Nutritional Blog: Functional Foods for Disease Prevention

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Abstract

There is a concern in the health community for the long-term effects of nutrition, whether good or bad, the diet of an individual will have life-long effects. Lifestyle modifications create a healthy way of living so that food can be a healer or a source for the prevention of disease. The following research focuses on the background research on functional food topics to provide a basis for six blog writings on nutrition. The following functional food topics are discussed: lifestyle modification versus diet; eating a rainbow of colors of fruits and vegetables; eating 5-a-day of fruits and vegetables regarding polyphenols; eating 5-a-day of fruits and vegetables regarding flavonoids; dietary fiber; and the essential fatty acids both omega-3 and omega-6. The over-arching theme of functional foods chosen included eating more fruits and vegetables in the diet for disease prevention. In addition, eating fish for omega-3 fatty acids is recommended as a nutritional lifestyle change that is beneficial for disease prevention, specifically coronary heart disease. A nutritional lifestyle change that includes functional foods is beneficial in disease prevention.
Introduction

With the Western Diet permeating our lifestyles, along with an overabundance of information about diets, what is healthy or not, good for you or not, to the point of confusion, it is important to understand some of the basics for a healthy eating lifestyle. Changing one’s nutritional lifestyle is not a diet, but a lifestyle change, a transition of beliefs that encompass a new thought process. This lifestyle change creates a healthy way of living, thus experiencing food as a healer or as the source for the prevention of disease. Hippocrates, the father of modern medicine, carries forward the famous quote “Let food be thy medicine and medicine be thy food.” Eating to live and be healthy is a way to help prevent disease.

To educate the public of this importance of the lifestyle change compared to dieting or following fads in eating, this paper will address topics that will be included in a blog about making changes toward a healthy eating lifestyle. Six total blog articles will be written and this paper addresses the scientific research that will back up the blog writings. The blog articles will be presented in more of layman’s term to educate the general public.

Functional foods are either a food or food component of which provides a health benefit that goes beyond basic nutrition (Insel, Ross, McMahon, & Bernstein, 2014). Functional foods include foods that contains or are considered flavonoids, carotenoids, dietary fiber, fatty acids, and probiotics to name a few. “Functional foods that contain significant amounts of bioactive components may provide desirable health benefits beyond basic nutrition and play important roles in the prevention of chronic diseases” (Lui, 2003, p. 517S). A nutritional lifestyle change that includes functional foods is beneficial in disease prevention.
Methodology

Using the American College of Healthcare Sciences library, LIRN resources were utilized. PubMed and ProQuest databases were primarily used to search for the literature review. Google Scholar was also utilized. In particular, the search term functional foods will be searched with each topic. Boolean search terms were very diverse due to the six topics presented in this paper and within the blogs. Search terms were as follows, not all inclusive: functional foods; functional foods and disease prevention; functional foods and health; functional foods and antioxidants; functional foods and polyphenols, functional foods and dietary fiber; functional foods and essential fatty acids; lifestyle modification; lifestyle modification versus diet; lifestyle modification and disease; phytochemicals and disease; phytochemicals and fruits and vegetables; rainbow of colors; eat a rainbow; eat a rainbow and fruits and vegetables; polyphenols; polyphenols and disease prevention; polyphenols and fruits and vegetables; flavonoids; flavonoids and disease prevention; flavonoids and fruits and vegetables; dietary fiber; dietary fiber and disease prevention; essential fatty acids and disease prevention; omega 3 fatty acid; and omega 6 fatty acid. Other Master level resource books were utilized.

Literature Review

With a variety of nutritional topics selected for the capstone project blog, a series of literature reviews were conducted. Each literature review examines a specific topic and blog posting at a more scientific or technical level, whereas, the blog posting will incorporate the research into layman's terms that are exciting, inviting and informative for the reader. The literature review is the background for the information provided in the blog article. The following functional food topics will be discussed within separate blog entries: lifestyle
modification versus diet; eating a rainbow of colors of fruits and vegetables; eating 5-a-day of fruits and vegetables; dietary fiber; and the essential fatty acids both omega-3 and omega-6.

