

## **The Grain Chain: Consumption Of Whole Grain Foods And Their Many Links To Disease Prevention**

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### **Abstract**

This research paper is intended to raise awareness of the benefits of whole grains in the diet as well as to educate the consumer on how to select whole grain products. Scientific studies are reviewed, and the beneficial effects of human consumption of whole grain foods are summarized.

Whole grain intake has constantly been linked to protection from coronary heart disease (CHD). Intake of whole grains has also been shown to have a favorable effect on the treatment and prevention of obesity, diabetes mellitus and certain types of cancers. In 1999, the United States Food and Drugs Administration (FDA) approved the Health Claim: "Diets rich in whole-grain foods and other plant foods and low in total fat, saturated fat and cholesterol may reduce the risk of heart disease and certain cancers". In addition, "Healthy People 2010 Initiative" gives the following recommendation. "Grain Product Intake: Increase the proportion of persons who consume at least six daily servings of grains with at least three being whole grain from 7% to 50% by the year 2010". This objective, as well as the FDA approved health claim about grains conveys the importance of whole grains in the diet.

It is the strong belief of most health professionals that good nutrition is the key to better health. In 2005, the United States Department of Agriculture introduced a new Food Pyramid which is intended to be used by the American public as a guide to wise food selection and better nutrition. One of the two most significant changes is the addition of whole grains to the Food Pyramid. The old Food Pyramid had a cereal and bread group, but it did not specify "whole" grains. However, because the Dietary Guidelines for Americans Committee Report "linked diets rich in whole grains to the reduced risk of heart disease and diabetes, as well as helping with weight management", the committee felt it necessary to recommend a minimum three ounces of whole grains daily. The guidelines instructs the consumer to look for the word "whole" before the word "grain" on the ingredient list of food packages. Researchers report that less than one in ten adults get the recommended amount of whole grains necessary to maintain good health and stave off preventable diet-related diseases. Americans need to be educated to the benefits of whole grains. Whole grains are rich in fiber and are also packed with hundreds of beneficial phytochemicals that have potent antioxidant properties. Whole grains are also an important source of essential vitamins and minerals. These nutrients may work synergistically to help us improve our health and prevent many diet-related diseases.

In this Research Paper, Patricia P. Smith, Ed.D. RD, LD/N; CFCS, Professor of Nutrition presents an overview of the scientific studies that led to the current recommendations regarding the consumption of whole grains. She discusses the importance of whole grains in the diet and their relationship in disease prevention. She further outlines ways by which the consumer is able to identify whole grain products.

### **Introduction**

Launched by the United States Department of Health and Human Services (USDHHS) in January 2000, Healthy People 2010 Initiative contains 467 objectives designed to serve as a road map for improving the health of all people in the United States during the first decade of the 21st century. "Healthy People 2010 Initiative" gives the following recommendation. "Grain Product Intake: Increase the proportion of persons who

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consume at least six daily servings of grains with at least three being whole grain from 7% to 50% by the year 2010. In 1999, the United States Food and Drug Administration (FDA) approved the Health Claim: “Diets rich in whole-grain foods and other plant foods and low in total fat, saturated fat and cholesterol may reduce the risk of heart disease and certain cancers”.

The overall goal of the United States Department of Health as well as the Food and Drug Administration is to promote and protect the health and safety of all people, in and through the delivery of high quality public health services and promotion of health care standards. While there is mounting scientific evidence that the consumption of whole grains has a favorable effect on the prevention and treatment of many diet-related diseases, this research paper will focus most heavily on coronary heart disease and obesity.

The prevalence of Obesity and Coronary Heart Diseases in developed countries is a major pressing issue that is directly related to health and nutrition. In the past decade health problems related to diet have increased steadily in America as well as in many other developed countries. Recent statistics provided by the Surgeon General of the United States, have indicated that death rates related to coronary heart disease (CHD) is one of the leading causes of death. Coronary heart disease-related deaths have now also shown a marked increase among the female population. Researchers have reported that, of all the heart disease deaths, 40 percent are women, whereas, only 20 percent are men. Anderson et. al. reported that the cost associated with deaths from cardiovascular diseases exceeded 1 million dollars annually in the United States and that it accounted for the

largest disease-related cost to health care. It is predicted that the cost of coronary health related problems will exceed \$120 billion per annum in the near future.

