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Functional Foods Based on Traditional Chinese Medicine

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1. Introduction

The primary role of foods is to satisfy hunger and provide people with necessary nutrients, while today more and more foods or phytochemical compounds from edible plants are used to prevent nutrition-related diseases and to increase physical and mental well-being of people. These products are called functional foods, which were introduced first in Japan in the early 1980s. In the last decades, functional food industries have been developed rapidly, and functional foods have been accepted in many countries by the public due to the demand for healthier foods and products. However, there is no clear definition regarding functional foods so far at global level (Menrad, 2003; Kaushik and Kaushik, 2010). Different countries have a different regulatory framework for functional foods. The modern concept of functional food was proposed first by the Japanese academic society in the early 1980s. The legislation for functional foods was first implemented as “Foods for Special Health Use (FOSHU)” in 1991 (Arai et al., 2001). According to FOSHU, functional foods refer to natural or formulated foods containing ingredients that aid specific body functions in addition to being nutritious. Functional foods consist of food- and drink-based formulations. This first legislation highlighted the functional food as a food which should be consumed as part of the daily diet (not a capsule, tablet, or powder). A working definition of functional foods has been developed by Functional Food Science in Europe (FUFOSE) in the 1990s, stating that this is a food item that beneficially affects one or more target functions in the body beyond adequate nutritional effects in a way that is relevant to either an improved state of health and well being and /or reduction of risk of disease. The American Dietetic Association (ADA, 1999) described functional foods as any potentially healthful food or food ingredient that may provide a health benefit beyond the traditional nutrients that it contains. This is a simple definition for spanning the vast topic of food and health. The International Food Information Council (IFIC, 1998) defines functional foods as foods that provide health benefits beyond basic nutrition. Generally, functional foods may be classified as conventional food, probiotics and nutraceuticals. Conventional food includes whole foods with functional effects at some physiological level, for example, nuts and tomatoes (Kaushik

and Kaushik, 2010). Probiotics are live microorganisms (in most cases, bacteria) that are similar to beneficial microorganisms found in the human gut. They are also called "friendly bacteria" or "good bacteria." Probiotics are available to consumers mainly in the form of dietary supplements and foods. They can also be used as complementary and alternative medicine. Most often, the bacteria come from two groups, *Lactobacillus* or *Bifidobacterium*. The probiotics can alleviate lactose intolerance, treat diarrhoea, enhance immune functions, etc. De Vrese et al (2001) discussed the influence of colonic flora, the colonic milieu (e.g. pH), and gas production (hydrogen) on symptoms of lactose intolerance. With reference to diarrhoea treating, although the evidence supporting the prevention of travellers' diarrhoea by probiotics is weak, there exists an overall protective effect on the prevention and treatment of diarrhoea from antibiotic-associated diarrhoea, with especially strong evidence on the efficacy of *Lactobacillus* in treating diarrhoea from rotavirus infection (Santosa et al., 2006; Guarino et al., 2009). As for probiotics and their role in immunomodulation, although several in vitro and in vivo studies on probiotics effects on immunity have been reported, the specific mechanisms of the observed changes remain unclear. Generally, an enhanced sIgA production and splenocyte proliferation were observed during the probiotics treatment. Moreover, regarding the cytokine production, several studies have shown that cytokine production by cells of the immune system can be altered by probiotic use (Erickson & Hubbard, 2000).

Nutraceuticals are foods or food ingredients that have defined physiological effects. They are derived from plants or foods, and are usually packaged and labelled similar to drugs. Functional foods and nutraceuticals are synonymous in many media and literature. Dr. Stephen De Felice, M.D., the founder and chairman of the foundation for innovation in Medicine, defined a nutraceutical as a food or part of a food that provide medical or health benefits, including the prevention and treatment of diseases. According to this concept, the nutraceuticals cover everything, including dietary supplements, fortified foods, functional foods and medical foods (Brower, 1998; Hardy, 2000; Kalra, 2003). Thus, the definition of nutraceuticals from the USA is a diet supplement that delivers a concentrated form of a presumed bioactive agent originating from a food, presented in a non-food matrix, and used to enhance health in dosages that typically exceed those that could be obtained from normal foods (Zeisel, 1999). Both in Canada and in Great Britain, functional foods are essentially a food, while a nutraceutical is an isolated or concentrated form. Thus, nutraceuticals are also naturally occurring dietary substances, with partly rather pharmaceutical dosage. Vitamins, minerals and herbal supplements fall into this scope. Currently, dozens of functional food components from plants as well as animals are under investigation for their potential role in disease prevention and health promotion.

With increasing needs and demand for a healthier life, functional foods are becoming more and more popular, while from the market perspective, functional foods are difficult to quantify because different definitions are used in the world. Therefore, more work should be done to establish a proper regulatory and harmonization of regulation and guidelines on functional foods at a global level, to ensure the quality and safety for active utilization of functional foods in different countries.

