一、 單選題（共 40 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）。

（※ 注意：試題第二部分為中翻英，請作答於試卷內。）

Article 1

(Source: Int J Food Sci Nutr, 2015, 66: 248–253)

Fruits and vegetables are rich in phenolic compounds, such as anthocyanins, flavonols, isoflavones and catechins which have strong antioxidant capacity. Anthocyanins, natural pigments that are responsible of the blue, violet and red colors of fruits, are one of the major flavonoid classes.
The well known nutritional value and antioxidant capacity of blueberries allow these species to be considered as an excellent "functional food" and has contributed in recent years to the growth of a profitable market for these commodities. Blueberries (*Vaccinium corymbosum* L.) contain essential nutrients and a variety of phytochemicals, such as polyphenols and flavonoids, which have been suggested to provide important health benefits. Statistical data suggests that regular consumption of fruits and vegetables, including berries, is associated with reduced risk of chronic diseases, such as cancer and cardiovascular disease. These compounds are not completely stable, and, after harvest, undergo changes during processing and storage, which may alter their biological activity.
Factors that may affect antioxidant activity include maturity, genetic differences, pre-harvest conditions, post-harvest storage and processing. Post-harvest storage can affect phenolic compound levels and antioxidant capacity in berry fruits. In blueberry, phenolic compounds are highly unstable and may be lost during processing. Processing also has marked effects on phenolic content and antioxidant capacity in fruits. Strawberries, blueberry and raspberries stored at temperatures of 0 ^{0}C resulted in an increase in antioxidant capacity. Controlled atmosphere storage of strawberry fruit decreased anthocyanin content in internal tissues.
In recent years, edible coatings are used to improve fruits appearance and conservation. Edible coatings have been studied for extending shelf life of some fresh berry fruits and blueberries. Edible coatings may control the internal gas atmosphere of the fruit, may serve as a barrier to water vapor, reducing moisture loss and delaying fruit quality losses. The interaction between the antioxidant capacity, anthocyanin and phenolic content and the use of edible coatings during storage of highbush blueberry has still not been investigated much.
Therefore, the objective of this work was to determine the effects of different coatings, alone or in conjunction, on antioxidant potential, anthocyanin and phenolic content and overall quality of high bush blueberry under commercial storage conditions

1. Which of the following compounds that are responsible of the blue, violet and red colors of fruits? (1) flavonols (2) catechins (3) isoflavones (4) anthocyanins
2. Statistical data suggests that regular consumption of fruits and vegetables is associated with reduced risk of what kind of disease (1) kidney disease (2) cardiovascular disease (3) oral disease (4) mental disease
3. Edible coatings may control which factor of the fruit, may serve as a barrier to water vapor,

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reducing moisture loss and delaying fruit quality losses? (1) pH (2) water activity (3) the internal gas atmosphere (4) temperature

4. According to the article stated above, which of the following statements is **incorrect**? (1) Post-harvest storage can not affect phenolic compound levels and antioxidant capacity in berry fruits. (2) Factors that may affect antioxidant activity include maturity, genetic differences, pre-harvest conditions, post-harvest storage and processing. (3) Edible coatings have been studied for extending shelf life of some fresh berry fruits and blueberries. (4) In recent years, edible coatings are used to improve fruits appearance and conservation.
5. According to the article stated above, which of the following statements is **correct**? (1) In blueberry, phenolic compounds are highly stable and may be lost during processing. (2) Strawberries, blueberry and raspberries stored at temperatures of 0 ^{0}C resulted in a decrease in antioxidant capacity. (3) Controlled atmosphere storage of strawberry fruit decreased anthocyanin content in internal tissues. (4) Processing has not marked effects on phenolic content and antioxidant capacity in fruits.

Article 2

(Source:J Sci Food Agric, 2016, 96: 2366–2372)

Garlic (*Allium sativum* L.) is a species of the onion genus. It has been used widely both as a culinary seasoning and a medical herb throughout history. Garlic could promote appetite and help digestion. The main effective components in garlic are organosulfur compounds and bioactive enzymes. Among these, allicin is well known for its pharmacological properties, including anti-bacterial, anti-hyperlipidaemia, anti-tumour and immuno-regulatory activity.

