Review Article

The role of nutrition in the prevention of coronary heart disease in women of the developed world

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Cardiovascular disease claims more than 500,000 women per year, making this disease the number one killer of women. Coronary heart disease in developed countries can be used as a representative classification when discussing cardiovascular disease management. Within the last 10 years research has illuminated the contributing risk factors and disease progression as they uniquely relate to women. Yet, current approaches to the prevention of primary risk factors in the development of cardiovascular disease fail to reach the potential described in scientific literature. Traditional prescriptions relied on hormone therapy or pharmacologic intervention to manage coronary heart diseases ignoring the non-hormonal aspects of cardiovascular health. Recent trends have begun to emphasize diet as a tool for the prevention of heart disease in women. This review attempts to highlight nutrition as a prescription that can be utilized to reduce the significant risk factors that women, who live in developed nations, face throughout their lifetime.

Key Words: coronary heart disease, primary risk factors, nutrition, women, lifestyle, developed countries

Introduction

Worldwide morbidity and mortality statistics have documented the increase of chronic diseases in developed nations. Of these, cardiovascular disease (CVD) remains the most prevalent.[1] Defining CVD would include atherosclerotic vascular disease, stroke, coronary heart disease (CHD), and peripheral artery disease, with CHD dominating the clinical presentation of CVD events and accounting for the majority of illnesses in developed countries. Research continues to expand our understanding of the association between individual macro- and micronutrients and certain chronic disease development.[2] The risk factors associated with CHD have been characterized by a variety of epidemiologic and intervention studies, giving us established scientific guidelines to identify those individuals who are at risk.[3] Risk reduction in persons without evidence or clinical symptoms of CHD is termed primary prevention. Certain primary risk factors for CHD will remain fixed while others, specifically diet, can be modified through lifestyle modifications. The modifiable risk factors are typically the result of poor habitual choices and their assessment and management is a cost effective means of preventing CHD.[4] Epidemiologic evidence from the INTERHEART study has identified nine risk factors that account for approximately 94% of the risk of a first occurrence of acute myocardial infarction in women.[5] This study strengthened the known associations between risk factors and modifiable lifestyle choices. Eight of the nine factors were noted to be strongly influenced and modified by diet and demonstrated that the prevention of CHD through changes in diet and lifestyle for this population is certainly attainable. When evaluating lifestyle changes and risk management, no distinction needs to be made between those diagnosed with CHD or other forms of atherosclerosis. The conclusions of the Coronary Risk Factors for Atherosclerosis in Women (CORA) study[6] clearly state that the impact of dietary habits on CHD risk in women is independent of, and additive to, conventional risk factors. The CORA study was designed to demonstrate the effect of nutrition on the manifestation of CHD and to provide a basis for improved preventive measures. The authors summarize that the potential for proper nutrition to prevent disease symptoms is often underappreciated and underutilized in favor of prescription medication. Recent research has established that an inappropriate lifestyle, including poor nutrition, can be a major contributor to the development of atherosclerosis in Western society.[7-9] This suggests then, that CHD might be preventable if an appropriate lifestyle were adapted.

It has been well documented that the utilization of prescription drugs to modify certain risk factors reduces the risk of CHD, as well as increases life expectancy and maintains health. Notably, pharmaceutical products can elicit a broad spectrum of responses, where some agents will provide the desired beneficial effect while, in other individuals, the effect is minimal or perhaps detrimental. In addition, some pharmaceuticals may be prescribed for a short duration while others will be employed for a lifetime.

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However, management of CHD risk factors with pharmaceuticals alone is rarely as effective as a combination therapy of lifestyle modification and pharmaceutical intervention. Most clinicians prefer to recommend lifestyle modifications prior to the initiation of drug therapy for this reason. The impact of CHD in women has been underestimated in clinical practice with recent research showing a disparity in not only risk factors but the utilization of medical and nutritional therapy as well.[10] It may be beneficial to advance lifestyle management with the same prescriptive approach as drug therapy in female patients as a means of reducing the prevalence of CHD in this population. The consumption of a particular diet could be prescribed to address the significant risk factors that are unique to the female patient, with the duration of the diet determined by the level of modification achieved.