From the point of view of specific products, the difference between a functional food and a drug is not clearly defined and is not easy to classify (Pletscher, 2004). Generally, foods are

usually defined as food and drink, while drugs are usually intended for use in the diagnosis, cure, treatment, or prevention of disease. There has been no common shared ground between foods and drugs in the past, and health-related claims were not permitted on foods. However, regulatory authorities and new legislation in some countries have opened up the possibility of properly substantiated health-related claims for foods and their ingredients in several countries and at the international level (Lupien, 2002). However, some of the functional foods may not be without side effects. For example, Bachmann and Hoffmann (2004) reported the interaction of L-Carnitin (a functional food) with acenocoumarol, an anticoagulant. In the event of such an incident, diagnosis becomes more difficult. Therefore, we have to face the reality that there is often no clear defined border between a functional food and a drug, and much more research work should be done on the safety, pharmacological effects and potential risks of the interaction of functional foods or functional foods and drugs.

The goal of this chapter is to offer a comprehensive review of developments and current status of the functional food area, as well as of medicated diets based on Traditional Chinese Medicines (TCM).

2. Chinese functional foods

2.1 Definition of functional food in China

Modern functional food appeared in the 1980's in China. Presently, the newly emerged functional food industry is under rapid development. In June 1996, the Ministry of Health of the People's Republic of China promulgated "the provision of functional foods administration". In this document, a functional food is defined as a food that has special health functions. It is suitable for consumption by special groups of people and has the function of regulating human body functions, but is not used for therapeutic purposes (Ministry of Health, 1996).

A similar definition is given in "General Standard for Health (Functional) Foods (GB 16740-1997)", proclaimed by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (used to be the State Bureau of Quality and Technical Supervision) in May 1997. Functional foods are foods which help regulating body functions by special groups of chemical compounds, but not for therapeutic purposes (General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China, 1997).

According to the guideline of registration for functional foods, promulgated by the State's Food and Drugs Administration in July 2005, health (functional) food means that a food has special health functions or is able to supply vitamins or minerals. It is suitable for consumption by special groups of people and has the function of regulating human body functions, but is not used for therapeutic purposes. It should also not cause any harm, whether acute or sub-acute or chronic (State Food and Drug Administration, 2005). These three regulations contain all the information when a functional food is registered, such as the definition, the materials needed, laboratory testing data, the suitable consumers, the package, labelling and advertisement regulations.

2.2 The history and development of functional foods in China

China is the treasure house of traditional Chinese medicine (TCM). The functional food, which initiated from Japan, is still based on the ancient Chinese saying "Medicine and food are isogenic". The documented use of functional foods in the history of TCM began as early as 1000 B.C. in the West Zhou Dynasty. The basic theories and knowledge of foods and nutrition had been established and developed in the process of looking for foods in ancient times. Hundreds of functional foods and corresponding recipes were recorded in many Chinese classical TCM publications, such as the medical classic of the yellow emperor (Han Dynasty), *ShenNongBenCaoJing* (Han Dynasty), *Compendium of Materia Medica* (Ming Dynasty), etc. These basic nutrition theories of TCM gave us some information and kinds of ideas for the application of the TMC/compounds of TCM in functional foods. Many present used products came from these monographs. Also, these medical volumes have accumulated and rendered valuable experiences for later nutrition researchers to develop superior functional foods and medical dietary foods in China. Over the past decades, functional foods have becoming one of the most important industries in China. Since the guideline of registration for functional foods were promulgated in 2005, the new functional foods were encouraged by the Food and Drug Administration (FDA) of the People's Republic of China. In the National Development Plan of Science and Technology for the Twelfth Five-year Program (2011-2015), research institutes and corporations are expected to develop safer functional foods with higher quality and better activities to increase the physiological functions, especially for old people, pregnant women, children and population in special working environment.

The reports from WTO showed that among all the population in the world, about 70% is in sub-optimal health situation, which means there is more than 1 billion of the population in sub-optimal health condition in China. Currently, China is becoming one of the most important and developed markets for functional foods, which are based on traditional dietary cultures and the rapid economic development among individuals and communities (Tee, 2002). With the globalization, a lot of famous international brands of functional foods garrisoned the market of China mainland in quick succession. In 1995, the first foreign company was Amway, since then, the number of abroad companies increased by more than 12% annually. Up to now, there are about 20 foreign food companies in China mainland, such as Amway, P&G, Jamieson, and VIVA. It is predicted by some international authoritative institutions that the sales volume of functional foods in China had reached 50 billion Chinese Yuan in 2005. By the end of July, 2011, 11,456 products were registrated in the Ministry of Health (MOH) and the State' FDA (SFDA) in China, including 10,807 domestic products and 649 foreign/international ones. Of the approved products, only about 30% of them are still currently on the market (Wu, 2004).

There are 27 categories of product specific health claims according to Technical Standards for Testing and Assessment of Health Food in China (2003), which are function related or refer to reduction of disease risk (Table 1) (Ministry of Health, 2003). However, an adjustment scheme of the health claims of functional food (a draft for discussing) has been published on the website of the SFDA on August 1st, 2011. According to the adjustment scheme, some health claims will likely be cancelled, e.g. the claim of assisting in blood pressure reduction, or combined, e.g. improving skin water content and improving skin oil content (SFDA, 2011). Most functional foods are found in 11 different formats, including capsule, tablet, powder, granule, liquid and food forms to fit people's busy lifestyle.