**Lifestyle Modification vs Diet**

The ways of the Western World include a desire to have it now… bigger, better, easier. The busy lifestyles that are led thus lead to a desire for convenience. Fast food, frozen dinners, quick meals regardless of their health factor are out of convenience. This carries over to dieting, fad diets, crash diets, etc. People want to see the results now. The quick fix, the convenience of some drink, or pill, or easy fix it meals to lose weight and lose it fast. But how does this type of attitude sustain weight loss in the long run, or even help to achieve the actual healthy weight goal at all. This is where lifestyle modification rather than dieting is healthier long-term.

There is a concern in the health community for the long-term effects of nutrition, whether good or bad, the diet of an individual will have life-long effects. Dieting in the short-term to lose weight will not necessarily bring better long-term health though definitely has its benefits, more specifically, only if weight loss is sustained. As has been discovered, a diet over many years that is high in saturated fats actually contributes to atherosclerosis which can then lead to coronary heart disease (Roth & Townsend, 2003). Long-term effects of nutrient deficiencies can also cause diseases such as iron-deficiency anemia, beriberi, night blindness, goiter, kwashiorkor, marasmus, osteomalacia, osteoporosis, pellagra, rickets, and scurvy (Roth & Townsend, 2003).

If weight management is a goal, and very well is a good goal to have with obesity on the rise lending to higher rates of disease, then lifestyle changes are the way to sustain weight loss. With a lifelong commitment to positive lifestyle behaviors that emphasize eating habits that are enjoyable and daily activity, successful weight management can be achieved (Schlenker & Long
Roth, 2011). Obesity brings about risks for metabolic, degenerative, neoplastic and anatomic diseases (Schlenker & Long Roth, 2011). It is important to view weight loss and a healthy weight as a lifestyle choice for disease prevention or reduction. This not only includes a healthy diet but activity level that promotes a healthy lifestyle.

**Research.** THE LIFESTYLE Heart Trial was a randomized control trial in the late 1990s that first investigated if ambulatory patients could be motivated to make lifestyle changes. This 5-year long trial showed that with lifestyle changes, blood cholesterol levels were improved and that nutritional lifestyle changes could be adhered to and show lower prevalence of cardiac events. There was a lifestyle modification of daily calories that were provided from the following foods: fruits, vegetables, whole grains, soy, legumes, nonfat dairy and alcohol. “In the experimental group, fat intake decreased from approximately 30% to 8.5%, cholesterol from 211 to 18.6 mg/d, energy from 8159 to 7724 J (1950-1846 cal), protein from 17% to 15%, and carbohydrates increased from 53% to 76.5%” (Ornish, et al., 1998, p. 2001). In the experimental group for this study, there was a decrease in frequency, severity, and duration of angina after one year and continued at five years due to the lifestyle changes (Ornish, et al., 1998).

Controlling blood pressure is an important aspect to better health. An article reviewed how lifestyle modifications are the means to controlling blood pressure and thus by reducing blood pressure could help with it being a risk factor for atherosclerosis and renal disease. This article discussed the role of lifestyle modifications that included increased physical activity, reducing sodium intake, maintaining a healthy body weight, moderate alcohol intake, increasing potassium intake, and consuming a diet that emphasizes fruits, vegetables, and low-fat dairy products, and that is reduced in fat and cholesterol (Appel, 2003). The combined effects of
lifestyle modifications can make a substantial difference in reduction of blood pressure which ultimately leads to prevention of disease.

A study was completed to review lifestyle modification changes in relation to type 2 diabetes. Of the 522 middle-aged, over-weight participants, they each received individualized counseling that worked on lifestyle changes of a reduction of weight, total intake of fat, and intake of saturated fat, while increasing intake of fiber and physical activity (Tuomilehto, et al., 2001). The results was that lifestyle modifications were a means to prevent the development of type 2 diabetes.