CHD is the leading cause of death among American women[11], with disturbing trends in the prevalence and management of certain risk factors.[12] The incidence of these risk factors is increasing with approximately 25% of women report no regular physical exercise[13], smoking rates declining less for women than for men, and 40% of women >55 years old presenting with elevated serum cholesterol levels.[14] A recent study by the Centers for Disease Control showed that clinicians are less likely to counsel women than men about the management of risk factors such as nutrition, exercise, and weight reduction.[15] A national survey on gender differences documented that women were significantly less likely to be enrolled in cardiac rehabilitation after bypass surgery or a myocardial infarction.[16] This demonstrates the imbalance of care given to women regarding CHD risk management and prevention despite the published recommendations for primary prevention being applicable to women as well as men.[17]

It is also important to note that first cardiovascular events in women, while occurring later in life, have a higher mortality. Therefore careful consideration should be given to individual risk factor management and preventative strategies that are critical to improving the quality of life for women in later years. The management of risk factors must acknowledge that CHD is not a categorical 'have or have not' disease but a continuum of multiple risk factors and conditions that are subject to modification at a variety of life stage endpoints. Women present with unique opportunities to discuss risk factors that would permit an emphasis on risk management at various points along this continuum. For example, pregnancy and the preconception period are optimal times to review a woman's health behavior as they relate to CHD risk factor management. Pregnant women can be encouraged, and are generally motivated, to discontinue smoking through the prenatal and postpartum period and are typically cautioned to avoid excessive weight gain during this period. Management of these two risk factors at the pre- and postpartum periods could result in reduced CHD risk in the future and promote health for both mother and child. The management of several risk factors for women can be achieved by the application of a specifically balanced diet that is designed to minimize the risk factors known to be present in the individual. This review attempts to highlight the role of nutrition in the prevention of CHD in women living in developed countries and introduce the concept of nutritional prescription, including macronutrient manipulation, dietary fiber, antioxidants and polyphenols, and soy products, in the prevention and management of coronary heart disease.

Macronutrient manipulation

The first course in managing risk factors for CHD involves the manipulation of dietary macronutrients. Many studies have evaluated the efficacy of multiple risk factor intervention strategies on mortality in men free of CVD. In the Lipids Research Clinics Coronary Primary Prevention Trial, it was established that every 1% decrease in LDL cholesterol (LDL-C) was associated with a 2% decrease in CHD risk.[18,19] These findings formed the basis for the National Cholesterol Education Program (NCEP) recommendations for both men and women with hypercholesterolemia. Consumption of a high fat, highly-refined carbohydrate Western diet represents the classic condition of overnutrition and was the direct target of these recommendations. Hypercholesterolemic individuals can be characterized by both elevated total and LDL-C levels. For those with 0-1 risk factors, LDL-C values are usually > 130 mg/dL and those with more than 2 risk factors have LDL-C levels > 160 mg/Dl.[20] The continuum of CHD development permits the new NCEP guidelines to target primary prevention patients as high risk if they present with multiple risk factors or with metabolic syndrome.[21] NCEP recommends that fat provide up to 30% of food energy with saturated and hydrogenated fats contributing no more than 7 – 10% of energy intake, monounsaturated fats comprising only 10 – 15%, and polyunsaturated fats only 7 – 8% of food energy. Dietary cholesterol level is recommended at < 200 mg/d on this diet.

Several epidemiologic studies have linked a Mediterranean-style diet (MD) to a low incidence of CVD.[22,23] Adherence to a MD was associated with 51% reduced odds of being obese and 59% reduced odds of having central adiposity when compared with a non-MD in a study utilizing a self-administered, validated food frequency questionnaire.[24] These values were reported after controlling for confounding factors such as age, sex, and physical activity level. A healthy food pattern as presented by the MD, which includes a combination of antioxidants and flavonoid-rich foods, has been reported to effectively decrease the susceptibility of the LDL particle to oxidation.[25] This is particularly enlightening to the cardiovascular benefits proposed by the consumption of a MD. The important aspects of the MD include high intakes of cereals, grains, vegetables, dried beans, olive oil, garlic, fresh herbs, seafood, and fruit. Meat and poultry are also eaten in moderation, with poultry selected more frequently than red meat. Animal fats in the form of butter, cream and lard are not included in this diet. The emphasis of this diet is on minimally processed foods and the inclusion of seasonally fresh and locally grown produce. Olive oil is the principal fat with its high concentration of monounsaturated oils. Total fat for this diet ranges from less than 25% to over 35% of calories while maintaining the NCEP standard of less than 7-10% of calories obtained from saturated fats. However, few intervention

type studies have been undertaken looking at the use of a MD as a primary prevention option. A recent study evaluated 212 men and women with moderate risk factors for CVD following either a low fat diet or a MD after three months. Both groups reported a decrease in saturated fats and an increase in monounsaturated fats with a concomitant increase in protein, carbohydrate and fiber intake. The participants in both diets had a decrease in body mass index (BMI), plasma cholesterol, and TG with the latter two remaining significant after adjustment for body mass.[26]