Allowed Claim FOR FUNCTIONAL FOODS IN CHINA	
1) Enhanced immunity	14) Improves nutritional anemia
	15) Assists in protecting against chemical injury to the liver
2) Antioxidative	16) Eliminates acne
3) Assists in memory improvement	17) Eliminates skin chloasma
4) Alleviates eye fatigue	18) Improves skin water content
5) Facilitates lead excretion	19) Improves skin oil content
6) Moistens and cleans throat	20) Regulates gastrointestinal tract flora
7) Improves sleep	21) Facilitates digestion
8) Facilitates milk secretion	22) Facilitates faecal excretion
9) Alleviates physical fatigue	23) Assists in protecting against gastric mucosa damage
	24) Weight loss
10) Enhances anoxia endurance	25) Assists in blood lipid reduction
11) Assists in irradiation hazard protection	26) Assists in blood sugar reduction
12) Improves child growth and development	27) Assists in blood pressure reduction
13) Increases bone density	

Table 1. Permitted health claims of functional foods in China

2.3 Examples of functional foods based on the TCM

Nowadays, with the rapid development of science and technology, the functional food industries have become a rising industry in the 21st century. People also have refocused their attention from disease treatment towards disease prevention and health improvement, from drugs towards functional foods, for achieving a high quality of life. Below are a few selected examples of functional foods based on TCM. The examples of 4 kinds of functional foods with good activities and long history in TCM culture will be introduced. This is not only because raw materials of 4 functional foods are mainly produced in China, but also these functional foods are still precious and expensive till now.

2.3.1 Oviductus Ranae

The Chinese forest frog was first documented in the Compendium of Materia Medica and was called “Shange”. The original Shange recorded in the works of Chinese materia medica is *Rana temporaria chensinensis* David. Oviductus Ranae is made from the oviduct of the female forest frog and was recorded by Ben-Cao-Tu-Jing (Susong of Song Dynasty), Compendium of Materia Medica and Chinese Pharmacopoeia for its effective health tonic. In ancient China, Oviductus Ranae was only used by high officials as a precious invigorant. The market price of Oviductus Ranae is about 3,000 \$/kg at present and it is also known as “soft gold”. The main nutritious elements of Oviductus Ranae are proteins (54.93%), amino acids (tryptophan 15.69 mg/100g, lysine 7.20 mg/100g), human chorionic gonadotrophin (HCG) (107.50 µg/g), estradiol (52.3±5.89 pg/100 mg), progesterone (187.9±19.4 pg/100 mg), testosterone (15.3±1.4 pg/100 mg), and diverse trace elements (K 1.65%, Ca 5.71%, Na 3.56%, Mg 0.53%, Cu 0.01%, Zn 0.02%, Fe 0.47%, Mn 0.06%, Se 0.001%, Cr 0.01%, Mo 0.002%, Sr 0.004%, Co 0.63%, Cd 1.09%, La 1.53%, Ba 3.73%, B 0.37%, Ni 0.65% and V 1.56%) and

vitamins. It was reported that *Oviductus Ranae* can enhance immunity of mice (Gao et al., 1996), improve sleep (Hua et al., 2009) and relieve physical fatigue (Zhang et al., 2011). *Oviductus Ranae* at the dose of 68.34 mg/100 g culture medium markedly prolonged the mean life span of *Drosophila melanogaster* (Liu et al., 1998). And *Oviductus Ranae* capsules have the potential protective effect on the reproductive organs of aged mice (Liang et al., 2008). Though *Oviductus Ranae* has been used for hundreds of years, there exist still no controlled human studies. More detailed researches about the activities and safety about *Oviductus Ranae* are needed.



Fig. 1. *Rana temporaria chensinensis* and *Oviductus Ranae*

2.3.2 TiepiFengdou

TiepiFengdou is processed by the stems of *Dendrobium officinale* Kimura et Migo (Orchidaceae). In many papers, the synonym *Dendrobium candidum* was used. *D. officinale* Kimura et Migo is an endangered species in China and ranked “the first of the nine Chinese fairy herbs” (Ji, 1999). It is mainly distributed in southern China, e.g. Zhejiang, Jiangxi, Guangxi, Guizhou, Yunnan provinces and Tibet. The stems of *D. officinale* have been used as a traditional Chinese tonic medicine for hundreds of years, and have been recorded in many medical monographs such as *ShenNongBenCaoJing*, *Compendium of Materia Medica*, *Supplement to the Compendium of Materia Medica*, etc. According to the ancient literature and modern pharmacological research results, it can benefit human health in many aspects, such as nourishing yin and clearing away unhealthy heat, benefiting the stomach, promoting the production of body fluids, resisting cancer and prolonging life (Ji, 1999; The Pharmacopoeia Commission of PRC, 2010). It contains dendrobium polysaccharides (23%) (Huang et al., 1994), alkaloids (0.02%-0.04%) (Zhu et al., 2010), amino acids (133 mg/g dried materials) (Huang et al., 1994), as well as several trace mineral elements, including Fe 292 µg/g, Zn 12 µg/g, Mn 53 µg/g, Cu 3.6 µg/g (Weng, 2003). Modern pharmacological studies (Liu et al., 2011) showed that *D. officinale* and its polysaccharides can significantly enhance cellular immunity and nonspecific immunity in mice. Humoral immunity was also enhanced after oral administration of *D. officinale*, but the polysaccharides had no influence. The antioxidant activity of total polysaccharide and purified polysaccharide DCP3c-1 from suspension-cultured protocorms of *D. candidum* had been studied, which showed the good antioxidant activity in vitro (He et al., 2007). Wu et al. (2004) indicated that the extract of *D. candidum* has obvious anti-hyperglycemic effects in adrenaline-induced hyperglycemia mice and streptozotocin-diabetic rats, and the mechanisms are stimulating the secretion of

insulin from β cells and inhibiting the secretion of glucagons from α cells, and it can probably decrease the decomposition of live glucogen and increase the synthesis of the liver glycogen. Moreover, *D. officinale* Kimura et Migo is one of the five species which contain chrysotoxene, erianin and confusarin. These compounds present good antitumour and anti-oxidation activities in vitro and in vivo (Chen et al., 2006; Gong et al., 2004).