Eat a Rainbow of Colors

The Western Diet has taken over and offers a myriad of options advertising to either pleasure or health, though neither really reaches to the basics. The transformation to a lack of color in the diet has caused for processed foods that are not healthy. Phytochemicals are what produces the colors in plant foods and are packed with nutrients and other benefits that cannot be found in other processed foods. “Americans’ fondness for foods lacking color also reflects a metaphor of what else is lacking in processed foods: phytochemicals” (Schaeffer, 2008, p. 34). Overall, phytochemical research has shown that they are beneficial in prevention of disease manifestation.

**Red. Flavonoids, lycopene, vitamin C, and folate**

*Sources:* Red apples, beets, red cabbage, cherries, cranberries, pink grapefruit, red grapes, red peppers, pomegranates, red potatoes, radishes, raspberries, rhubarb, strawberries, tomatoes, and watermelon (Garden-Robinson, 2011).
“A carotenoid, lycopene is a powerful antioxidant that has been associated with a reduced risk of some cancers, especially prostate cancer, and protection against heart attacks” (Schaeffer, 2008, p. 34). We hear how drinking a glass of red wine is good for us and this is part of the reason why, the flavonoids in red wine that are beneficial. Vitamin C is also a carotenoid and has antioxidant properties. Adequate consumption of vitamin C has been shown to reduce risks of chronic diseases that include cancers, heart disease and cataracts (Insel, Ross, McMahon, & Bernstein, 2014).

**Orange and Yellow.** *Beta-carotene, vitamin A, and vitamin C*

*Sources:* Yellow apples, apricots, butternut squash, cantaloupe, carrots, grapefruit, lemons, mangoes, nectarines, oranges, papayas, peaches, pears, yellow peppers, persimmons, pineapple, pumpkin, rutabagas, yellow summer or winter squash, sweet corn, sweet potatoes, tangerines, yellow tomatoes, and yellow watermelon (Garden-Robinson, 2011).

Carotenoid foods which is converted into vitamin A has been shown through research to reduce cancer risk, heart disease and improves immune function (Garden-Robinson, 2011). Carotenoids have been shown to have a strengthening effect on growth-regulatory signals that occur between cells, which thus then helps to prevent damaged cells to develop into tumors (Insel, Ross, McMahon, & Bernstein, 2014).

**Green.** *Chlorophyll, vitamin K, carotenoids, indoles, saponins, isothiocyanates, folate, and omega-3 essential fatty acids*

*Sources:* Green apples, artichokes, asparagus, avocados, green beans, broccoli, brussels sprouts, green cabbage, cucumbers, green grapes, honeydew melon, kiwi, lettuce, limes, green onions, peas, green pepper, spinach, and zucchini (Garden-Robinson, 2011).
It is well-known that it is healthy to eat our leafy green vegetables. There are so many benefits of eating our greens, we are also seeing the green food craze or green juicing. There is good reason for this because of the many benefits of consumption of our greens. “Green vegetables are excellent sources of vitamin K, folic acid, potassium, as well as carotenoids and omega-3 fatty acids” (Schaeffer, 2008, p. 34). Omega-3 fatty acids are an essential fatty acid for our body which means our body cannot produce it, and the Western Diet is disproportionate in the consumption of the other essential fatty acid, omega-6, as compared to omega-3. The phytochemicals in green foods have been shown to have anti-cancer properties (Schaeffer, 2008).

**Purple and Blue. Anthocyanin**

*Sources:* Blackberries, blueberries, eggplant, figs, juneberries, plums, prunes, purple grapes, and raisins (Garden-Robinson, 2011).

Disease prevention includes that of cancer and heart disease by consumption of purple/blue fruits and vegetables which contain anthocyanin (Schaeffer, 2008). Blueberries are known to have one of the highest antioxidant activities of all foods (Schaeffer, 2008).

**White. Flavonoids**

*Sources:* Bananas, cauliflower, garlic, ginger, jicama, mushrooms, onions, parsnips, potatoes, and turnips (Garden-Robinson, 2011).

