Walnuts: Heart-Health And Beyond

December 1, 2004

WALNUTS ARE THE 21ST CENTURY 'SUPER FOOD'

There are few foods that are as nutritiously complete and good for the human body as walnuts. For more than a dozen years, research by highly-respected scientific and clinical experts has continued to reveal that this "Super Food" is packed with nutrients that positively affect the body on a multitude of levels.

Walnuts are unique as one of the most nutrient-dense whole food sources of alpha-linolenic acid (ALA), an essential omega-3 fatty acid. Numerous studies have concluded that omega-3s help reduce the potential for heart disease, cancer, stroke, diabetes, high blood pressure, obesity and clinical depression.

The bottom line is that walnuts contribute nutrients essential to a healthy lifestyle. Eating walnuts is one of the easiest things a person can do to improve their health. Best of all, they taste great and are ideally suited for inclusion in any diet, as part of meals or snacks.

NEW CLINICAL STUDY SHOWS WALNUTS PROTECTIVE FOR PEOPLE WITH TYPE 2 DIABETES

A new study conducted in Australia shows that, for patients with type 2 diabetes, a whole foods diet including walnuts can reduce LDL "bad" cholesterol by as much as 10 percent. Findings of this new study are published in the December 2004 issue of *Diabetes Care*, a journal of the American Diabetes Association (ADA).

Primary study investigator Linda Tapsell, Ph.D., APD, director of the National Centre of Excellence in Functional Foods, located at the University of Wollongong, Australia, says, "This is one of the first studies to look at the effect of polyunsaturated fatty acids on diabetes management. Walnuts are an easy and convenient way of getting polyunsaturated omega-3 fatty acids into the diet. And they're particularly important for people with diabetes because they are a simple snack food, which is an integral component of managing the diet in diabetes."

Tapsell says that a diet including walnuts can help the body address one of the problems associated with early stage type 2 diabetes – insulin resistance – which hinders the absorption of glucose from the bloodstream into human cells.

These findings are significant. According to the ADA, more than 65 percent of people with diabetes die from heart disease or stroke. In the United States, 18.2 million people, or 6.3 percent, have diabetes and most have the type 2 form of the disease. The World Health Organization reports that at least 171 million people worldwide have diabetes and this number will likely double by 2030.

WALNUTS REDUCE THE RISK OF HEART DISEASE

An ever-growing body of research has shown that walnuts play a significant role in reducing the risk of heart disease. The heart benefits of walnuts include lowering cholesterol, reducing inflammation and improving arterial function.

Results from a November 2004 study from The Pennsylvania State University – published in the *Journal of Nutrition* – showed that eating walnuts can significantly reduce C-reactive protein and harmful plaque adhesion molecules, two significant markers of inflammation in arteries.

Penny Kris-Etherton, Ph.D., distinguished professor of nutrition at Penn State and primary investigator for the study says, "The important new finding with our research is that a diet high in walnuts beneficially affects multiple risk factors for coronary heart disease, which can have a greater impact on decreasing cardiovascular risk than just targeting single risk factors."

Many people look to fish, such as salmon, for omega-3s. However, Kris-Etherton says, "The omega-3 fatty acids in walnuts were converted to the same omega-3 fatty acids found in marine sources, and had a similar effect on inflammation. Reducing inflammation can help decrease the progress of arteriosclerosis – the development and build-up of plaque in the arteries."

A March 2004 clinical study from the University of Barcelona showed that substituting walnuts for monounsaturated fat in a Mediterranean diet improved, and even restored, endothelial function (the elastic property of arteries to dilate when meeting an increased demand of blood). The study also showed that walnuts reduce cell adhesion molecules associated with atherosclerosis, commonly known as hardening of the arteries. These dual effects enhance the circulatory system, aiding in the prevention of heart disease. According to the researchers, walnuts are the first whole food to show such cardiovascular benefits. The study was published in *Circulation: Journal of the American Heart Association* (March/April 2004).

Research from The Pennsylvania State University showing that an ALA diet improves vascular function was reported at the American Heart Association's 5th Annual Conference on Arteriosclerosis, Thrombosis, and Vascular Biology in San Francisco (May 2004). Lead author Sheila G. West, Ph.D. says, "Our findings suggest that the special kind of fatty acids that are present in walnuts can improve the function of arteries and allow them to dilate better." Additionally, a University of San Francisco study published in *Stroke* in l995 found omega-3s reduced the incidence of stroke.