Fig. 2. *Dendrobium officinale* and TiepiFengdou

2.3.3 Poria

Poria cocos (Polyporaceae), the Chinese name being Fu-Ling, is an oriental rotten pine-tree fungus. It has been widely used as a Chinese traditional herbal medicine for its diuretic, sedative, and tonic effects for centuries and was first documented by ShenNongBenCaoJing, the first Chinese medical pharmacopoeia written in the Han Dynasty. Various studies of this fungus have demonstrated its marked multiple activities in different experimental models, such as the antioxidant activity in mice (Wu et al., 2004; Lin et al., 2011), anti-hyperglycemic activity in streptozocin- treated mice (Li et al., 2010), anti-aging activity in mice (Hou et al., 2004), anti-inflammatory activities in human leukemic U937 and HL-60 cells (Chen & Chang, 2004), and in the models of xylene-induced ear swelling in mice and the chronic inflammatory reaction of rat granuloma induced by cotton (Hou et al., 2003), and at last the antitumor activities in S180 and K525 cells (Wu et al., 1994). *P. cocos* is widely distributed in Hubei, Henan, Anhui and Zhejiang provinces. Several triterpenes, pachyman, and pachymaran have been identified from *P. cocos* (Tai et al., 1992; Cheung, 1997; Mizushima et al., 2004; Zjawiony, 2004). Dehydrotrametenolic acid, one triterpene constituent of *P. cocos*,



Fig. 3. *Poria cocos* and Poria

was shown to reduce hyperglycemia in db/db mice, which can activate peroxide proliferator-activated receptor- γ (PPAR- γ) (Sato et al., 2002) and enhance the insulin sensitivity (Li et al., 2010). Yu et al. (2004) suggested that pachyman could improve cell-mediated immunity and could have anti-tumor function in the chickens infected with marek's disease virus (MDV).

2.3.4 Bitter gourd buccal tablet

Momordica charantia L., commonly known as bitter gourd, bitter melon, bitter lemon, balsam pear, or karela, is an economically important medicinal plant belonging to the family cucurbitaceae. It is widely cultivated in Asia, Africa, and South America, and has been used in various parts of the world to treat diabetes. The immature fruits are eaten as vegetables and are a good source of vitamin C, vitamin A, phosphorus and iron (Sultana & Bari Miah, 2003; Paul et al., 2009). The vitamin C content of Chinese bitter gourd varies from 440 mg/kg to 780 mg/kg per edible portions (Behera et al., 2010). Among the secondary bioactive metabolites of *M. charantia*, are cucurbitane-type triterpenoids. These compounds and their aglycones showed some biological effects beneficial to diabetes and obesity (Lee et al., 2009). Leung et al. (2009) reviewed the anti-diabetic and hypoglycaemic effects of *M. charantia* in animal studies and clinical studies. Fruits and seeds of bitter gourd possess medicinal properties such as anti-HIV, anti-ulcer, anti-inflammatory, anti-leukemic, antimicrobial, antitumor and antidiabetic properties (Taylor, 2002). The Compendium of Materia Medica records that *M. charantia* has the function of eliminating heat, making people vigorous, clearing people's mind and eyes, tonifying the kidney and so on. Freeze-dried bitter melon capsules are widely available and marketed in health food stores across North America and Western European countries. And in China, the bitter gourd buccal tablet was made from the concentrated solution of bitter gourd, maltitol, sorbitol and isomaltooligosaccharide (Zhang et al., 2004). After the processes of mixing, prilling, drying and tableting, a kind of healthy bitter gourd buccal tablet of low calories was prepared, which is a functional food and usually used as a auxiliary medical service for treating diabetic (Sun et al., 2000; Liu et al., 2002). This production can be found in many supermarkets and functional food stores.



Fig. 4. *Momordica charantia* L. and Bitter gourd buccal tablet

3. Chinese medicated diets

In the theories of TCM, food and medicine are of equal importance in preventing and treating diseases. Influenced by these theories, Chinese people prefer to foods made of food

materials and edible herbal medicines offered by restaurants or home made by themselves to regulate the body physiology, prevent diseases or promote recovery. This kind of food is called medicated diet/food in China. In the third part of the chapter, the definition, the history and the current status of medicated diets are discussed.

3.1 Definition of Chinese medicated diets

Medicated food/diet is delicious foods made of food materials and herbal medicines under TCM theories, nutrition and Chinese cooking technologies guidance, with a good colour, aroma and taste. It has not only the efficiency of medicine but also the delicacy of food, and has been used to prevent and cure diseases, build up one's health and prolong one's life.