### **A Working Definition Of Coronary Heart Disease**

In this discussion, coronary heart disease is defined as any disease or health problem that affects the heart and the cardiovascular system. One of the most common cardiovascular diseases is atherosclerosis of the coronary arteries. This is a build-up of plaque, which clogs and narrows the coronary arteries, thereby restricting the blood flow to the heart. Without adequate blood flow to the heart, it becomes starved of oxygen and vital nutrients. A lack of adequate and constant oxygenated and nutrient-filled blood to the heart can result in angina as well as varying severity of heart attacks.

Other problems that affect the heart are elevated cholesterol levels, stroke, heart valve disease, heart muscle disease and heart failure. Cardiovascular disease also affects the heart and blood vessels and is involved in disorders such as hypertension, high cholesterol, high blood sugar and obesity. All of these factors predispose an individual to heart attack and stroke and are collectively called metabolic syndrome. Cardiovascular disease in children is also on the rise. Pediatric cardiologist Dr. Phyllis Pollack states, “That cardiovascular disease in children was unheard of just 25 years ago”. Now she treats children as young as four years old for dietary high cholesterol and teens who suffer from hypertension.

Lifestyle and diet play a vital role in the prevention and treatment of cardiovascular disease. Whole grain, as part of a healthy diet, is known to help reduce the risk of the development of the metabolic syndrome and ultimately a reduction in heart disease.

(Hark and Deen, 2005, 214) Researchers have found that men and women, who had at least three servings of whole grain each day, were less likely to develop metabolic syndrome than those who consumed one serving of whole grain a day.

### **A Working Definition Of Obesity**

Obesity can be defined as being 30% or more above one's BMI (body mass index). BMI is one of the clinical measurements that is currently being used to determine obesity. Dr. Yoplak, chairman of the Vienna Congress of Health says that "obesity is now epidemic." Several researches have reported that 19- 22% of youths are seriously overweight which means that they are equal to or above the 95<sup>th</sup> percentile for their body mass index (BMI). (Greiman, 2004) reported that obesity is a major problem. Research has shown that 50-65% of adults in the United States are overweight or obese. Childhood obesity continues to rise at an alarming rate. Obesity is a condition characterized by the excessive accumulation and storage of fat in the body and it is the second leading cause of unnecessary deaths in the United States. According to the American Obesity Association, the end results of obesity are "similar or greater than smoking, problem drinking, and being poor." The number of obese Americans and obesity in the Western World have continued to increase since 1960, a trend that is not slowing down.

In the past few years, the World Health Organization (WHO), Center for Disease Control (CDC), the Food and Drug Administration (FDA), have all made the prevention and treatment of obesity one of their top priorities. Healthcare costs of American adults who are diagnosed with obesity have skyrocketed. In European populations where

previously, there were little or no signs of obesity, reports now indicate that 20-25% of their population is obese.

As Dr. Pollack puts it “obesity is a deadly weapon taking aim at the nation’s future health”. She goes on to say that this could mean that our children might be the first Americans who will not outlive their parents by as many as 10 years. Lifestyle related cardiovascular disease in children, is now epidemic. Sixty percent of overweight children have at least one risk factor of cardiovascular disease compared to ten percent of those with a lower body mass index (Pollack, 2006). Obesity is a major problem to world health and it is becoming the #1 contributor to poor health, replacing malnutrition and infectious disease. Obesity is directly related to the development of heart disease, type II diabetes, arthritis, fatty liver disease, hypertension, gall bladder disease, certain cancers, and elevated levels of cholesterol and stroke. Some associative risks of obesity are conditions such as arthritis, gout, abnormal pulmonary function, and sleep apnea.

One of the causes of obesity is consumption of more kilocalories than is used by the body. Clearly obesity is destructive to good health. Highly processed foods do not make the diner feel full as quickly as unprocessed foods such as whole grain products. This over consumption of refined foods can lead to overweight and obese individuals. Eating whole grain foods can help to prevent children, as well as, adults from becoming overweight, because whole grain foods are packed with fiber.