California's Loma Linda University, in 1993 clinical trials, was the first to find that walnuts in a controlled diet reduced "bad" LDL cholesterol and heart disease risk significantly more than the Step 1 diet that was then recommended by the American Heart Association. Five walnut studies reviewed in 2002 by the Life Sciences Research Office (LSRO) – an independent, non-profit organization that conducts peer-reviewed scientific reviews, prepares expert documents and manages scientific meetings – confirmed these findings, which also demonstrated that the walnut diet out-performed a healthy Mediterranean diet. In addition, the Kyushu University (Japan) clinical study, also published in 2002, showed a healthy Asian-style diet to be even healthier with walnuts.

THE HEALTHY POWER OF OMEGA-3s

There have been major changes in the American diet in the past few decades as people have increased their use of processed foods, which are loaded with unhealthy doses of saturated- and trans-fats. This has led to an unhealthy balance of essential fatty acids (EFAs). Ideally, the two families of EFAs (omega-6 and omega-3) should be balanced in a ratio of no more than 4:1 for optimum health. The average American's dietary ratio can be in excess of an alarming 20:1, or more. Artemis P. Simopoulos, M.D., president of The Center for Genetics, Nutrition and Health and author of *The Omega Diet* says, "Walnuts are unique because they have a perfect balance of omega-6 and omega-3 polyunsaturated fatty acids, a ratio of 4:1, which has been shown to decrease the risk of sudden death in the Lyon Heart Study." Simopoulos says omega-3s reduce the bloodstream levels of LDL (bad) cholesterol and maintain or raise HDL (good) cholesterol.

The presence of omega-3s reduces blood pressure, arterial inflammation and the stickiness of platelets, making them less likely to cling together and form plaque, which can build-up, rupture and plug arteries. EFAs, particularly omega-3s, may also play a role in reducing arrhythmia (irregular heart beat pattern) and cardiac arrest. Take, for example, the U.S. Physicians' Health Study (Harvard), published in June 2002. The study, which followed 21,454 men for an average of 17 years, illustrated that dietary nut intake was associated with a significantly reduced risk of sudden cardiac death. The Lyon Heart Study published in *Lancet* in l994 showed healthy EFAs in the blood reduced clotting and inflammation, decreasing risk for clogging of the arteries and sudden heart attack by 70 percent.

ANTIOXIDANTS: FOOT SOLDIERS IN THE BATTLE AGAINST DISEASE

Reported in June 2004, a USDA study of food antioxidants noted the high antioxidant concentration in walnuts. Antioxidants help the body ward off life-threatening maladies such as cancer, heart disease and diabetes, as well as debilitating ailments such as arthritis, osteoporosis and Alzheimer's disease. While there are several different methods used to measure antioxidant levels, such as the oxygen radical absorbance capacity (ORAC) and the ferric-reducing ability of plasma (FRAP) methods, walnuts rank highly under either method.

WALNUTS AND WEIGHT MANAGEMENT

The latest study from Australia once again affirmed that the health benefits from eating walnuts do not come at the expense of weight gain. Researchers have noted in many walnuts studies that subjects did not gain weight when walnuts were substituted for other fat in the diet. People reported feeling more satisfied; many said walnuts made it easier to stick to a diet. This response was also noted by McManus et al in their study published in October 2001 by the *International Journal of Obesity*, which concluded that people following a moderate fat weight loss diet, including peanuts and tree nuts, such as walnuts, were able to improve weight loss and keep weight off for a longer period than people following the traditionally recommended low-fat diet.

FDA ALLOWS HEALTH CLAIM FOR WALNUTS

In a landmark decision in March 2004, the U.S. Food and Drug Administration (FDA) delivered the strongest governmental endorsement of walnuts to date when it affirmed: "Supportive but not conclusive research shows that eating 1.5 ounces per day of walnuts, as part of a low saturated fat and low cholesterol diet and not resulting in increased caloric intake, may reduce the risk of coronary heart disease. See nutrition information for fat content." This FDA decision came in response to a petition filed by the California Walnut Commission, which highlighted a body of international scientific research substantiating the benefits of eating walnuts as part of a heart-healthy diet. The body of evidence suggests that the nutritional composition of walnuts contributes to these heart health benefits.