White foods have flavonoids which are also antioxidants and a type of polyphenol. They have been shown to lower cholesterol and blood pressure, and reduce the risks of heart disease and some cancers (Garden-Robinson, 2011).

**Benefits of Consumption.** Eating a rainbow of fruits and vegetables is a healthy way to consume your 5-a-day plus in consumption of these important foods. As seen, there are so many
benefits to eating fruits and vegetables and adding the variety to receive the numerous benefits including disease prevention. The different phytochemicals in the variety of colors that are created provide different actions in our body systems that can be beneficial and preventative toward disease.

**Research.** It has been estimated that in the United States, that one third of deaths from cancer could be avoided through dietary and nutritional modification (Lui, 2004). Epidemiological studies have consistently shown that eating a wide variety of fruits and vegetables in the diet on a consistent basis reduces risk of chronic diseases (Lui, 2004). This article discussing phytochemicals concludes that “a recommendation that consumers eat 5 to 10 servings of a wide variety of fruits and vegetables daily is an appropriate strategy for significantly reducing the risk of chronic diseases and to meet their nutrient requirements for optimum health” (Lui, 2004, p. 3479S). The antioxidants from fruits and vegetables alone are not only what offers the health benefits, but also the synergist, whole food that includes the phytochemicals from eating a wide variety of colors of fruits and vegetables. “Studies to date have demonstrated that phytochemicals in common fruit and vegetables can have complementary and overlapping mechanisms of action, including modulation of detoxification enzymes, scavenging of oxidative agents, stimulation of the immune system, regulation of gene expression in cell proliferation and apoptosis, hormone metabolism, and antibacterial and antiviral effects” (Lui, 2003, p. 3479S).

**5-a-Day: Polyphenols**

“Polyphenols are the most abundant antioxidants in the diet” (Scalbert, Johnson, & Saltmarsh, 2005, p. 215S). There have been more than 8,000 polyphenols that have been
identified (Gustafson, 2014). Why are antioxidants so important in our diet has to do with the free radicals that have been shown to be a cause in diseases of many kinds including cancers.

“Several of the body’s routine processes, including cell metabolism and the defense mechanism of inflammation produce “oxygen radicals”—atoms of oxygen with an extra unpaired electron that make them particularly eager to react with other molecules in ways that can create all kinds of trouble” (Pollen, 2009). The trouble is created because of oxidative stress when the free radicals are in the body and there is not enough antioxidant properties to neutralize them.

One study looked at the possibility of polyphenols and a dietary reference intake (DRI) value. This study looked at the 5-a-day thought of eating fruits and vegetables and that ‘lifespan essential’ needs could be based off of that (Williamson & Holst, 2008). Polyphenols are actually the most abundant of antioxidants that are in the diet which could be as high as 1 gram per day, which is approximately 10 times more than intake of vitamin C and 100 times higher than intakes of vitamin E (Scalbert, Johnson, & Saltmarsh, 2005).

**Sources.** Fruits, fruit juices, tea, coffee, red wine, vegetables, leguminous plants, and cereals (Manach, Scalbert, Morand, Rémésy, & Jiménez, 2004 & Scalbert, Johnson, & Saltmarsh, 2005).

**Benefits of Consumption.** Polyphenols or the antioxidant properties of foods has been more heavily researched in discovering how they assist in the prevention of disease. Our biological systems are able to deal with the oxidative stress when antioxidants are available to diffuse the negative impact on cells. Free radicals have been shown to be an issue for the development of cancer or other diseases, and these uncharged molecules are chemical in nature and cause damage. By consuming 5-a-day of fruits and vegetables, then we are able to feed the
body an adequate amount of polyphenols with antioxidant properties that will provide a lifespan essential need for the body to prevent disease.

**Research:** “Current evidence strongly supports a contribution of polyphenols to the prevention of cardiovascular diseases, cancers, and osteoporosis and suggests a role in the prevention of neurode-generative diseases and diabetes mellitus” (Scalbert, Johnson, & Saltmarsh, 2005, p. 215S). There is a lot of supportive research in the role of polyphenols in prevention of degenerative diseases and with these studies it has become clear that the antioxidant properties of polyphenols mechanism of action are beyond the modulation of oxidative stress (Scalbert, Johnson, & Saltmarsh, 2005).