### **Literature Review**

This review of the literature examines the evidences that link intake of whole grains to the treatment and protection of diseases. Studies were identified as those which included whole grain, total fiber, cereal, fruit or vegetable intake. Whole grains are

defined as those rich in dietary fiber, resistant starch, vitamins, minerals, phytoestrogens, antioxidants and other nutrients.

According to (Stampfer, 1999) whole grains and dietary fiber had the strongest and most consistent association with protection from heart disease. Liu, S.L.; Stampfer, et al conducted a study to evaluate whether high whole-grain intake reduces risk of CHD in women. They studied 75,521 women aged 38-63 years old who had no previous history of cardiovascular disease or diabetes. They documented results which showed that out of 761 cases of CHD, 208 were fatal and 553 were nonfatal myocardial infarction. The lower risk was associated with higher whole-grain intake. The researchers concluded that the increased intake of whole grains may protect against CHD.

In some studies, the consumption of whole grains decreased the risk of heart disease by as much as twenty to thirty percent. Antioxidants present in whole grains delay the damage of oxygen on cholesterol levels which can damage arteries. Soluble and insoluble fibers have beneficial effects on those with heart disease as well as on those with Diabetes Mellitus. Fiber in whole grains slows down the absorption and digestion of carbohydrates which results in a reduced demand for insulin. An increased abdominal girth is part of the metabolic syndrome which can contribute to heart diseases hence weight control is important in the fight against heart disease. The soluble and insoluble fiber found in whole grains play an important part in the prevention and control of diet-related diseases such as coronary heart disease and obesity, as well as other dietary related diseases. Since soluble fiber leaves the stomach slowly, it increases the feeling of fullness after a meal and helps with weight control. Whole grains also lessen the

progression of arteriosclerosis which is plaque build-up in the arteries from lipids which can lead to a heart attack due to artery blockage.

Whole grain foods provide the body with key vitamins, minerals, protein and antioxidants. All these elements not only help in the fight against heart disease and obesity, but contribute to an overall state of health and well-being. Researchers have shown that one of the best natural remedies for the improvement of health is to consume diets high in whole grains, fruits, and vegetables. Several researchers have established that a diet which includes whole grains will not only lower cholesterol and blood pressure, but also aids in the prevention and treatment of obesity, cancer, and heart disease. In the State of Florida where this presenter resides, many initiatives have been recommended and implemented to help in the fight against obesity. Take note of the Special Report below

**“Special Report”**

**ANNOUNCES RESULTS OF STUDY ON OVERWEIGHT HIGH SCHOOL**

**STUDENTS IN FLORIDA**

*--Special Report Shows an Increase in Overweight Teenagers--*

**TALLAHASSEE** The Florida Department of Health (DOH) today announced the results of a study on Overweight and Related Risk Factors among Florida High School youth show that there was a 28.6 percent increase in the percentage of high school students who were overweight from 9.1 percent in 2000 to 11.7 percent in 2003.

Obesity and being overweight has become an alarming epidemic among our adolescents and being overweight increases an individual’s risk for serious chronic diseases, DOH Secretary John O. Agwunobi, M.D., M.B.A., M.P.H., said. To combat this alarming health issue of obesity, the Department has committed to educating our youth by promoting healthy lifestyles and suggesting healthy behaviors, such as daily exercise and a nutritious diet.

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According to the 2003 Youth Risk Behavior Survey (YRBS), being overweight was more prevalent among male students (16.5 percent) than among female students (8.1 percent). There was no significant difference in the prevalence of being overweight among three racial/ethnic groups. Among non-Hispanic White students, there was a dramatic increase of 45.6 percent in the prevalence of being overweight between 2002 and 2003. This report used self-reported data from the YRBS and the Florida Youth Tobacco Survey (FYTS). Data for the study was collected from students in grades 9-12.

Healthy People 2010, a comprehensive, nationwide health promotion and disease prevention agenda, was used as a guideline in both of DOH's youth surveys. Healthy People 2010 recommend adolescents to participate in vigorous activity for at least 20 minutes a day on three or more days per week. Approximately 61 percent of Florida high school students met this goal in 2003.