3.2 The history of Chinese medicated diets

Chinese medicated diet has a long history in Chinese culture. Dietotherapy is the way to cure and prevent disease by eating food with curative effects, which is one of the parts of science of health preserving of TCM. In China, its history can be dated back to the Shang Dynasty 3,500 B. C. In the Yellow Emperor's Internal Classic, a medical classic in TCM, which appeared approximately in the Warring States Period, several medicated diet prescriptions were recorded. Sun Simiao, a well-known doctor in the Tang Dynasty, listed and discussed dietetic treatment, dietetic treatment for senile health care and health preservation, etc, in his books of *BeiJiQianJinYaoFang* and *QianJinYiFang*. It is emphasized in these books that "dietetic therapy should come first for any senile diseases, and then followed by medicine if they are not cured." These two books were substantial in medicated diet prescriptions, which were important marks of the establishment of the dietotherapy in China. The book *ShiLiaoBenCao* (Dietotherapy of Medical Material) by Meng Xian, a student of Sun Simiao and a famous doctor of the Tang Dynasty 618~907 A. C., has a great influence on later generations. It is the earliest extant monograph of dietetic treatment. Later, similar kinds of books on dietetic treatment have been published, including *Peaceful Holy Benevolent Prescriptions* (Wang Huaiyin and some others, Song Dynasty), *Principles of Correct Diet* (Husihui, Yuan Dynasty), the *Compendium of Materia Medica* (Li Shizhen, Ming Dynasty), among others. In *Recipe of Suixiju* by Wang Shixiong (Qing Dynasty), 331 species belonging to 7 phyla of medicated food and drink were introduced. With the development of economy and the continuous increase of the people's living standard, medicated diet is more and more valued by the people, and a number of scientific works on medicated diet have been published recently.

Medicated diet has some therapy effect. It can be prepared either from Chinese herbs alone, or from Chinese herbs and food according to certain prescriptions, by processing and cooking. In light of its form and process, the medicated diet can be divided into 3 types.

1. Liquid diet:

a. Fresh juice

This is the juice extracted from edible Chinese fruits alone, such as fresh fruits, or together with some fresh, clean-washed Chinese herbs. Fresh lotus leaf juice from lotus leaves (leaves of *Nelumbo nucifera* Gaertn) is a good example, documented in *Compendium of Materia Medica* and *Pharmacopoeia of the People's Republic of China* (2005). Studies on the main

chemical constituents found that the content of flavonoids from lotus leaf reached 36mg/g (Zhang et al., 2005) and thus constitutes a good source of polyphenols. Research results of Lin et al. (2009) indicated that the antioxidant capacity of lotus leaves is partially relevant to its flavonoids. Huang et al. (2011) suggest that the lotus leaf methanolic extract and its active constituent catechin are useful in the control of hyperglycemia in non-insulin-dependent diabetes mellitus through their action as insulin secretagogues in vitro and in vivo. The total alkaloids extracts of lotus leaf have the function of regulating the lipids of the hyperlipidemia rats (Zhu and Li, 2010). The clinical observations showed that the lotus leaves have the significant effect on reducing blood lipid after 3 months treatment (Xie, 2010).

b. Medicated tea

This is the mixed powder of drugs with tea or without tea. Chinese herbs such as fruits, flowers and vegetables are often used as ingredients of medicated tea, while some drastic or extremely bitter herbs are not used. Generally, this kind of medicated tea is taken frequently as a common tea. Ginger and Sugar Tea, for instance, which were recorded in General Records of Holy Universal Relief (also called ShengJiZongLu, Zhaoji and others, Song Dynasty) and were used to treat wind-cold type of common cold, is made from fresh ginger (*Zingiber officinale* Roscoe) and brown sugar. Ginger, from the rhizome of *Zingiber officinale* Rosco (Zingiberaceae), is a common condiment for foods and beverages in China. It is a well-known spice and herbal medicine used to treat diseases such as the common cold, cough and gastrointestinal problems. Hiroshi et al. (2010) suggested that the repeated administration of the aqueous constituents of ginger augmented the serum corticosterone level and that this may have gradually induced anti-inflammatory activity. Gao and Zhang (2010) revealed that crude polysaccharides and favonoids from *Z. officinale* have antibacterial activities. The volatile oil of ginger has protective effects on antioxidation activity of carbon tetrachloride damaged mice (Sun, 2010). Gingerols are the major pungent constituents of ginger, which has the significant antioxidant activity (Masuda et al., 2004) and have antiplatelet activity in rats (Jiang et al., 2010). Results from Liu et al. (2009) suggest that hypolipidemic effects of mulberry extract are via an enhancement of Low-density lipoprotein receptor gene expression and the clearance ability of low-density lipoprotein and a decrease in the lipid biosynthesis.

c. Medicated soup

Medicated soup is a kind of thick soup, which is usually stewed or braised in water with edible Chinese herbs alone, or along with meat, chicken, spareribs and so on. It is to be taken as a common soup to prevent diseases and strengthen health. Four Ingredients Decoction (SIWU Decoction), for example, is such a soup which contains four individual herbs, Radix Rehmanniae (*Rehmannia glutinosa* Libosch.), Radix Paeoniae Alba (*Paeonia lacti flora* Pall.), Rhizoma Chuanxiong (*Ligusticum chuanxiong* Hort.) and Radix Angelicae Sinensis (*Angelica Sinensis* (Oliv.) Diels.). This decoction is used to invigorate qi and promote blood circulation (Yu et al., 2003). Zhang et al. (2000) confirmed the effect of Siwu Decoction on red blood cell immunoadhesive function and stem cell multiplication in mice. Moreover, Lu et al. (2001) reviewed the pharmacological effects of Siwu Decocotion in immune, blood, and cardiovascular systems and Siwu Decocotion have significant radioprotective effect (Lu et al., 2001; Guo et al., 2004).

