil and a continuous phase of water, it is called (A) Pickering (B) w/o (C) o/w (D) multiple emulsion.
38. Pickering emulsion is stabilized by (A) particle (B) droplet (C) surfactant (D) gel.
39. Which of the following description about oleogel is wrong? (A) better stability of entrapped compound (B) good temperature resistance (C) excellent control release (D) higher bioaccessibility.
40. The advantage of applying solid lipid particles to encapsulate water-insoluble gradients is (A) nontoxic (B) cheap (C) biocompatibility (D) all of the above.

Article 7.

Sarcopenia: revised European consensus on definition and diagnosis

(Source: Age Ageing, 2019, 48: 16–31)

Optimal care for people with sarcopenia is essential because the condition has high personal, social and economic burdens when untreated. In terms of human health, sarcopenia increases risk of falls and fractures; impairs ability to perform activities of daily living; is associated with cardiac disease, respiratory disease and cognitive impairment; leads to mobility disorders; and contributes to lowered quality of life, loss of independence or need for long-term care placement, and death. In financial terms, sarcopenia is costly to healthcare systems. The presence of sarcopenia increases risk for hospitalisation and increases cost of care during hospitalisation. Among older adults who are hospitalised, those with sarcopenia on admission were more than 5-fold more likely to have higher hospital costs than those without sarcopenia. Results of a large, community-based study in the Czech Republic showed that direct healthcare costs were more than 2-fold higher for older people with sarcopenia than for those without. In a study of older people in the community, in assisted-living facilities, or in residential living facilities, researchers found that lower gait speed and chair stand were potential drivers of disability in activities of daily living (ADL) and that such disability was associated with lower quality of life (QoL) and higher healthcare costs in these target groups. In another study, patients with sarcopenia had significantly elevated costs of care during hospitalisation—regardless of whether they were younger or older than 65 years.

Many aspects of the epidemiology and pathophysiology of sarcopenia are better understood today than 10 years ago. Researchers have identified links between muscle pathology and adverse health outcomes, and studies have also provided evidence that certain treatment strategies can help prevent or delay adverse consequences.

Such new insights led EWGSOP2 to review, 'What is new?' and 'How can we use this knowledge to improve care for people

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with sarcopenia and to guide future research studies?' These insights include:

- First, sarcopenia has long been associated with ageing and older people, but the development of sarcopenia is now recognised to begin earlier in life], and the sarcopenia phenotype has many contributing causes beyond ageing. These insights have implications for interventions that prevent or delay development of sarcopenia.
- Second, sarcopenia is now considered a muscle disease (muscle failure), with low muscle strength overtaking the role of low muscle mass as a principal determinant. This change is expected to facilitate prompt identification of sarcopenia in practice.
- Third, sarcopenia is associated with low muscle quantity and quality, but these parameters are now used mainly in research rather than in clinical practice. Muscle mass and muscle quality are technically difficult to measure accurately.
- Fourth, sarcopenia has been overlooked and undertreated in mainstream practice, apparently due to the complexity of determining what variables to measure, how to measure them, what cut-off points best guide diagnosis and treatment, and how to best evaluate effects of therapeutic interventions. To this end, EWGSOP2 aims to provide clear rationale for selection of diagnostic measures and cut-off points relevant to clinical practice.

Please answer the following questions:

41. What does sarcopenia mean? (A) an essential condition for living (B) chest discomfort (C) a type of cancer (D) muscle failure.
42. Which of the following description about sarcopenia is wrong? (A) increases the risk of falls (B) associated with respiratory disease (C) costly to healthcare systems (D) tends to occur in male.
43. Which of the followings is not caused by sarcopenia? (A) loss of independence (B) low chair stand (C) a need for long-term care (D) difficulty speaking.
44. The term "on admission" can be replaced by which of the followings? (A) in the hospital (B) with permission (C) in agreement with (D) under protection.
45. According to this article, which of the followings might cause disability of people with sarcopenia (A) diabetes (B)lower gait speed (C) lower income (D) insufficient social activities.
46. According to this article, the cost of hospitalized elderly with sarcopenia is about ___ -fold higher than those without sarcopenia. Please fill in a number in the blank. (A) 2 (B) 5 (C) 10 (D) 20.
47. Which age population would cause higher healthcare cost if they are in the condition of sarcopenia? (A) 45-55 (B) 56-65 (C) >65 (D) no age limitation.
48. Which of the following concepts is wrong for sarcopenia(A) the phenotype is aging specific (B) many aspects regarding epidemiology and pathophysiology of sarcopenia are clearer than 10 years ago (C) causing financial burden (D) is associated with cognitive impairment.
49. According to this article, which of followings would be a good indicator to determine sarcopenia? (A) low muscle mass (B) low income (C) low muscle strength (D) poor memory.
50. What does EWGSOP2 indicate (A) a name of a test (B) a place name (C) a name of an organization t (D) a name of a scientist.

試題隨卷繳回