“In addition to their antioxidant properties, polyphenols show several interesting effects in animal models and in vitro systems; they trap and scavenge free radicals, regulate nitric oxide, decrease leukocyte immobilization, induce apoptosis, inhibit cell proliferation and angiogenesis, and exhibit phytoestrogenic activity” (Arts & Hollman, 2005, p. 317S). Polyphenol compounds in red grapes have been shown beneficial and where is the recommendation comes for drinking of red wine. In a study with 30 males who had coronary heart disease, there was favorable results in improving endothelial function from the compounds in red grapes (Lekakis, et al. 2005).

Polyphenolic compounds in tea have been studied and shown to have effects against disease. Animal studies have shown tea consumption has protective effects against lung, forestomach, esophagus, duodenum, pancreas, liver, breast, colon, and skin cancers that are induced by chemical carcinogens (Mukhtar & Ahmad, 2000). There is a large body of evidence and epidemiological support for green and black teas and their compounds for their reduction for cancer risk (Mukhtar & Ahmad, 2000).
5-a-Day: Flavonoids

Flavonoids are a type of polyphenol, thus again high in antioxidants. They are similar to vitamin E in their structure and due to their compound structure, the antioxidant and anti-proliferative activity is enhanced (Jamison, 2003). Flavonoid research in both animal and human studies has documented flavonoids having potential as the following: antiallergenic, antiviral, anti-inflammatory, vasodilating, anti-carcinogenic and antioxidant properties (Jamison, 2003).

Flavonols are the most common flavonoids in foods and mostly are represented by the components of quercetin and kaempferol but also include isorhamnetin and myricetin (Insel, Ross, McMahon, & Bernstein, 2014 & Manach, Scalbert, Morand, Rémésy, & Jiménez, 2004). Flavonols and flavanones help to neutralize free radicals because these compounds can damage cells and potentially lead to cancer or tumors, so the flavonols actually boost cellular antioxidant defenses (Insel, Ross, McMahon, & Bernstein, 2014 & Jamison, 2003). Flavanols include catechins, epicatechings, epigallocatechin, and procyanidins and can contribute to heart health (Insel, Ross, McMahon, & Bernstein, 2014). Anthocyanins include cyanidin, delphinidin, and malvidin and also bolster antioxidant defenses and can help with brain function (Insel, Ross, McMahon, & Bernstein, 2014).

Specific actions of flavonoids include quercetin and its prevention in LDL cholesterol in being oxidized which is beneficial for the cardiovascular system (Reader’s Digest, 2007). Epicatechins also can benefit the heart like quercetin and also improve blood vessel function and can even reduce inflammation (Reader’s Digest, 2007). Studies have exhibited in particular that flavonols and flavones decrease the risk of cardiovascular disease (Jamison, 2003).
Sources. Examples of flavonols include onions, kale, leeks, broccoli, and blueberries, red wine and teas (Manach, Scalbert, Morand, Rémésy, and Jiménez, 2004). Examples of flavanols include tea, cocoa, chocolate, apples, and grapes (Insel, Ross, McMahon, & Bernstein, 2014). Examples of flavanones are mostly in citrus fruits, but slightly in tomatoes and mint (Insel, Ross, McMahon, & Bernstein, 2014 & Manach, Scalbert, Morand, Rémésy, and Jiménez, 2004). Examples of anthocyanins includes red wine, certain cereals, aubergines, cabbage, beans, onions, radishes, but most abundant in fruit like berries, cherries and red grapes (Insel, Ross, McMahon, & Bernstein, 2014 & Manach, Scalbert, Morand, Rémésy, and Jiménez, 2004).