A low-fat, high-carbohydrate (LF) diet has recently been shown to maintain weight loss following a 7.5 year follow-up.[27] However, a focused analysis of the Women's Health Initiative over an 8 year period, found that a reduced fat intake and increased fruit, vegetable, and grain intake did not significantly alter the CHD risk profile for postmenopausal women.[28] This suggests that a restricted fat diet is ineffective in the risk management of CHD in this population and that a more focused diet, one which specifies the types and amounts of carbohydrates and fats to consume, might be more efficacious. In a randomized trial comparing low-fat to low-carbohydrate diets, the low-carbohydrate diet was found to be more effective for short-term weight loss and was not found to have deleterious effects on CHD risk factors in healthy women.[29] Carbohydrate restricted diets (CRD) have been reported to be at least as effective as LF diets in inducing weight loss for up to one year. CRD have been reported to produce favorable alterations in both TG and HDL-C, with unfavorable or minimal changes in LDL-C [30], although a particle size shift to larger, more buoyant LDL, which are less atherogenic [31] has been consistently reported. The diet is effective at reducing high fasting glucose and insulin, high TG concentrations, and raising low HDL-C.[32] The application of a CRD offers a successful strategy for the treatment of patients with high BMI and high plasma TG, both recognized as risk factors for CHD, as well as metabolic syndrome. Evidence from the Framingham Offspring Study points to the prevalence of metabolic syndrome in both obese and non-obese women and suggests that targeted dietary pattern modifications could provide beneficial effects.[33] Use of CRD improved glycemic control in type 2 diabetic patients to a point where previous medications could be discontinued [34], while additional research has shown that CRD can lead to beneficial changes in plasma lipids during weight loss. Additional research compared CRD and LF diets as treatments for hyperlipidemia and obesity over a six month period and reported that CRD had better participant retention and greater weight loss.[35] Both diets have been proven to promote weight loss and reduce obesity as a risk factor within the population studied. Overall, the baseline values of the subject at risk should determine the correct nutritional prescription for the reduction of CHD risk factors. Elevated LDL-C and total cholesterol values would indicate the use of traditional restricted fat diets as a primary treatment, while elevated TG and BMI would warrant the application of a CRD to bring the primary risk factors under control. Once decreased TG and sufficient weight loss has been achieved, the subject could be transitioned to include a variety of complex carbohydrates, such as whole grains and fruits and vegetables, into their dietary pattern thereby changing the nutritional prescription. The concept of nutritional prescription is supported by the research done with insulin sensitivity and weight loss. Comparing the hypocaloric macronutrient content of a low carbohydrate/high fat diet to a low fat/high carbohydrate diet, researchers discovered that insulin sensitivity determined the effectiveness of the diet in obese women. To obtain optimal results from the diet prescribed, the authors conclude that those with fasting insulin levels below 10 μU/mL should be counseled to consume a high carbohydrate/low fat diet. Insulin resistant individuals, with fasting insulin levels above 15 μU/mL, who would most likely present with metabolic syndrome, should be prescribed a CRD until insulin sensitivity improves.[36]

Other researchers have specifically assessed premenopausal women and carbohydrate intake to evaluate the association between macronutrient intake and plasma lipid response. Subjects were divided into low and high carbohydrate intake groups and the results showed that those consuming < 53% of energy from carbohydrates had lower LDL-C concentrations and a larger LDL particle than those consuming > 53% carbohydrates, suggesting a relationship between level of carbohydrate intake and plasma lipid levels.[37] This reduced carbohydrate, weight loss program also demonstrated a reversal of metabolic syndrome and well as a decrease in insulin resistance in this subpopulation of women.[38] Another intervention in overweight, premenopausal women involved not only dietary manipulation but increased physical activity as well to evaluate the effects on plasma lipids and CHD risk factors. The intervention resulted in a LDL particle with decreased atherogenicity via an increase in particle size and a decrease in susceptibility to oxidation. [39] This body of research reflects the importance of weight loss in the management of CHD risk factors and indicates that a even a small reduction in weight can have tremendous effects on the risk factors of CHD in addition to the nutritional intervention applied.