GOOD FAT PROMOTES GOOD HEALTH

Many clinical studies published in peer-reviewed scientific journals have provided strong evidence that "good" fats, like omega-3 fatty acids, promote good health. As a result, new dietary guidelines have been established by several leading health organizations and government agencies:

- The American Institute for Cancer Research (AICR) announced its support (May 2004) of the FDA decision to permit nutrient content claims for foods rich in omega-3s, given a link between omega-3s and reduced risk of some cancers. With news about toxins in certain marine sources of omega-3s, as well as nutritional questions about farm-raised fish, the AICR recommended walnuts as a beneficial alternative source of the essential nutrient.

- In July 2003, the FDA announced its Consumer Health Information for Better Nutrition Initiative and identified omega-3 fatty acids as a key area of focus.

- The American Heart Association issued a statement in November 2002 that urged a daily dose of omega-3-rich foods, such as fish, walnuts, flaxseed and some vegetable oils.

- The Food Nutrition Board of the National Academies' Institute of Medicine released dietary recommendations in September 2002 that said, "People must get two types of polyunsaturated fatty acids, known as alpha-linolenic acid (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid), from the foods they consume since neither is synthesized in the body." For alpha-linolenic acid, the recommendation is 1.6 and 1.1 grams per day for men and women, respectively. **The 2.5 grams of alpha-linolenic acid in just one ounce of walnuts more than satisfies the National Academies' daily dietary recommendation.**

FAST FORWARD, FLASHBACK

In historical terms, walnut science is new and cutting-edge. Yet their health lore is ancient. It's interesting to glance back and remember that during Medieval times, walnuts were considered a medicine. A potion containing walnut leaves was used to treat muscular aches and pains and walnuts were believed to soothe the digestive system. Later, in the 16th and 17th centuries, herbal treatments became official medical practice under the "Doctrine of Signatures," and various plants were prescribed due to their resemblance to a particular body part. Hence, the walnut, with its visual likeness to the human brain, was used to treat head ailments, boost intellect and calm emotions. Even today, in Asian cultures, the walnut is considered a brain food; college students there munch on walnuts by the handful before exams, hoping to boost their scores. Depending on which way a walnut is cracked open, it has a striking resemblance either to the brain or the heart. Crack a walnut and see the hearts for yourself. You won't get a "perfect" heart every time, but you'll get the message – walnuts are heart-healthy.

CHRONOLOGICAL SUMMARY

FDA HEALTH CLAIM

Published: **March 31, 2004**
Organization: U.S. Food and Drug Administration (FDA)
Description: "Supportive but not conclusive research shows that eating 1.5 ounces per day of walnuts, as part of a low saturated fat and low cholesterol diet and not resulting in increased caloric intake, may reduce the risk of coronary heart disease. See nutrition information for fat [and calorie] content."

DIETARY RECOMMENDATIONS

Published: **July 10, 2003**
Organization: U.S. Food and Drug Administration
Title: Consumer Health Information for Better Nutrition Initiative Task Force Report and Recommendations
Description: "As part of its continuing initiative to provide Americans with the information they need to make healthy nutritional choices about foods and dietary supplements, the Food and Drug Administration (FDA) today announced an initiative to help consumers obtain accurate, up-to-date, and science-based information about the health consequences of these products."
Recommendation: The report highlights key areas in which FDA intends to focus efforts on providing better nutrition information and health messages to consumers, including the benefits of eating foods high in omega-3 fatty acids and the benefits of substituting nuts for other sources of fat in a diet.

Published: **November 2002, Kris-Etherton et al, *Circulation: Jrnl of the American Heart Assoc.*, 106:2747**
Organization: American Heart Association (AHA) Nutrition Committee
Title: "Fish Consumption, Fish Oil, Omega-3 Fatty Acids, and Cardiovascular Disease"
Description: Scientific statement based on review of evidence from epidemiological studies and randomized control trials. Introduction notes that, "Since the first AHA Science Advisory 'Fish Consumption, Fish Oil, Lipids, and Coronary Heart Disease,'[*] important new findings, including evidence from randomized controlled trials (RCTs), have been reported about the beneficial effects of omega-3 (or n-3) fatty acids on cardiovascular disease (CVD) in patients with preexisting CVD as well as in healthy individuals. New information about how omega-3 fatty acids affect cardiac function (including antiarrhythmic effects), hemodynamics (cardiac mechanics), and arterial endothelial function have helped clarify potential mechanisms of action."
Recommendation: In summary, the report states that, "Collectively, these data are supportive of the recommendation made by the AHA Dietary Guidelines to include at least two servings of fish per week (particularly fatty fish). In addition, the data support inclusion of vegetable oils (e.g., soybean, canola, walnut, flaxseed) and food sources (e.g., walnuts, flaxseeds) high in a-linolenic acid in a healthy diet for the general population."
[*] Stone NJ. Fish consumption, fish oil, lipids, and coronary heart disease. *Circulation.* 1996; 94: 2337–2340