Benefit of Consumption. The benefits of consuming flavonoids bring about many of the same results as polyphenols since they are a sub-set of polyphenols. They assist with disease prevention by offering antioxidant properties. They provide a healthy support toward the recommendation to consume at least 5-a-day in fruits and vegetables.

Research. There was a study in Findland involving 9,959 people showing an inverse association between flavonoid intake and incidence of all cancers, and after a 24-year follow-up, the risk of lung cancer was reduced by 50 percent of those with the highest flavonol intake (Lui, 2003). A review was completed to find numerous epidemiological studies to show reduction in cancer risk and other chronic diseases along with a decreased risk for cardiovascular disease (Arts & Hollman, 2005).

Dietary Fiber

Dietary fiber is important in the diet for digestion. Fiber is not digested and travels through the digestive system and is removed through the stool. Even though fiber is not a nutrient, it is important for our diet in the ways that it passes through the digestive tract. The
American Dietetic Association (2008) has the position that adequate amounts of dietary fiber should be consumed by plants and that populations that do consume so have less chronic disease. The consumption of dietary fibers that provide viscosity help to lower blood cholesterol levels along with helping normalize blood glucose and insulin levels, and because of this then they should be part of dietary plans in treating cardiovascular disease and type 2 diabetes (Marlett, McBurney, & Slavin, 2014). Insoluble fiber works like a sponge and takes water with it from the intestines whereas soluble fiber is like a sticky gel that takes cholesterol with it so that it doesn’t enter the bloodstream and clog arteries (Reader’s Digest, 2007).

Soluble fiber, or whole grains containing fiber have shown to affect both hepatic cholesterol and lipoprotein metabolism, along with colonic fermentation which inhibits hepatic fatty acid synthesis, changing intestinal motility and slowing macronutrient absorption thus leading to improved insulin sensitivity (Rudkowska & Jones, 2007). The different benefits of dietary fiber include the maintenance of a healthy GI tract, reducing some risk for cancers, reducing the risk of coronary heart disease, and the maintenance of healthy blood glucose levels (Insel, Ross, McMahon, & Bernstein, 2014). A higher intake of dietary fiber has shown beneficial to lower the prevalence of coronary heart disease and stroke (Mahan, Escott-Stump & Raymond, 2012). “The US Food and Drug Administration (FDA) approved health claims for 2 dietary fibers, β-glucan (0.75 g/serving) and psyllium (1.78 g/serving), on the assumption that 4 servings/d would reduce cardiovascular disease risk” (Jenkins, Kendall, Vuksan, Vidgen, Parker, Faulkner,…. Corey, 2002, p. 834). There are various physiological actions from the consumption of dietary fiber that include a reduction of cholesterol and attenuating blood glucose, also helps
maintain GI health, and positively affects calcium bioavailability and immune function (Tungland & Meyer, 2002).


**Benefits of Consumption.** Though not a nutrient, dietary fiber is very important to health for many reasons. Not only can the higher consumption of dietary fiber help with weight management or to lose weight, but can help in prevention of disease and helps with type 2 diabetes among other disorders. It is really an essential part of the diet and the recommended amounts are not being met by the Western Diet.

**Research.** There was a pooled analysis of 10 cohort studies to evaluate an association between consumption of dietary fiber intake and risk of coronary heart disease. There was a six to 10 year follow-up and of 5,249 incident total coronary cases and 2,011 coronary deaths that occurred among 91,058 men and 245,186 women for the study, there was a 14 percent decrease in risk of all coronary events and a 27% decrease in risk of coronary death associated to total dietary fiber intake (Pereira, et al., 2004). In a study completed for type 2 diabetes, a higher fiber diet improved glycemic control (Chandalia, Garg, Lutjohann, von Bergmann, Grundy, & Brinkley, 2000).

**The Omega’s**

Their are two essential fatty acids in the human diet that cannot be made by the body and must be consumed through food and nutritional sources. Omega-6 fatty and omega-3 fatty acids
are the two polyunsaturated essential fatty acids. Omega-3 fatty acids include ALA, EPA, and DHA. “Alpha-Linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have various properties for which they can be classified as functional foods” (Kaur, Chugh & Gupta, 2012).