d. Medicated wine

This is a liquid made by combining wine with Chinese herbs. It can be made by either infusing or brewing, for example, Chinese wolfberry wine. The major active components from wolfberry (*Lycium chinense* Mill.) are polysaccharides. Ho et al (2009) demonstrated that a fraction of polysaccharides from wolfberry can antagonize glutamate excitotoxicity in rat cortical neurons, which provided remarkable neuroprotective effects of wolfberry. And the extract of Chinese wolfberry had a significant anti-fatigue effect in mice (Qin et al., 2009; Yin & Wang, 2010). Some research results showed that this anti-fatigue activity of wolfberry might relate to polysaccharide extract (Sheng & Fan, 2011).

2. **Semi-liquid diet:**

a. Medicated gruel

This is a kind of gruel prepared by cooking rice, together with herbs, or the decoctions, which have the function for health care. For example, gruel of Pipaye (Folium Eriobotryae) was cooked by rice and Folium Eriobotryae. Folium Eriobotryae is dry leaves of *Eriobotrya japonica* (Thunb) Lindl (Rosaceae), which was first documented in MingYiBieLu by Tao Hongjing. It has a long history of application for relieving cough and reducing sputum. Modern pharmacological research proved that Folium Eriobotryae has the anti-inflammatory and antitussive effects (Wang et al., 2004), and it was used clinically to treat acute and chronic respiratory diseases. Moreover, recent results showed that flavonoid fraction from Folium Eriobotryae has the hypoglycemic effect (Lv et al., 2009)

b. Medicated paste

This is a kind of paste, made by the powders of herbs and round-grained rice flour or wheat flour. Mulberry Gao is a tonic for enriching blood and nourishing yin. Mulberry is a deciduous tree native to China and Korea, belonging to the Moraceae family. The fruit of mulberry has a tonic effect on kidney energy, and thus, it is used as an antiphlogistic, a diuretic and an expectorant (Koyuncu, 2004). Jeong et al. (2010) indicated that mulberry fruit extract induced human glioma cell death in vitro through ROS-dependent mitochondrial pathway and inhibits glioma growth in vivo via reduction of tumor cell proliferation and induction of apoptosis.

3. **Solid diet:**

a. Medicated cake

This is a cooked cake or noodle prepared by the mixture of Chinese herbs and rice flour, or wheat flour, or bean flour. It is processed by either steaming or baking. Take Eight-Ingredient Cake for example, may be used to strengthen the spleen (Liu et al., 2009). We will have a detailed knowledge to Eight-Ingredient Cake in the following context.

b. Cuisines

This is a large group of medicated diet, including varieties of meat and vegetable dishes. It is prepared by cooking chicken, or duck, or fish, or vegetable, etc. along with vegetables and TCM. It can be cooked in many ways: stewed, braised, steamed, boiled, stir-fried, roasted, and fried and so on. For example, crucian carp (*Carassius auratus* (L.)) steamed with tea, stewed duck with aweto (*Cordyceps sinensis*).

Most medicated diets are in conventional food form. Generally, people would like to cook it at home or buy it from some local restaurants. The medicated diets are especially popular in Southern China, e.g. in Zhejiang, Guangdong and Guangxi provinces. People take different medicated diets according to the point of view of “the unification of humanity and nature” in Chinese traditional medicine theories. The health claims of medicated diets are listed in Table 2 and Table 3. The health claims of medicated diets contain 2 categories, medicated diets for health preservation and common diseases coordination (Peng, 2010).

Allowed Claims for Medicated Diets in China	
Health preservation	Preserving heart, lung, liver, kidney, conditioning spleen and stomach
1) Preserving five organs	
2) Facial beautification and figure shaping	Blackening hair, improving eyesight, skin moistening, skin lightener, spots removing, anti-acne, removing wrinkle and emaciating bodies
3) Nourishing	Nourishing brain, improving memory, tranquilizing the mind, enriching blood, regulating qi*, nourishing yin* and strengthening yang*

* The theory of Yin and Yang is one part of the basic theories in TCM, which is directly originated from the traditional Chinese philosophical thought of "the way of Heaven at unity with the course of Man's affairs". The relationship between Yin and Yang include opposition, interdependent, ebb and flow, and transformation. Yang means the outside, the upper, and the back, whereas Yin means the inside, the lower and the front of the human body structure. For example, the hair and skin are Yang, while the organs, heart, spleen, kidney, etc, are Yin. The imbalance of Yin Yang will lead to the occurrence of diseases. Thousands of TCM are classified into Yin and Yang according to the herbal nature. TCMs with Yang nature are prescribed to the patients of Yin deficiency. On the contrary, the patients of Yang deficiency get the TCMs with Yin nature. Of course, the explanation above is only the simple example to let the Yin Yang theory understood easily.

According to the TCM theory, Qi is the basic element of the human body. Qi is divided into 4 types: the most important is Yuan Qi from the kidney, then Zong Qi comes from the chest, Ying Qi generated from the spleen and stomach, flowing into vessels, and the last one is Wei Qi from the spleen and stomach, staying between vessels.