Published: **September 2002**
Organization: Food and Nutrition Board (FNB), the National Academies' Institute of Medicine (IOM) of the National Academy of Sciences (NAS)
Title: "Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Protein and Amino Acids (Macronutrients)"
Description: A Report of the Panel on Macronutrients, Subcommittees on Upper Reference Levels of Nutrients and Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes
Recommendation: Issued by the NAS after more than two years of study, the report addresses the new Dietary Reference Intakes (DRIs). In regard to polyunsaturated fat and DRI for linolenic acid the report states: "People must get two types of polyunsaturated fatty acids, known as alpha-linolenic acid (an omega-3 fatty acid) and linoleic acid (an omega-6 fatty acid), from the foods they consume since neither is synthesized in the body." For alpha-linolenic acid, the recommendation is 1.6 and 1.1 grams per day for men and women, respectively.
(Note: One ounce of walnuts contains 2.5 grams of alpha-linolenic acid.)

CLINICAL STUDIES, STATEMENTS, REPORTS AND FINDINGS

Published: **December 2004, Tapsell et al, *Diabetes Care,* Volume 27, Number 12**
Research Organization: National Centre of Excellence in Functional Foods, University of Wollongong, Australia
Study Title: "Including Walnuts in a Low Fat/Modified Fat Diet Improves HDL Cholesterol-to-Total Cholesterol Ratios in Patients With Type 2 Diabetes"
Subjects: 58 men and women, ages 35-75, diagnosed with type 2 diabetes mellitus for at least one year and generally well
Study Description: A parallel randomized controlled trial comparing three dietary advice groups each with 30% energy as fat: low fat, modified low fat and modified low fat inclusive of 30g walnuts (equivalent to around 8-10 nuts) per day.
Results: "The walnut group achieved a significantly greater increase in HDL cholesterol-to-total cholesterol ratio and HDL than the other two treatment groups. A 10% reduction in LDL cholesterol was also achieved in the walnut group." In conclusion, "Structured 'whole of diet' advice that included 30g walnuts/day delivering substantial amounts of polyunsaturated fatty acid improved the lipid profile of patients with type 2 diabetes."

Published: **November 2004, Zhao et al, *Journal of Nutrition*, 0022-3166/04**
Research Organization: The Pennsylvania State University
Study Title: "Dietary Alpha-Linolenic Acid Reduces Inflammatory and Lipid Cardiovascular Risk Factors in Hypercholesterolemic Men and Women."
Subjects: 20 men (ages 36-60), 3 women (ages 55-65) with moderate hypercholesterolemia
Study Description: Randomized, controlled, 3-diet, 3-period, cross-over study design. Two diets low in saturated fat and cholesterol, and high in PUFA varying in ALA (ALA diet) and linoleic acid (LA Diet) compared with an average American diet (AAD). In the two high-PUFA diets, half of the total fat was derived from walnuts and walnut oil because they are rich sources of PUFA and, particularly, ALA (100 g of walnuts provides 38g of LA and 9g of ALA; 100 g of walnut oil provides 53g of LA and 10g of ALA). The ALA diet included a teaspoon of flaxseed oil.
Results: Compared to the average American diet, both the LA and the ALA diets including walnuts lowered total cholesterol 11%, LDLs 11-12% and triglycerides 18%. After six weeks on the diet, CRP declined after both the LA and ALA diets, but more so on the ALA diet. "In conclusion, a diet high in PUFA, especially ALA, elicits cardioprotective effects by decreasing lipid and lipoprotein levels and by eliciting vascular anti-inflammatory effects. The fact that ALA has marked, beneficial effects on multiple CVD risk factors further underscores its potentially important role in CVD risk reduction."