**Importance of Omega-3s.** It is important to note that in the Western Diet, there is a disproportionate amount of omega-3 fatty acids to omega-6 fatty acids. “The ration of omega-6 to omega-3 in the typical American today stands at more than 10 to 1 (Pollan, 2009). “About 95–99% of the population gets ω-3 fatty acids lesser than that required for good health, making ω-3 fatty acids an essential nutrient and therefore the most therapeutic of all the essential nutrients (20 minerals, 14 vitamins, 8–11 amino acids, 2 fatty acids)” (Kaur, Chugh & Gupta, 2012). ALA omega-3 fatty acids, such as walnuts and flax, may contribute to heart health and the maintenance of mental and visual functions (Insel, Ross, McMahon, & Bernstein, 2014). ALA has anti-inflammatory effects (Mahan, Escott-Stump & Raymond, 2012). DHA omega-3 fatty acids, such as those found in fish, may reduce the risk of coronary heart disease and helps with mental and visual functioning (Insel, Ross, McMahon, & Bernstein, 2014).

**Sources of Omega-3.** Alpha-linolenic acid is found abundantly in flax seed, mostly in the chloroplast of green leafy vegetables, and at smaller quantities in hemp, walnut, soybean and canola oil (Kaur, Chugh & Gupta, 2012). Fish and fish oils are the primary and most abundant source of EPA. DHA is found in fish oils and also red brown algae (Kaur, Chugh & Gupta, 2012).

**Source of Omega-6.** Linoleic acid, or omega-6 fatty acids, includes at a higher level safflower, sunflower and corn oils; soybean, sesame and almonds at a moderate level; smaller
quantities in canola, peanut and olive oils; and very low quantities in coconut and palm kernel (Kaur, Chugh & Gupta, 2012).

**Benefits of Consumption.** Essential fatty acids are foods we need to consume since our body cannot make them. Since the Western Diet is weighed heavily on omega-6 consumption, it is important to have a nutritional diet lifestyle change that includes consumption of omega-3 fatty acids. Omega-6 and omega-3 fatty acid levels in the body should be in equal amounts for ultimate benefits to the body.

**Research.** Through cohort studies and other epidemiological studies, it has been found that consumption of fish two to three times weekly reduces the risk of heart disease. In a 30-year follow up study called the Western Electric Study of men, evidence supported that fish consumption favorably affects coronary heart disease mortality (Kris-Etherton, Harris & Appel, 2002). In the Nurse’s Health Study, women were evaluated for fish consumption and omega-3 fatty acids and it was shown that there was an inverse association between fish and omega-3 fatty acid intake and coronary heart disease death (Kris-Etherton, Harris & Appel, 2002).

**Discussion**

Healthy eating begins with a change in attitude toward food. This most likely is a process over time and depends on many factors that relate to a persons life experience. Lifestyle changes will depend on how and what they currently eat, what their food preferences are, their culture, their attitudes and beliefs, emotional ties to eating, and their lifestyle in terms of family, work and other factors. Making the changes to a healthy eating lifestyle can take some work at first, but can be made more simple with the right attitude.
Supportive evidence has shown that lifestyle modifications help for disease prevention for a longer life of health. Eating more fruits and vegetables in the diet is beneficial in disease prevention because of phytochemicals, polyphenols, flavonoids, and dietary fiber. Dietary fiber in other foods such as whole grains and legumes is also helpful in reaching adequate fiber intakes for disease prevention. Studies have shown that adding fish oils or essential fatty acids to the diet, specifically omega-3 fatty acids, is beneficial in disease prevention.

**Nutritional Blog**

Each blog writing uniquely presented the material researched in a more layman’s style for the general population’s understanding of the nutritional values of each topic. A style and flow of the blog format was developed that includes at least one recipe to try for each topic presented. The general goal was to aim for 600 to 1,000 words including the recipes, adding some images for color, to tell the story, visual imagery for a more exciting representation of the message. The blog on flavonoids was less than the word count goal as it was part two of 5-a-day and the main points were covered in part one. On the actual blog there will be a link to the part one blog post.