While cardiovascular disease increases with age, regardless of gender, premenopausal women are thought to be protected from CHD development as result of their elevated HDL-C levels when compared to men. In women, a 1 mg/dL increase in HDL-C is correlated with a 4% decrease in total CHD risk.[40,41] However, this protection begins to erode as women enter the end of menses and their lipid profile begins to mimic those of men. After controlling for other risk factors, postmenopausal women have higher rates of CHD than do premenopausal women of the same age.[42,43] An elevated level of LDL-C in postmenopausal women, consistent with men at this age, is a major risk factor for CHD. However, in postmenopausal women, reduced levels of HDL-C are more predictive of the disease than elevated LDL-C [44], especially if plasma TG are elevated as well. This is a critical aspect of postmenopausal dyslipidemia because elevated plasma TG are an independent risk factor for women.[45] This represents a different lipid profile that must be managed in the prevention of CHD for this subclass of women. Postmenopausal women have higher LDL-C levels than men for the first time, along with elevated

TG.[46] Evaluating women aged 55 – 69 years old, it was shown that waist-to-hip circumference was predictive of a 60% increase in relative risk from CHD [47], while overweight premenopausal women demonstrated a similar predictive response [48], demonstrating the influence of obesity in CHD risk management. As previously discussed, the CRD could be prescribed for postmenopausal women needing to lose weight and lower triglycerides as a primary order of CHD risk management.

Food component manipulation

Dietary Fiber

Epidemiologic evidence has also supported the hypothesis that dietary fiber may reduce the risk of CHD through a variety of mechanisms. Morris was the first investigator to report an association between cereal fiber and reduced CHD incidence [49], which was followed by the Nurse's Health Study whose prospective data on women supported the recommendation to increase consumption of fiber-rich whole grains and fruits as a primary preventative measure against CHD risk.[50] Dietary fiber and its associated substances have favorable impact on CHD risk factors as a result of the soluble fiber component that lowers serum cholesterol, LDL-C, and apolipoprotein B concentrations.[51,52] In a pooled analysis of cohort studies, it was concluded that the consumption of dietary fiber from both cereals and fruits was negatively associated with the risk of CHD.[53,54] Further research has identified a link between whole grain consumption and protection against CHD.[55] The physiochemical properties of soluble fiber can significantly alter lipid metabolism and result in a decreased LDL-C level. Substantial evidence from randomized clinical trials demonstrate that an average reduction of 9% in LDL-C can be achieved by the incorporation of soluble fiber into the diet.[56] These recommendations are applicable to both men and women and represent a dietary adaptation that can significantly alter serum cholesterol levels within the framework of a macronutrient balanced diet.

Dietary Polyphenols

Because of the significance that reduced HDL-C levels have in women, dietary therapy directed towards improving HDL-C levels is critical. The elevated levels of flavonoids in wine are suspected as providing the protective benefits and surveying the literature surrounding the 'French Paradox' [57], various hypotheses explaining the protective effects of wine consumption also illuminated various polyphenolic compounds postulated to be involved in the cardioprotective effects, independent of the action of ethanol. Grapes contain a variety of polyphenols including resveratrol, flavonoids and its derivatives. Polyphenols, found in the skins and seeds of the grape, vary in concentration as a result of climate and processing, and while grape juice was found to increase plasma TG due to the carbohydrate content of the juice, grape polyphenols have been shown to decrease TG and apolipoprotein B concentrations.[58] Postmenopausal women consuming 36 grams per day of lyophilized grape powder (LGP) were shown to have beneficial effects on plasma lipids and reduced whole-body oxidative stress as measured by urinary isoprostanes.[59] Recent work has identified a role for LGP in the inflammatory cascade. Treatment with LGP significantly decreased inflammatory markers such as tumor necrosis factor- α and interleukin-6, in both pre- and postmenopausal women.[59] A reduction in these markers indicates an anti-inflammatory effect, thereby reducing the cytokine production involved in CHD progression. The negative consequences of alcohol consumption may possibly be circumvented by the consumption of LGP for the reduction of plasma TG and LDL-C levels.