Another Healthy People 2010 objective is for 75 percent of children and adolescents to watch no more than two hours of TV a day, but only 57.3 percent of Florida high school students achieved this objective. The Governor's Task Force on the Obesity Epidemic recommended that parents and caregivers seek out and provide options other than television viewing or computer use for children after school.

Unhealthy lifestyles that include physical inactivity and poor nutrition increase the risk of overweight and obesity which, significantly increases the risk for chronic diseases including some cancers, high blood pressure, heart disease, arthritis and diabetes.

In the fall of 2003, Governor Jeb Bush established the Governor's Task Force on the Obesity Epidemic to address the epidemic of obesity in Florida. Many of the 22 recommendations that were developed focused on youth. DOH is implementing initiatives that focus on promoting healthy lifestyles among Florida's youth. The Secretary's Obesity Summits provided solutions for local communities, schools, parents and healthcare to support and reinforce healthy lifestyle practices. Additionally, DOH has promoted Step Up, Florida! A statewide initiative intended to focus specifically on physical activity. During the 2005 Step Up, Florida! event, over 50,000 school-age youth participated.

Several researches have reported that one of the best remedies in the fight against obesity is to maintain a diet high in whole grains, fruits, and vegetables. By changing one's diet the obesity epidemic rate can be decreased and the overall health of the individual can be improved. The media-released page below further substantiates the fact that whole grains have a protective and beneficial effect on health.

Media Release

### Reduce coronary heart disease risk by eating more whole grain foods

Australians can reduce the risk of coronary heart disease by eating more whole grain cereal foods such as mixed grain and whole meal breads, whole grain breakfast cereals, whole meal pasta, brown rice and oats. This recommendation comes from a review of research, conducted by Professor Stewart Truswell, Emeritus Professor of Human Nutrition at the University of Sydney.

Among other findings the research review highlighted four separate studies involving a total of over 65,000 men and 109,000 women in the US and Finland in the late 1990s which showed that as consumption of cereal fiber or whole grain foods increases, the incidence of coronary heart disease declines. "It appears the effect is the result of many different protective factors present in whole grains, rather than a single factor," said Prof. Truswell. "Folate antioxidants, vitamin E and selenium, polyunsaturated oils, phytoestrogens and the cholesterol lowering effect of soluble fiber all contribute.

"The scientific evidence supports claims that whole grain cereal foods may reduce the risk of coronary heart disease. The findings also suggest that fiber independent of fats is an important dietary component in preventing heart disease.

"In America, the US Food and Drug Administration permit food manufacturers to make a health claim on whole grain foods which states that they reduce the risk of heart disease and some cancers, but this is not currently allowed in Australia.

"It is important Australians realize the value of increasing whole grain cereal consumption to reduce the risk of heart disease," said Prof. Truswell. The American studies have shown that as little as one serve of whole grain foods each day can reduce the risk of heart disease.

Adding more whole grain foods to the diet is important because heart disease is the leading cause of death in Australia. It claims one life every ten minutes kills twice as frequently as cancer and is responsible for 24 times more deaths than traffic accidents.

The research review was commissioned by *Go Grains* - a nutrition communication program developed by BRI Australia and supported by Australian grain growers and the Commonwealth government through the Grains Research and Development Corporation. Professor Trowel's research review can be viewed on [gograins.grdc.com.au/for\\_health/index.htm](http://gograins.grdc.com.au/for_health/index.htm). With compliments: *Go Grains* Nutrition Communication Program

### What Are Whole Grains?

The superior health benefits of whole grains are no longer questioned by researchers.

Whole grains in their natural states are the entire seed of a plant. A whole grain is a grain that has not been processed. It consists of the bran, the germ and the endosperm. The