Table 2. Health claims of medicated diets in China for health preservation.

3.3 Some examples of medicated diets

Medicated diets from TCM have a long history in China. In ancient time, medicated diets, especial medicated cake and medicated soup were usually offered only to the noblemen in the Palace. Eight Ingredients cake, for example, was ever the favourite snack of the famous Qianlong emperor and Empress Dowager Cixi. Up till now, Chinese people still like these diets for preserving the health. Four selected medicated diets are discussed here.

3.3.1 Five-Juice Drink

Five-Juice Drink was first documented in Detailed Analysis of Epidemic Warm Diseases by Wu Jutong (Qing Dynasty). It is made from the juices of the water chestnut (Bulbus

Claims	
Common diseases coordination	
1) Pediatric diseases	Salivation, anorexia, infantile malnutrition, intestines parasite infection, diarrhoea, enuresis, obesity
2) Nervous system and mental disorders	Depression, insomnia, schizophrenia, neurasthenia, senile dementia, neuralgia, neuritis and palsy
3) Sense organ diseases	Conjunctivitis, glaucoma, cataract, night blindness, osteopathy, dermatosis
4) Digestive system diseases	Esophagus cancer, gastritis, gastric ulcer, duodenal ulcer, gastric cancer, gastropotosis, hyperchlorhydria, enteritis, rectal cancer, dysentery, constipation, hepatitis, fatty liver, liver cirrhosis, liver cancer
5) Respiratory system diseases	Common cold, pharyngitis, parotitis, relieving cough and eliminating phlegm, bronchitis, pneumonia, lung cancer, pulmonary tuberculosis
6) Circulatory system diseases	Coronary heart disease, arrhythmia, hypertension, hyperlipidemia, anemia virus, angiosclerosis, hemorrhage disease, leukemia
7) Endocrine system disease	Diabetes mellitus, thyroid enlargement, thyroid carcinoma, gout disease
8) Urinary diseases	Diuresis, nephritis, kidney calculi, urinary tract infection, bladder cancer
9) Reproductive system diseases	Dysmenorrhea, menoxenia, mastitis, infertility, pregnant reaction, menopause syndrome, impotence, emission, premature ejaculation, ejaculatory incompetence, prostatitis
10) Motor related system disease	Hyperosteogeny, osteoporosis, rheumatism, Eliminating wind and dampness, rheumatoid

Table 3. Health claims of medicated diets in China for common disease coordination

Heleocharis Tuberosae), fresh reed rhizome (Rhizoma Phragmitis), fresh lotus root (Rhizoma Nelumbinis), pear (Malum Piri) and fresh lilyturf root (Radix Ophiopogonis). Five-Juice Drink is used for satisfying one's thirst and relieving heat in rabbits (Jiang et al., 2007). Wu and Qiu (2009) revealed that water chestnut peel extract has strong inhibitory effect on both bacteria and fungi, especially on bacteria. The effects of liver protection of Rhizoma Phragmitis have been reported in mice and rats (Zhang et al., 2002; Zhang et al., 2002; Li et al., 2005).

3.3.2 Eight ingredients cake

Eight Ingredients cake was invented first by the famous archiater (private doctor of emperor) Chen Shigong (Ming Dynasty), and became more and more popular since the Qing Dynasty. It is said that Eight Ingredients cake was the favourite refectation of Empress Dowager Cixi. This cake is made of 8 medicinal herbs, including Ginseng (*Panax ginseng*), Chinese yam (*Dioscorea oppositae* thunb.), Tuckahoe (*Poria cocos*, Fu-ling), Gordon Euryale Seed (*Semen Euryales*), lotus seed (*Semen Nelumbinis*), Rhizoma Atractylodis Macrocephalae, hyacinth bean (*Semen Dolichoris Album*), Semen Coicis, and high-quality glutinous rice flour. There exist multiple recipes for eight ingredients cake with fine distinctions and it has gradually become a famous snack in China with a sustained reputation of over 100 years. Though this snack has been in popular for many year, there is no related modern scientific literatures about the pharmacological effects recorded in ancient monographs, except the research papers on the individual herbs. More studies on the safety and efficacy are needed.

3.3.3 Herbal teas

Herbal teas, which are also known as tisanes or herbal infusions, are herbal or plant infusions. Unlike actual teas, herbal teas do not come from *Camellia sinensis* plant but come from other sources, such as blossoms of linden, leaves of peppermint and fruits of hibiscus (Trevisanato et al., 2009). In China, herbal tea is commonly known as Liangcha. The documents of traditional Chinese herbal tea are dating back to as early as ancient China. With incomes growing steadily, consumers began looking for healthier drinks. Herbal teas, with its medicinal properties, are becoming one of the most popular soft drinks in China. With the sales of Wang Laoji's Liangcha for example, 9 billion Chinese Yuan have been generated in 2007 in China. The formula of Wang Laoji's Liangcha contains *Mesona chinensis*, *Plumeria rubra* cv. *Acutifolia*, *Microcos paniculata*, Flos *Chrysanthemi* (*Dendranthema morifolium*), *Lonicera japonica*, Spica *Prunellae* (*Prunella vulgaris* L.), Radix *Glycyrrhizae* (*Glycyrriza Uralensis*), white granulated sugar and water. Other tea-based soft drinks such as bottled ptisan, Ku Ding tea (leaves of *Ilex latifolia* Thunb) and lemon tea also have become popular in China. Generally, herbal teas are used for clearing hectic heat, removing dampness, improving eyesight and detumescence. Li et al. (2010) reported the effects of Wanglaoji Herbal Tea on cytotoxic T lymphocyte activity in spleen of restraint stress mice. A comparative research of antioxidant activities of 20 herbal teas saled in the market were performed (He et al., 2010). The lipid metabolic dysfunction can be improved by Wanglaoji Herbal Tea in restrained mice, and the mechanism might be related to the amelioration of oxidative situation in plasma (He et al., 2008). But these kinds of beverages are not fit for pregnant women and children as the herbals used in the drink are cool in nature (Boullate et al., 2000). Moreover Wang (2008) evaluated the safety activity of Fuxing Tang Guangdong Herbal Tea in the master dissertation, and the results showed that there are no observed indicators after 30 days feeding on rats.