The research presented in this paper was the background information used for each blog post. There was extended research and reading beyond what is presented within the context of this paper that provided the educational and supportive data and knowledge to present the information in each blog post. The references are presented within the context of this writing but other knowledge is from the educational program at the American College of Healthcare Sciences and other reading completed by the author.
Functional Foods

It is healthful advice to eat a rainbow of colors by choosing a variety of fruits and vegetables. Phytochemicals in the fruits and vegetables that are the chemical compounds giving them color is what provides beneficial properties. These natural compounds are packed with nutrients and other benefits that cannot be found in other processed foods. From lycopene in tomatoes to the flavonoids found in bananas, phytochemicals assist in disease prevention. Research supports that phytochemicals reduce cardiac events, lower blood pressure, assist in glucose levels of type 2 diabetes and help to reduce the risk of cancer and other chronic disease.

Polyphenols or the antioxidant properties of foods has been more heavily researched. They are the most abundant antioxidant in the diet and aid in the prevention of disease. They have been shown to assist with oxidative stress to help diffuse free radicals that have been shown to be an issue for the development of cancer or other diseases. Because of this, then eating 5-a-day of fruits and vegetables has the research backing from polyphenol consumption for disease prevention. Flavonoids, a type of poloyphenol, are also beneficial to disease prevention.

Dietary fiber is an important part of dietary intake though not a specific nutrient. Consuming fiber can be accomplished through fruits, vegetables, whole grains, legumes and seeds. Enough fiber in the diet helps for a healthy digestive system. Dietary fiber is also beneficial in weight management. With an adequate dietary fiber intake, there is a reduction and helps toward the prevention of chronic disease.

Omega-3 fatty acids obtained through eating fish two to three times a week is recommended for the benefit of heart health. Flaxseed is also another beneficial source of omega-3 fatty acids.
Conclusion

The Western Diet permeates Western living and does not offer the healthiest lifestyle. The overabundance and wealth of information that is not necessarily based on scientific evidence but possible marketing can be confusing to consumers. Changing one’s nutritional lifestyle should not be a diet, but instead a lifestyle change, a transition of beliefs that encompass a new thought process. This lifestyle change creates a healthy way of living, thus experiencing food as a healer or as the source for the prevention of disease. The blog research and project provides scientifically backed evidence of healthier lifestyle modifications for nutrition.

Overall, the blog posts research on functional food topics provides a basis for the first blog post regarding lifestyle changes versus going on a diet for weight loss. Lifestyle modifications for overall health should include eating whole foods and changing the way one eats for the rest of their life along with increased activity. This first blog post leads into the other five researched functional food topics tying the research together for this presented nutritional blog Capstone paper.

An over-arching theme of the functional foods chosen included eating more fruits and vegetables in the diet. Eating a rainbow of colors provides phytochemicals which are beneficial to the prevention of disease and are found in fruits and vegetables. Polyphenols and flavonoids, a type of polyphenol, are packed with antioxidants which have been shown to prevent disease and assist in the prevention of cancers. Antioxidants help with free radicals in the body and reduce oxidative stress on the cells. Eating more fiber is also shown to be healthier and reduce risk of disease. By eating adequate fruits and vegetables in the diet, this greatly assists in the achievement of dietary fiber intake. In addition, eating fish for omega-3 fatty acids is
recommended as a nutritional lifestyle change that is beneficial for disease prevention, specifically coronary heart disease.

Through the research of each topical discussion for the blog postings, there was sufficient data to support disease prevention from eating a more healthful diet. This would include making lifelong changes through lifestyle modifications for long-term health benefits. Each of the functional food topics discussed were well-supported in their prevention of cancers, coronary heart diseases and other chronic disease. Changing the nutritional eating habits will greatly improve a person's current and future health. A nutritional lifestyle change that includes functional foods is beneficial in disease prevention.
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