Although garlic has been widely used as one of the popular seasonings for food and medicinal purpose in China, Korea and America, consumption of raw garlic is limited due to its unpleasant odour and taste. The unpleasant odour and taste could be removed by heat treatment. Also, by this way, the palatability of garlic could be improved. Accordingly, heating treatment has been widely used to process black garlic to improve the flavour and quality of garlic, and further endow garlic with new functions.

When garlic is heated, its bioactive aspects are changed. Alliin and deoxidised alliin are decomposed to allyl sulfur-containing compounds, and some sulfur-containing compounds in thermal degradation have a fragrant smell. In fermented garlic much of odorous smell from fresh garlic is removed and many sulfur-containing compounds are formed, which contribute to health benefits. Through the heating process, unstable and unpleasant compounds in raw garlic are converted into stable and tasteless compounds. As a result, black garlic generally has a sweet–sour flavour instead of the offensive odour and taste. Moreover, black garlic does not cause abdominal pain or other gastrointestinal problems. It is reported that black garlic has stronger antioxidant activity than fresh garlic, and better efficacy in preventing metabolic diseases and alcoholic hepatotoxicity. Moreover, the heating process could lead to non-enzymatic browning reactions, for example the Maillard reaction, caramelisation and the chemical oxidation of phenols. Non-enzymatic browning reactions can give black garlic a typical dark brown colour, and lead to the formation of some antioxidant compounds.

In recent years, many studies have been conducted to investigate the bioactive compounds in black garlic (i.e. total phenols, 5-hydroxymethylfurfural) and their functional activities. However, limited

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information is available regarding changes in the quality indicator content of black garlic and the characteristic of quality formation during thermal processing. The purpose of this study was to measure the content of quality indicators in the black garlic during processing with different temperatures. These results might contribute to our understanding the role of temperature in the quality formation of black garlic.

6. According to the article stated above, which of the following statements is **correct**? (1) Limited information is available regarding changes in the quality indicator content of black garlic and the characteristic of quality formation during thermal processing. (2) Garlic couldn't promote appetite and help digestion. (3) Alliin is well known for its pharmacological properties, including anti-bacterial, anti-hyperlipidaemia, anti-tumour and immuno-regulatory activity. (4) Garlic has been widely used as one of the popular seasonings for food and medicinal purpose in China, Korea and Africa.
7. According to the article stated above, which of the following statements is **incorrect**? (1) Garlic (*Allium sativum* L.) has been used widely both as a culinary seasoning and a medical herb throughout history. (2) When garlic is heated, its bioactive aspects are changed. (3) In fermented garlic much of odorous smell from fresh garlic is not removed and many sulfur-containing compounds are formed, which contribute to health benefits. (4) Black garlic does not cause abdominal pain or other gastrointestinal problems.
8. Non-enzymatic browning reactions can give black garlic what kind of a typical colour, and lead to the formation of some antioxidant compounds. (1) yellow (2) dark brown (3) brown (4) purple
9. In recent years, many studies have been conducted to investigate the bioactive compounds in black garlic and their functional activities. Which one of the following compounds is the bioactive compound of black garlic? (1) allicin (2) diallyl disufide (3) alliin (4) 5-hydroxymethylfurfural
10. What is the factor of limited consumption of raw garlic? (1) colour (2) water activity (3) odour (4) appearance

Article 3: **Compounds from *Caesalpinia sappan* with anti-inflammatory properties in macrophages and chondrocytes**

(Source:Food & Function, 2015, 748: 61–67.)

The heartwood of *Caesalpinia sappan* is a traditional ingredient of food and beverages in South East Asia and has been used in traditional medicine as an analgesic and anti-inflammatory drug or to promote blood circulation. Scientific studies have confirmed different bioactivities associated with its use. Here, five fractions were isolated from the ethanolic extract of *C. sappan* heartwood, including episappanol, protosappanin C, brazilin, (iso-)protosappanin B and sappanol using high-performance liquid chromatography (HPLC). All compounds were tested for their anti-inflammatory effects in two different cell lines. Cytokine concentrations in the cell supernatant were determined using enzyme-linked immunosorbent assay (ELISA), and mRNA levels were measured using reverse-transcription quantitative polymerase chain reaction (RT-qPCR). In lipopolysaccharide-stimulated macrophages, all compounds significantly inhibited the secretion of the pro-inflammatory cytokines interleukin (IL-6) and tumor necrosis factor-alpha (TNF-α). Sappanol increased the secretion of the anti-inflammatory IL-10. In IL-1β-