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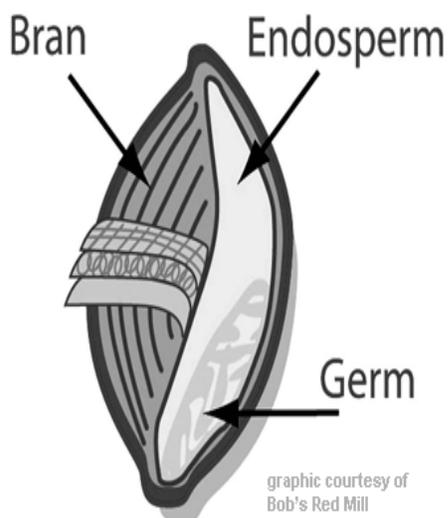
bran forms a fiber-rich outer layer which contains antioxidants, B vitamins and fiber. The germ is the embryo of a new plant and it is a source of vitamins, minerals and polyunsaturated fats. The endosperm supplies most of the carbohydrates in the form of starch. When the whole grains are refined, the bran and the germ are removed. These are removed to give the grains a finer texture and promote longer shelf life. About 25 to 90% of the nutrients such as, dietary fiber, iron, and vitamins are removed when the milling process is complete. (Higgins 2002). Processors add some of the nutrients back to the product through a process known as “enrichment”. The one ingredient that is not added back at all is the fiber. Even though refined grains have some nutrients, whole grains are healthier and provide more protein. The key element to this nutritious disease-fighting food is that the grain be not refined. Whole grains contain all three parts: the bran, the germ, and the endosperm whereas, refined grains contain only the endosperm. fiber, some vitamins, and minerals.

All three parts of the grain must be used in order to get the optimal health benefits. (Hark and Deen, 2005,) A whole grain product as defined by the U.S. Food and Drug Administration is one that contains a minimum of fifty-one percent whole grains by weight. A product must meet this standard to carry the FDA approved health claim that “a diet rich in whole grain foods may reduce the risk of heart disease and certain cancers.” This means that the word “whole grain” should be first on the ingredient list of a product. Whole grains not only contain fiber, minerals, and vitamins, but they also contain two disease-fighting agents called antioxidants and photo chemicals. The Whole Grains Council gives a detailed description of each part of the whole grain:

- Bran- is the multi-layered outer skin of the kernel, and is tough enough to protect the other two parts of the kernel from assaults by sunlight, pests, water, and disease. It contains important antioxidants, B vitamins, and fiber.
- Germ- is the embryo which, if fertilized by pollen will sprout into a new plant. It contains many B vitamins, some protein, minerals, and healthy fats.

Endosperm- is the germ's food supply, which provides essential energy to the young plant so it can send roots down for water and nutrients, and send sprouts up for sunlight's photosynthesizing power. The endosperm is by far the largest portion of the kernel. It contains starchy carbohydrates, proteins, and small amounts of vitamins and minerals.

**Figure 1 The kernel**



Grains vs. Their Refined Flours”, the article contained some detailed facts about refined flour made from wheat. The calorie content of refined white flour actually increases about 10% because of all the ingredients that have been added in an effort to replace those lost by the refining process.

Now that a working definition of whole grain has been outlined, it might be easier to determine the links between whole grains and their role in disease prevention. According to the American Institute of Cancer Research, “Consuming whole grains on a daily basis can result in 17 to 35% fewer deaths from heart disease, and cancer”.

### **Some Links Between Whole Grain Consumption And Disease Prevention**

Whole Grain foods contain essential nutrients and provide individuals, especially children with the carbohydrate fuel their bodies’ need for energy. It also contains soluble fiber which can help kids feel fuller longer. Eating whole grain foods can help prevent children from becoming overweight because it is packed with fiber. According to an American Dietetic Association (ADA) member survey, 93 percent of dietitians polled agreed that the fiber in whole grain cereals such as oatmeal helps children maintain healthy body weight.

The consumption of whole grain is vital not only for kids but for adults as well.

The soluble fiber in oats absorbs a considerable amount of water significantly slowing down the digestive process which results in feeling full longer. The American Diabetes Association recommends that people with diabetes eat grains, beans, and starchy vegetables. Among the grains, the best choice is whole grain such as oatmeal. Research suggests that soluble fibers may help smooth out blood glucose level.

Since the late 1970s, many studies have examined the relationship between dietary fiber and blood pressure. In the majority studies on oats and blood pressure, it has been shown that oats tend to reduce blood pressure. Reductions in blood pressure seem to be in

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response to the increase in fiber intake that came from eating oatmeal. (Quaker Oats Company 2002) A lower blood pressure will in turn have a positive effect on the heart.