Phytosterols

Phytosterols are found in vegetable oils, seeds, nuts, and some fruits [60] and their dietary intake varies. Typically plant sterols contribute 0.01%, by weight, of adult intake in the United States.[61] Because the stereochemical structure of phytosterols closely resembles that of cholesterol, they can inhibit cholesterol absorption, thereby lowering total plasma cholesterol levels. In humans only 5% of the ingested plant sterols are absorbed [62] leaving very low plasma level in healthy individuals. Absorbed phytosterols circulate in plasma lipoproteins in an esterified or unesterified form, similar to cholesterol.[63] It has been suggested that plant sterols and stanols can be added to the diet to help reduce the amount of dietary cholesterol absorbed. Phytosterols are effective in reducing serum cholesterol levels with minimal side effects in men, women, and children.[64-66] Phytosterols compete with cholesterol within the intestinal lumen during the formation of the bile salt micelle thus reducing cholesterol absorption. The discovery of the dedicated transporters in the removal of plant sterols and the coincidental effusion of cholesterol from both enterocyte and hepatocyte, demonstrated the cholesterol lowering effects of phytosterols.[67] Plant sterol therapy has been shown to cause a significant increase in serum lecithin:cholesterol acyltransferase activity in hypercholesterolemic subjects [68], suggesting an upregulation of reverse cholesterol transport. In sixteen recently published human studies, phytosterols were used to reduce plasma cholesterol levels with an average 10% reduction in total cholesterol and a 13% reduction in LDL-C.[69] Similarly, plant sterols have been added to a variety of common foods, such as margarines and orange juice, as an effective means of reducing LDL-C during therapeutic lifestyle changes.[70] These effects were seen in a relatively short time course of 8 weeks, supplementing the diet with 2g/d of plant sterol products. Supplementing any diet aimed at lowering total cholesterol levels with phytosterols is a viable option for most women.

Soy Protein and its other components

The connection between phytoestrogens and cardiovascular disease was brought to the forefront of disease management after a 1995 meta-analysis concluded that the intake of 47 g of soy protein per day could lower total and LDL cholesterol values.[71] Soy protein is associated with many components including isoflavones, saponins, and phytates, each of which has been investigated for their hypolipemic effects. Results from this research have been varied. Some authors have reported that neither phytates nor isoflavones alone, have a significant effect

Table 1. Summary of nutritional prescriptions

Diet or nutrient	Macronutrient composition	Changes in lipoproteins	General features
NCEP Diet	≤ 30% from Fat < 10% Sat Fat < 200 mg/d Cholesterol	lowering LDL values > 130 mg/dL	Generalized Diet recommendations that are difficult to apply in practice due to inability to quantify amounts of fat and cholesterol in daily foods consumed.
Mediterranean Diet	≤ 35% from Fat < 10% Sat Fat	↓ Sat Fat ↓ Total Cholesterol ↓ Triglycerides ↓ Body Mass Index	Contains specific dietary suggestions such as using olive oil and minimizing use of processed foods. Includes consumption fresh fruits, vegetables, fish, chicken, legumes and grains. Minimal contribution by red meats.
Low Fat Diet	≤ 20% from Fat	↓ Sat Fat ↓ LDL-C ↓ Total Fat ↔ CHD risk ↓ Body Mass Index	Generalized Diet recommendations aimedat reducing obesity in women over time.
Carbohydrate Restricted Diet	< 20g/d from Carbohydrates	↓ Triglycerides ↓ Fasting Glucose ↓ Fasting Insulin ↔ LDL-C ↓ Body Mass Index ↑ HDL-C	Specific dietary instructions that does not require portion control but does have restrictions on types of food included in the diet. Generates weight loss within two weeks. Suggested for postmenopausal women who present with elevated triglycerides and obesity.
Fiber	↑ Soluble fiber intake to 15 g/d	lowering LDL values ~ 9% ↓ Total Cholesterol ↓ Apolipoprotein B	Increased consumption of soluble fiber in form of cereals, whole grains, and fruits. Easily incorporated into any dietary changes to be made with respect to lowering CHD risk
Polyphenols	↑ Intake with wine, lyophilized grape powder or whole grapes to 36 g/d	↓ Inflammatory Markers ↓ Total Cholesterol ↓ Triglycerides	Adding wine to diet solely for polyphenol consumption is not recommended. Consumption of grape powder is tested method for achieving effects of polyphenolic compounds. Simple addition/ supplementation to existing diet.
Phytosterols	Addition of ~ 2 g/d	↓ Total Cholesterol ~ 10% ↓ LDL-C ~ 13%	Many established grocery items now offer the option to add plant sterols to the diet. Easily incorporated into any dietary changes that are made in an effort to reduce CHD risk.
Soy Protein	Addition of ~ 25 g/d	↓ Total Cholesterol ↓ LDL-C if baseline value is > 130 mg/dL	Addition of soy protein to the diet is facilitated by numerous grocery items now being offered. Easily incorporated into any dietary changes that are made in an effort to reduce CHD risk. Gastrointestinal complaints are common and must be addressed when considering this option.