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stimulated chondrocytes, all fractions reduced the mRNA expression and the secretion of the pro-inflammatory cytokines IL-6 and TNF-α. The highest anti-inflammatory effect was found for brazilin in both cell lines. Of note, this is the first study which shows the anti-inflammatory effect of sappanol and episappanol. This study provides evidence for the efficacy of the traditional use of *C. sappan* as an anti-inflammatory remedy. Given the high prevalence of inflammation-related pathologies including arthritis, and the urgent need to clinically intervene with these diseases, the anti-inflammatory activity of diverse compounds from *C. sappan* may be of interest for the development of complementary and alternative treatment strategies.

11. What is the main purpose of this research? (1) To understand the chemical structure of ethanolic extract of C. sappan heartwood. (2) To evaluate the antioxidant of ethanolic extract of C. sappan heartwood. (3) To evaluate the anti-inflammatory activity of ethanolic extract of C. sappan heartwood. (4) To investigate the antiproliferative activity of ethanolic extract of C. sappan heartwood.
12. Which of following cytokine is used as *in vitro* model for human chondrocytes? (1) IL-6 (2) IL-10 (3) IL-1β (4) TNF-α.
13. Which cytokine has anti-inflammatory activity? (1) IL-6 (2) IL-10 (3) IL-1β (4) TNF-α.
14. Which of the following cells is used in this study? (1) macrophage cells (2) liver cells (3) colon cells (4) B cells
15. According to this article, which of the following compound shows highest anti-inflammatory effect in both cell lines. (1) sappanol (2) brazilin (3) protosappanin C (4) protosappanin B

Article 4: Kudingcha and Fuzhuan Brick Tea Prevent Obesity and Modulate Gut Microbiota in High-Fat Diet Fed Mice.

(Source: Mol Nutr Food Res, January, 2018)

Kudingcha (KDC) from Ilex kudingcha and Fuzhuan brick tea (FBT) are popular beverages in China, and their preventive and therapeutic roles in metabolic disorders have been reported. However, the relationship between the gut microbiota modulatory effects of KDC and FBT and prevention of obesity is still not clearly understood. KDC and FBT were tested individually for their capacities to prevent obesity and modulate the gut microbiota in high-fat diet (HFD) fed C57BL/6J mice. The results showed that both KDC and FBT supplementation could modulate oxidative injury, inflammation, lipid metabolism and reduce HFD induced obesity significantly. Both KDC and FBT could enhance the diversity of gut microbiota. KDC could reduce the relative abundance of Erysipelotrichaceae, while FBT could reduce the ratio of Firmicutes to Bacteroidetes and enhance the relative abundance of Bifidobacteriaceae. These findings suggest that KDC and FBT could attenuate features of the metabolic syndrome in HFD-fed mice, which might be due to the modulation of gut microbiota by KDC and FBT.

16. What is the main purpose of this research? (1) To evaluate the relationships between the relationship between the gut microbiota modulatory effects of KDC and FBT and prevention of obesity (2) To evaluate the relationships between high fat and factors associated CVD risk. (3) To evaluate the relationships between microbiota and factors associated cancer. (4) To explore the relationships between KDC and FBT associated CVD risk.

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17. According to the article, which of following gut microbiota was reduced in KDC supplementation? (1) Firmicutes (2) Bacteroidetes (3) Erysipelotrichaceae (4) Bifidobacteriaceae.
18. According to this study, which of following statement is correct? (1) FBT could reduce the ratio of Firmicutes to Bacteroidetes (2) KDC could reduce the ratio of Firmicutes to Bacteroidetes (3) FBT could increase the ratio of Firmicutes to Bacteroidetes (4) KDC could increase the abundance of Erysipelotrichaceae
19. According to this study, which of following statement is correct? (1) KDC and FBT could attenuate features of the metabolic syndrome, which might be due to the modulation of gut microbiota (2) KDC and FBT could attenuate features of the metabolic syndrome, which might be due to the reduction of gut microbiota (3) KDC and FBT could attenuate features of the metabolic syndrome, which might be due to the enhancement of gut microbiota (4) KDC and FBT could attenuate features of the metabolic syndrome, which might be due to reduce the ratio of Bacteroidetes to Firmicutes.
20. According to the article, which of the following **is not** corrected with HFD fed C57BL/6J mice? (1) IL-10 (2) oxidative injury (3) inflammation (4) lipid metabolism.