Published: **Online March 22/In Print April 6, 2004, Ros et al, *Circulation: Journal of the American Heart Assoc.***
Research Organization: Hospital Clinic of Barcelona
Study Title: "A walnut diet improves endothelial function in hypercholesterolemic subjects: A randomized crossover trial"
Subjects: 21 men and women (ages 25-75) with high cholesterol
Study Description: 8-week randomized crossover design; cholesterol-lowering Mediteranean diet, and a diet of similar energy and fat content in which approximately 1.4-2.3 ounces of walnuts daily (equivalent to 40-65 grams or 8-13 walnuts), based on subjects' total caloric intake, replaced roughly 32 percent of the energy from monounsaturated fat. Participants followed each diet for four weeks.
Results: Compared with the Mediterranean diet, the walnut diet increased endothelium-dependent vasodilation by 64 percent and reduced levels of vascular cell adhesion molecule-1 by 20 percent. In addition, as in previous studies, the walnut diet decreased total cholesterol and LDL cholesterol. Study concludes that the results provide further support for the inclusion of walnuts in healthy diets.
(Researcher notes walnuts differ from all other nuts because of their high content of alpha-linolenic acid (ALA), a plant-based omega-3 fatty acid, which may provide additional anti-atherogenic properties. Also referenced are the amino acid L-arginine, and the gamma-tocopherol form of vitamin-E, both of which walnuts are rich in, as effective in preventing harmful vascular blockage.)

Published: **November 2002, Jiang et al, *Journal of the American Medical Association*, 288:20**
Research Organization: Harvard School of Public Health
Study Title: "Nut and Peanut Butter Consumption and Risk of Type 2 Diabetes in Women."
Subjects: 83,818 women from 11 states in the Nurses' Health Study; aged 34-59; no history of diabetes, cardiovascular disease or cancer.
Study Description: Prospective cohort study. Subjects completed a validated dietary questionnaire at baseline in 1980 and were followed up for 16 years.
Results: "Our findings suggest potential benefits of higher nut and peanut butter consumption in lowering risk of type 2 diabetes in women. To avoid increasing caloric intake, regular nut consumption can be recommended as a replacement for consumption of refined grain products or red or processed meats."

Published: **July 2002, Iwamoto et al, *European Journal of Clinical Nutrition,* 56,629-637**
Research Organization: Kyushu University
Study Title: "Serum lipid profiles in Japanese women and men during consumption of walnuts."
Subjects: 20 health women and 20 healthy men
Study Description: Four week controlled, single-blind crossover designed study. Participants were randomly assigned to two mixed natural diets. After four weeks, the groups switched diets.
Results: LDL "bad" cholesterol was lowered by 8.9 percent in men and 10.6 percent in women.
Total cholesterol was lowered by 3.8 percent in men and 4.9 percent in women. There was no significant change in HDL "good" cholesterol.

Published: **June 2002, Albert et al, *Archives of Internal Medicine*, Volume 162**
Research Organization: Brigham and Women's Hospital; Harvard School of Public Health
Study Title: "Nut Consumption and Decreased Risk of Sudden Cardiac Death in the Physicians' Health Study."
Subjects: 21,454 male participants enrolled in U.S. Physicians' Health Study
Study Description: Prospectively assessed whether increased frequency of nut consumption, as ascertained by an abbreviated food frequency questionnaire at 12 months of follow-up, was associated with a lower risk of sudden cardiac death and other coronary heart disease end points.
Results: Compared with men who rarely or never consumed nuts, those who consumed nuts 2 or more times per week had a 47 percent lower risk of sudden cardiac death and a 30 percent lower risk of total coronary heart disease death.

Published: **May 2002, Feldman, *Journal of Nutrition*, 132 (5S)**
Research Organization: Life Sciences Research Office, American Society for Nutritional Sciences
Study Title: "The Scientific Evidence for a Beneficial Health Relationship Between Walnuts and Coronary Heart Disease"
Subjects: 200 subjects considered representative of the adult population in the U.S. at risk of coronary heart disease
Study Description: Scientific review of five controlled, peer-reviewed, human clinical walnut intervention trials.
Results: Key findings suggest that: (1) Consuming walnuts did not cause a net gain in body weight (2) Walnuts decreased serum cholesterol and reduce relative risk for heart disease by 30-50 percent (3) Walnuts are unique among nuts due to their polyunsaturated fat (omega-3 and omega-6 fatty acid) content.