3.3.4 Gruel of Hetaoren (Semen Juglandis)

In fact, medicated gruels are almost the most popular medicated diet in China because gruels are easy and convenient to cook. Different kind of medicated gruels are provided for different people such as old people, children, women, patients.

Gruel of Hetaoren is made from Semen Juglandis (*Juglans regia* L.) and a proper amount of rice. The recipe is the following: Pound Hetaoren into pieces. Rice, together with a proper quantity of water and Hetaoren pieces are simmered for half an hour. Then the food is ready. Gruel of Hetaoren is used for nourishing the heart, tranquilizing the mind and tonifying the brain to benefit intelligence, and the acetone extract of Semen Juglandis could scavenge oxygen free radicals and have antiaging effect in mice (Bi & Yin, 2006). The phenolic compounds from walnut kernels have the significant antioxidant activities (Zhang et al., 2009). Zhao et al. (2004) indicated the semen juglands extract could improve learning and memory of mice.

4. Conclusion

With the remarkable improvement of people's living standard, in addition to the large aging population, more and more parts of the population is becoming interested in achieving and maintaining well-being and a high quality of life, and the demand for health-preserving foods is growing rapidly.

The functional food industry has been developing rapidly for 30 years in China. It is undeniable that in this industry, a great progress has been made, especially in the number, the claims related and the quality of the functional foods. Versatile products can be provided for different customers. The sales volume of functional foods in China in 2009 have reached 13.4 billion dollars, which means that China has become the second biggest functional food market in the world after the USA.

However, there are new opportunities and challenges in this industry up to now. Functional foods that we find on the market today are often based on the general discoveries in nutritional science, and less on a deliberate research strategy to develop functional food. For future research on functional foods, it would be of interest to focus on the mechanisms by which various food components, such as phytochemicals found in fruits, vegetables, whole grains, and herbs, positively affect health and whether these components work independently or synergistically. New functional foods with precise pharmacological mechanisms are needed.

The elderly population aged 60 has reached 144 million, 11% of the total population in China in 2006 and the number of old person will increase continuously. It is vital to improve the health care work of the aged and prevent occurrence of aging-related diseases, such as cardiovascular disease, stroke, cancer, diabetes mellitus, etc. Functional foods and nutraceuticals constitute a great promise to improve health and prevent aging-related chronic diseases (Ferrari, 2004).

With China being a leading producer of agricultural products, there is a great potential for many commodities to be processed into functional foods for domestic and global markets. More attention should be directed to potential nutraceuticals from agricultural products.

At last, the universal definition of functional food in the world should be stipulated. With the continuous development of food science and technology research, some assessment methods need to be re-evaluated and modified. More effective and safer functional foods should enter the markets for the health of people of the world.

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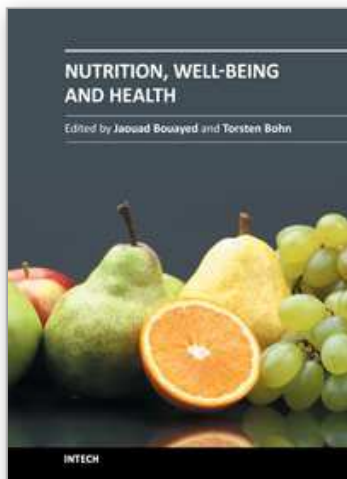
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In our modern society, expectations are high, also with respect to our daily diet. In addition to being merely "nutritious", i.e. supplying a variety of essential nutrients, including macro-nutrients such as proteins or micro-nutrients such as minerals and vitamins, it is almost expected that a good diet offers further advantages - especially well-being and health and the prevention of chronic diseases, which are, as we generally tend to grow older and older, becoming a burden to enjoying private life and to the entire society. These additional qualities are often sought in diets rich also in non-nutritive components, such as phytochemicals. In contrast to drugs, which are taken especially to cure or ameliorate diseases, it is expected that a healthy diet acts in particular on the side of prevention, allowing us to become old without feeling old. In the present book, rather than trying to give an exhaustive overview on nutritional aspects and their link to well-being and health, selected topics have been chosen, intended to address presently discussed key issues of nutrition for health, presenting a reasonable selection of the manifold topics around diet, well-being, and health: from the antioxidants polyphenols and carotenoids, aroma-active terpenoids, to calcium for bone health, back to traditional Chinese Medicine.

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