Article 5

(Source: Diabetes Care, January, 2018)

Nutrition therapy

For many individuals with diabetes, the most challenging part of the treatment plan is determining what to eat and following a meal plan. There is not a one-size-fits-all eating pattern for individuals with diabetes, and meal planning should be individualized. Nutrition therapy has an integral role in overall diabetes management, and each person with diabetes should be actively engaged in education, self-management, and treatment planning with his or her health care team, including the collaborative development of an individualized eating plan. All individuals with diabetes should be offered a referral for individualized MNT, preferably provided by a registered dietitian who is knowledgeable and skilled in providing diabetes-specific MNT. MNT delivered by a registered dietitian is associated with A1C decreases of 1.0–1.9% for people with type 1 diabetes and 0.3–2% for people with type 2 diabetes.

Eating Patterns, Macronutrient Distribution, and Meal Planning

Evidence suggests that there is not an ideal percentage of calories from carbohydrate, protein, and fat for all people with diabetes. Therefore, macronutrient distribution should be based on an individualized assessment of current eating patterns, preferences, and metabolic goals. Consider personal preferences (e.g., tradition, culture, religion, health beliefs and goals, economics) as well as metabolic goals when working with individuals to determine the best eating pattern for them. It is important that each member of the health care team be knowledgeable about nutrition therapy principles for people with all types of diabetes and be supportive of their implementation. Emphasis should be on healthful eating patterns containing nutrient-dense foods with less focus on specific nutrients. A variety of eating patterns are acceptable for the management of diabetes. The

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Mediterranean, Dietary Approaches to Stop Hypertension (DASH), and plant-based diets are all examples of healthful eating patterns that have shown positive results in research, but individualized meal planning should focus on personal preferences, needs, and goals.
The diabetes plate method is commonly used for providing basic meal planning guidance as it provides a visual guide showing how to control calories (by featuring a smaller plate) and carbohydrates (by limiting them to what fits in one-quarter of the plate) and puts an emphasis on low-carbohydrate (or nonstarchy) vegetables.

Fats

The ideal amount of dietary fat for individuals with diabetes is controversial. The National Academy of Medicine has defined an acceptable macronutrient distribution for total fat for all adults to be 20–35% of total calorie intake. The type of fats consumed is more important than total amount of fat when looking at metabolic goals and CVD risk, and it is recommended that the percentage of total calories from saturated fats should be limited. Multiple randomized controlled trials including patients with type 2 diabetes have reported that a Mediterranean-style eating pattern, rich in polyunsaturated and monounsaturated fats, can improve both glycemic control and blood lipids. However, supplements do not seem to have the same effects as their whole food counterparts. A systematic review concluded that dietary supplements with n-3 fatty acids did not improve glycemic control in individuals with type 2 diabetes. Randomized controlled trials also do not support recommending n-3 supplements for primary or secondary prevention of CVD. People with diabetes should be advised to follow the guidelines for the general population for the recommended intakes of saturated fat, dietary cholesterol, and *trans* fat. In general, *trans* fats should be avoided. In addition, as saturated fats are progressively decreased in the diet, they should be replaced with unsaturated fats and not with refined carbohydrates.

21. According to the author's opinion, what is the most challenging part of the treatment plan? (1) the distribution of macronutrients (2) how many meals in a day (3) how to eat (4) following a meal plan.

22. What is the best eating pattern for diabetes patients? (1) controlling total fat to be 20–35% of total calorie intake (2) supplied with n-3 fatty acids (3) it should be tailored to the individual patient (4) limited dietary cholesterol.