on plasma lipids [72] while the consumption of intact soy protein, regardless of isoflavone concentration, decreased the plasma lipid risk factors associated with CHD in postmenopausal women.[73] Additionally, a combined preparation of soy protein, fiber, and phospholipid showed twice the lipid-lowering effect of soy protein alone.[74] In older women with mild hypercholesterolemia, a high intake of soy phytoestrogens had no effect on lipid profiles suggesting that the combined protein-isoflavone product is more effective.[75] The combined product caused the reduction of LDL-C levels which was more pronounced in hypercholesterolemic women, although small but significant changes were also noted in mildly hypercholesterolemic and normocholesterolemic women as well.[76,77] It appears that LDL-C levels need to be above the 130 mg/dL level in order for soy protein consumption, at a minimum of 25 g/d, to exhibit a hypolipemic effect.[78] Evaluating the mechanisms behind the reduction in plasma cholesterol, researchers reported that soy protein intake, at various isoflavone amounts, appeared to alter low density lipoprotein receptor activity or concentration [79] and increase catabolism of LDL-C through the upregulation of bile acid synthesis.[80] To further support the health claims of soy consumption, the U.S. Food and Drug Administration authorized the labeling of soy protein products with health claims regarding their reduced risk of CHD [81] quoting, "Based on the totality of publicly available scientific evidence, soy protein included in a diet low in saturated fat and cholesterol may reduce the risk of CHD by lowering blood cholesterol levels".

Summarizing the research would indicate that soy protein may improve lipid risk factors for CHD and its inclusion as part of an overall diet strategy to reduce CHD risk is warranted. It is of note that a recommended daily intake of 47 g/d of soy protein is handicapped by gastrointestinal disorders, major adjustments to dietary habits, product variability in soy protein content due to processing, and for some, an unpalatable addition to the diet. These factors should be considered when supplementing the diet with soy protein for the express purpose of reducing CHD risk factors.

Summary

Cardiovascular disease in women is responsible for more than half a million deaths per year. Primary prevention remains critical because first cardiovascular events in women are often fatal. Current clinical trial evidence justifies placing a strong emphasis on plasma lipid-lowering treatment as part of primary prevention. Because recommendations for risk factor management are based on the future probability of a cardiovascular event, the intensity of the lipid-lowering treatment must be determined by the patient's presentation of risk factors and their responsiveness to treatment. The value of nutritional prescription cannot be too strongly emphasized. Even under controlled conditions, diet without weight reduction can modify plasma lipids by 10% - 25% [82]. Efforts should therefore be made to support dietary recommendations for individuals with multiple cardiovascular risk factors with the acknowledgement that lipids and lipoproteins in women are crucial CVD risk factors that will respond to nutritional intervention. A summary of the nutritional prescriptions described are contained in Table One. Widespread confusion over the clinical application of nutritional research has caused many professionals to adhere to a one diet- one goal approach. This mentality fails to recognize the continuum of CVD or the multifactorial aspects of its development. The efficacy and feasibility of multiple dietary changes aimed at a variety of risk factors over time can only serve to improve the health and well being of the individual. Evidence exists to support multiple dietary recommendations to lower cardiovascular risk and future research will clarify the role that dietary composition plays in the prevention of CVD.

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We would like to report no conflicting affiliations or industrial links at this time.

Contributions:

CMG was responsible for the first draft of this review and subsequent editing. MLF was responsible for editing and clarification of ideas presented.

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Review Article

The role of nutrition in the prevention of coronary heart disease in women of the developed world

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營養對預防已開發國家女性冠心病的角色

每年有超過 500,000 女性死於心血管疾病，讓這個疾病成為女性的頭號殺手。當討論心血管疾病的管理時，冠心病在已開發國家可被當作是典型的分類。過去十年的研究闡明女性獨立相關的危險因子與疾病的進程。然而，目前對預防心血管疾病發展的初級危險因子的方法卻無法達到科學文獻描述的潛力。傳統的處方依賴荷爾蒙治療或藥物介入去管理冠心病，而忽視了非荷爾蒙的心血管健康的面向。最近的趨勢開始強調以飲食當作預防女性心臟病的工具。本文獻回顧試圖以強調營養當成居住在已開發國中的女性一輩子降低顯著的危險因子的處方

關鍵字：冠心病、初級危險因子、營養、女性、生活型態、已開發國家。