Published: **March 2002, Halvorsen et al, *Journal of Nutrition,* 132 (3)**
Research Organization: University of Oslo, Norway; Akershus University College, Norway; Agricultural University of Norway; University of Minnesota
Study Title: "A Systematic Screening of Total Antioxidants in Dietary Plants"
Study Description: Systematic assessment of total antioxidants in a variety of dietary plants used worldwide, including various fruits, berries, vegetables, cereals, nuts and pulses. When possible, three or more samples of dietary plants from three different geographic regions in the world were analyzed.
Results: The systematic analysis presented in the study will facilitate research into the nutritional role of the combined effect of antioxidants in dietary plants.
(Researchers note walnuts are second only to dog rose in antioxidant content of all the dietary plants analyzed in this study.)

Published: **December 2001, Munoza et al, *Journal of Lipid Research*, 42,2069-2076**
Research Organization: Hospital Clinic of Barcelona/Loma Linda University
Study Title: "Walnut-enriched diet increases the association of LDL from hypercholesterolemic men with human HepG2 cells"
Subjects: 10 men with polygenic hypercholesterolemia
Study Description: Randomized, crossover feeding trial: Control, Mediterranean-type cholesterol-lowering diet, and a diet of similar composition in which walnuts replaced 35% of energy from unsaturated fat, were given for six weeks each.
Results: The walnut diet reduced serum total and LDL cholesterol by 4.2% and 6.0% respectively.
Out-performing a cholesterol-lowering Mediterranean diet, researchers noted that on the walnut diet, subjects could consume more calories without gaining weight.

Published: **October 2001, McManus et al, *International Journal of Obesity*, 25,1503-1511**
Research Organization: Brigham & Women's Hospital
Study Title: "A randomized controlled trial of a moderate-fat, low-energy diet compared with a low fat, low-energy diet for weight loss in overweight adults"
Subjects: 101 overweight men and women
Study Description: Randomized, prospective 18 month trial in a free-living population
(1) Moderate-fat diet (35% of energy); (2) low-fat diet (20% of energy)
Results: People following a Mediterranean-style moderate fat weight loss diet, including peanuts and tree nuts, such as walnuts, were able to improve weight loss and keep weight off for a longer period than people following the traditionally recommended low-fat diet.
(Researchers suggest that walnuts aid satiety, which is a factor in successful dieting.)

Published: **August 2001, Anderson et al, *Journal of Nutrition*, American Society for Nutritional Sciences, 0022-3166**
Research Organization: University of California, Davis
Study Title: "Walnut Polyphenolics Inhibit In Vitro Human Plasma And LDL Oxidation"
Study Description: Polyphenol-rich extracts from walnuts were studied in vitro and compared with ellagic acid for their ability to inhibit in vitro plasma and LDL oxidation, as well as their effects on LDL during oxidative stress.
Results: Walnut polyphenolics are effective inhibitors of in vitro plasma and LDL oxidation.

Published: **July 2001, Almario et al, *American Journal of Clinical Nutrition*, 74:72-9**
Research Organization: University of California, Davis
Study Title: "Effects of Walnut Consumption On Plasma Fatty Acids and Lipoproteins in Combined Hyperlipidemia"
Subjects: 7 men and 16 postmenopausal women
Study Description: Participants sequentially adhered to the following diets in free-living conditions:
(1) habitual diet (2) habitual diet plus walnuts (3) low-fat diet (4) low-fat diet plus walnuts
Results: Compared to the diets without walnuts, the proportion of small particle LDL decreased by 27% with the habitual diet plus walnuts and 7% with the low-fat diet plus walnuts. Small particle LDL is considered to be a promoter of cardiovascular disease.

Published: **April 2000, Zambon et al, *Annals of Internal Medicine*, 132(7):538-46**
Research Organization: Hospital Clinic of Barcelona/Loma Linda University
Study Title: "Substituting Walnuts for Monounsaturated Fat Improves the Serum Lipid Profile of Hypercholeterolemic Men and Women."
Subjects: 49 men and women with high cholesterol
Study Description: Conducted at Lipid Section, Hospital Clinic of Barcelona
12-week randomized crossover feeding trial
Free-living study – participants prepared meals at home
Cholesterol lowering Mediterranean diet
Walnuts substituted for some of the monounsaturated fat in the diet
Results: LDL cholesterol lowered by 5.9% and total cholesterol lowered by 4.1%, out-performing a cholesterol-lowering Mediterranean diet.
(Researchers also noted that subjects on the walnut diet, despite increased energy, did not gain weight.)