23. Which of the followings is the responsibility of diabetes patients (1) attend diabetes related courses (2) learn how to manage themselves (3) take part in establishing the treatment plan with their health care team (4) all of the above.

24. Which of the following descriptions of MNT is correct? (1) it would be better to be individualized (2) the effect of MNT is better on type 2 diabetes than type 1 diabetes (3) it is a kind of chronic disease like diabetes (4) it is provided by skilled doctors.

25. According to this article, what is the ideal percentage of calories from macronutrients for diabetes patients? (1) it should follow a one-size-fits-all eating pattern (2) the percentage should be associated with A1C value (3) total fat should be decreased (4) there is no such thing.

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26. Which of the followings would affect the design of the best eating pattern for people with diabetes? (1) how much money they earn (2) which countries they are from (3) their health beliefs (4) all of the above.

27. According to your knowledge, which of the description is correct for nutrient-dense foods if they are with same amount of nutrients? (1) the foods with hard texture (2) the foods with higher density (3) the foods can be easily digested (4) the foods with less calories.

28. what do you think diabetes plate method might be? (1) diabetes patients can put their meal on the plate (2) it offers a visualized instruction for patients to control calories (3) it suggests what kind of food is better for the patients (4) the plate should be bought form a registered dietitian.

29. Which of the following description is correct? (1) n-3 fatty acid has been approved to be beneficial for glycemic control in type 2 diabetes patients (2) the effect of n-3 supplements is similar to their whole food counterparts (3) total amount of fat should be decreased and then replaced by other macronutrients (4) there is no conclusion about the ideal amount of dietary fat for diabetes patients.

30. according to the content of this article, what might be the reason that Mediterranean-style eating pattern can improve blood glucose and lipids in clinical trials? (1) there are abundant phytochemicals in Mediterranean meal (2) trans fats are avoided (3) saturated fats are decreased (4) Mediterranean meals contain more polyunsaturated and monounsaturated fats.

Article 6

(Source: Toni Tarver, Food Technology, 2016, 70: 18.)

Kefir: The Yogurt of the Future?

University of Idaho associate professor Gülhan Ünlü remembers a time in the 1970s and 1980s when yogurt was not common in supermarkets, so people made it themselves at home. Now supermarket shelves are packed with a variety of brands, flavors, and types of yogurt. Ünlü believes that kefir will go through the same transition. "I see kefir as 21st century yogurt," she pronounces. Kefir is a fermented milk-based drink made by the actions of a legion of symbiotic microorganisms. "Kefir is a very complex probiotic. There are over 30 different species of organisms in kefir, including lactic acid bacteria and yeast," she explains. These microorganisms are encased in a matrix of milk proteins and polysaccharides called kefir grains, which resemble small clumps of cauliflower or popcorn. Cow's milk is most commonly used to make kefir, but the beverage can be made by inoculating any type of milk with kefir grains. This can be done simply enough in home kitchens but is impractical for commercial kefir products. Commercial kefir products are thus made with a starter culture instead of actual kefir grains, which means commercial kefir products tend not to have the same properties (fewer probiotics, diminished health benefits, etc.) as traditional kefir.

In an effort to remedy this issue, Ünlü and her laboratory staff are working to create shelf- stable kefir grains. "We want to make sure that each and every one of them is preserved. To do that, we are working with … cryoprotectants," she says. The idea is that instead of buying commercial kefir products, consumers can purchase shelf-stable kefir grains and make their own probiotic dairy beverages. Ünlü and her laboratory team also conduct ongoing research on the health benefits that kefir may possess. "Right now I am working with kefir as a functional food in my laboratory," she

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says. One of the projects involves determining what effects kefir may have on diabetes and cholesterol markers.

31. Who is Gülhan Ünlü? (1) The discoverer of kefir (2) The discoverer of kefir grains (3) A faculty works on food microbiology (4) A founder of a commercial kefir company.
32. What are kefir grains? (1) Popcorn kernels in a starter culture (2) Cauliflower seeds in a starter culture (3) Aggregated milk proteins (4) Sheathed complex probiotics.
33. According to this article, kefir may have beneficial effects on (1) blood sugar level (2) dental health g (3) liver protection (4) *bone* health.
34. According to this article, which statement is NOT correct about traditional kefir? (1) It can be made from goat milk (2) It is a mixture of microorganisms (3) It is a home-made fermented dairy product (4) It a stable frozen product.