Published: **April 1999, Laverdrine et al, *Preventive Medicine*, 28:333-9**
Research Organization: University of Grenoble
Study Title: "Blood Cholesterol and Walnut Consumption: A Cross-sectional Survey in France"
Subjects: 793 men and women, ages 18-65
Study Description: Cross-sectional study
Results: The positive effect of walnut consumption on blood HDL cholesterol and apo A1 is of special interest since these lipid parameters have been shown to be negatively correlated with cardiovascular morbidity.

Published: **November 1998, Hu et al, *British Medical Journal*, 317:1341-5**
Research Organization: Harvard School of Public Health
Study Title: "Frequent nut consumption and risk of coronary heart disease in women: prospective cohort study" (Nurses' Health Study)
Subjects: 86,000 female nurses
Study Description: Epidemiological study
Results: Participants who consumed one ounce (about ¼ cup) of nuts, including walnuts, five or more times a week had 35% less risk of heart disease. Alpha-linolenic acid, more abundant in walnuts than any other nut, suggested to be the determining factor.

Published: **January 1998, Chisholm et al, *European Journal of Clinical Nutrition*, 52(1):12-6**
Research Organization: University of Otago, Dunedin, New Zealand
Study Title: "A diet rich in walnuts favourably influences plasma fatty acid profile in moderately hyperlipidaemic subjects."
Subjects: 21 men
Study Description: Randomised cross over study
Results: Despite an unintended increase in the total fat intake on the walnut diet, fatty acid profile of the major lipid fractions showed changes which might be expected to reduce risk of cardiovascular disease.

Published: **May 1995, Simon et al, *Stroke*, 26: 778-782**
Research Organization: University of California, San Francisco
Study Title: "Serum Fatty Acids and the Risk of Stroke"
Subjects: 96 middle-aged men who had suffered a stroke, equal number who had not
Study Description: Epidemiological comparison
Results: For every .13 percent increase in alpha-linolenic acid (an omega-3 fatty acid), risk of stroke dropped by 37%. Walnuts are one of the richest plant food sources of alpha-linolenic acid.

Published: **June 1994, de Lorgeril et al, *Lancet*, 343(8911):1454-9**
Research Organization: Institut National de la Santé et de la Recherche Médicale (INSERM)
Study Title: "Mediterranean alpha-linolenic acid-rich diet in secondary prevention of heart disease" (Lyon Heart Study)
Subjects: 605 patients
Study Description: Prospective, randomized single-blinded secondary prevention trial
Results: These results show EFAs in the blood reduce clotting and inflammation, cutting risk for sudden heart attack and clogging of the arteries. Two grams of alpha-linolenic acid on a modified Crete Mediterranean diet reduced total death by 70%.

Published: **March 1993, Sabate et al, *New England Journal of Medicine*, 328:603-7**
Research Organization: Loma Linda University
Study Title: "Effects of Walnuts on Serum Lipid Levels and Blood Pressure in Normal Men"
Subjects: 18 men with normal cholesterol
Study Description: 8-week randomized crossover feeding study
Step 1 Diet of the National Cholesterol Education Program, recommended by the American Heart Association. Walnuts substituted for some of the saturated fat in the diet.
Results: In the walnut diet, LDL cholesterol dropped 16%, total cholesterol dropped 12%, out-performing the Step 1 control diet.

Published: **July 1992**, **Fraser et al, *Archives of Internal Medicine*, 152: 1416-24**
Research Organization: Loma Linda University
Study Title: "A possible protective effect of nut consumption on risk of coronary heart disease."
Subjects: 31,208 Seventh-day Adventists
Study Description: Cohort investigation which began in 1974, including detailed investigation of diet.
Results: Nut consumption reduces the risk of both fatal and nonfatal coronary heart disease.

Scientific Advisory Council

The walnut industry has been a leader in health research for more than a decade, the first among nuts to commission clinical studies in the early 1990s. Committed to producing the highest quality foods, the industry also believes in the nutritional power of whole foods. To assess research in progress around the world, and to review proposals and study results, a decade ago the California Walnut Commission established an advisory board of scientists from leading universities.

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Editors' Note – *Available:*

- ? Interview Resources (doctors, dietitians, scientists, authors, public health education experts)
- ? Listing of Nutrients in Walnuts
- ? Study Reprints
- ? Photography, Graphics, B-roll
- ? Recipes and more information at www.walnuts.org

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