Article 7

(Source: The Weekly Newsletter: April 20, 2016, Institute of Food Technologists.)

Interpol seizes largest haul of fake food, beverages

A joint Interpol and Europol public health and safety operation resulted in the seizure of more than 10,000 tons and one million liters of hazardous fake food and drink across 57 countries. Dubbed "Operation Opson V," the operation resulted in seizures ranging from nearly nine tons of counterfeit sugar contaminated with fertilizer in Khartoum, Sudan, to Italian officers recovering more than 85 tons of olives which had been "painted" with copper sulfate solutions to enhance their color.

Involving police, customs, national food regulatory bodies, and partners from the private sector, checks were carried out at shops, markets, airports, seaports, and industrial estates between November 2015 and February 2016. A number of arrests were made worldwide throughout the operation and investigations are continuing. Among the aims of the operation is to identify and disrupt the organized crime networks behind the trafficking in fake goods and enhance cooperation between the involved law enforcement and regulatory authorities

In Greece, officers discovered three illicit factories producing counterfeit alcohol. Police seized equipment used in the manufacturing process, including labels, caps, and empty bottles in addition to more than 7,400 bottles of fake alcohol and counterfeit labels. In the United Kingdom, authorities recovered nearly 10,000 liters of fake or adulterated alcohol including wine, whisky, and vodka. In Burundi, more than 36,000 liters of illicit alcohol were seized.

After police in Thailand carried out checks on an individual found to be transporting four tons of meat illegally imported from India, further investigations led to the discovery of an illicit network operating across 10 provinces. Officers recovered and destroyed more than 30 tons of illegal beef and buffalo meat unfit for human consumption, which had been destined for sale in supermarkets.

False labeling proved to be a common thread for all types of foodstuffs around the world. In Australia, testing of 450 kg of honey revealed it had been blended or adulterated, and a consignment of peanuts had been repackaged and relabeled as pine nuts, posing a significant threat to allergy sufferers.

"Fake and dangerous food and drink threaten the health and safety of people around the world who are often unsuspectingly buying these potentially very dangerous goods," said Michael Ellis, head of Interpol's Trafficking in Illicit Goods unit, which coordinated activities between the world police

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body's participating countries across the globe. "With Operation Opson V resulting in more seizures than ever before, we must continue to build on these efforts to identify the criminal networks behind this activity whose only concern is making a profit, no matter what the cost to the public."
First launched in 2011, the Opson operations have grown from involving just 10 countries across Europe to involving nearly 60 countries in every region of the world and resulting in the seizure of tens of thousands of tons of fake and substandard food and drink.

35. What is the theme of this article? (1) a food fraud report. (2) a food allergy warning (3) an alcohol abuse warning (4) a food contamination warning.
36. What is the main goal of Operation Opson? (1) to against food adulteration (2) to making profits for food company (3) to promote health food products (4) to reduce food allergy.
37. What issue is NOT mentioned in this article? (1) adulterated liquor (2) adulterated olive oil (3) contaminated sugar (4) substandard beef.
38. According to this article, how many countries were involved at the initial stage of Opson operation? (1) 10 (2) 60 (3) 57 (4) 85.
39. According to this article, what is Michael Ellis? (1) a police (2) a spokesman from Opson operation (3) a head of criminal networks (4) a reporter.

40. According to this article, what locations may not examined for fake food and beverages? (1) retails (2) harbors (3) air terminals (4) restaurants.

二、 中翻英 (20%)

許多慢性及退化性疾病，例如癌症、心臟病、及神經退化例如阿茲海默症、帕金森氏症，其部分原因與氧化壓力有關。氧化壓力也與老化過程有關。活性氧會損傷生物分子例如蛋白質、脂質、去氧核糖核酸。雖然人體有一些機制可消除自由基，但非 100%有效。蔬菜、水果、堅果類被視為是抗氧化劑最佳的來源。許多礦物質與維生素，例如硒、抗壞血酸、生育醇也具有抗氧化劑的功能。