Whole grain foods are naturally low in fat. The soluble fiber helps maintain blood sugar levels, prolongs digestion of minerals and maintains blood sugar levels. According to the Mayo Clinic's website, the high fiber content of whole grain foods helps one feel full sooner and longer.

There is substantial scientific evidence to show that whole grains can reduce the risk of certain cancers, Diabetes Mellitus, obesity and coronary heart disease. According to a 2002 review by McIntosh and Jacobs, cancer risks can be reduced 30 to 40% if whole grain foods are eaten on a regular basis. One of the main disease fighting agents of whole grains is dietary fiber and the elements it carries to various cells. Fiber propels food through the body quickly, and at the same time, removes toxins and promotes the growth of healthy flora and fauna in the intestines. It also provides increased satiety, so it is useful for weight control. Whole grains contain phytoestrogens which plays a part in reducing the development of hormone-dependent diseases. Vitamin E is also found in whole grains and prevents the formation of carcinogens. Whole grains also mediate glucose response, which is important in protecting against colon and breast cancers, diabetes and coronary heart diseases. The researchers found that compared to refined grains, whole grains offered more fiber and several nutrients which protected individuals against several diseases including cardiovascular disease.

Other researches have made it clear that in addition to lowering cholesterol and maintaining blood sugar levels, that there is a very positive relationship to eating whole grain foods and maintaining an ideal body weight. Women eating a diet rich in whole

grains had a 50% less chance of being obese according to American Journal of Clinical Nutrition.

In a study, pre-menopausal women ages twenty to fifty ate three to four high fiber muffins per day which were made with wheat bran. The bran decreased their blood estrogen levels by 17% after two months. The lignin in whole grains act as weak hormone-like substances and occupy the hormone receptors in the body which actively protects the body against high circulating levels of hormones such as estrogen. By occupying estrogen receptors and accelerating the metabolism of estrogen in the body, wheat appears to have a dual function in protecting women against some of the leading causes of diet-related deaths.

Morris, et al was one of the first investigators to specifically associate cereal fiber (whole grain) intake and the reduced incidence of CHD. Liu et al. studied women in the Nurse's Health Study for 10 years, from 1984 to 1994. He found that an increase of whole grains in the diet may protect against CHD. Anderson, et. al. analyzed several studies in his article entitled "Whole Grain and Heart Disease" published in Journal of the American College of Nutrition (2002) and reported the following ; "...From these results it is clear that whole grains rather than cereal, fruit or vegetables, are having the most consistent impact on risk for CHD. Total fiber also appears to have a strong protective effect". "... After a pooling of studies, the strongest association was between whole grain and whole wheat bread intake and the risk of heart disease." "Beneficial associations between fiber intake and CHD have been found both in men and women".

Of 29 studies that were reviewed by Anderson et. al, it was reported that "consumption of whole grains and total dietary fiber had the strongest and most

consistent association with protection from CHD. The highest levels of total fiber were also associated with reductions in CHD risk. The presence of antioxidants, phytoestrogens and other photochemicals, and polyunsaturated fatty acids in whole grain products may contribute to their protective effects on coronary heart disease. Jacob and colleagues reported that high levels of whole grain intake have much greater protective effects than high levels of refined grain product. Dietary fiber, which is abundant in whole grains remain the leading element which accounts for the significant effect on the reduction of coronary heart disease.

Several recent survey data have indicated that more than 50% of all American adults are overweight or obese. Likewise, it has also been reported that there is a correlation between obesity and the rise in Type 2 Diabetes Mellitus. Obesity, especially increased abdominal girth, has consistently been reported as an underlying cause of type 2 diabetes. Several studies have reported a positive effect of whole grain on Type 2 Diabetes Mellitus. (Dr. Simin Liu 2002) reviewed studies related to whole grain foods and Diabetes Mellitus and reported that “recent epidemiological data indicate that diets rich in high-fiber whole grains are associated with lower risk of coronary heart disease and type 2 Diabetes Mellitus. The data is consistent with results from recent metabolic experiments, suggesting favorable lipid profiles and glycemic control associated with higher intake of whole grains but not refined grains.

It is therefore a wise decision for health professionals to educate the consumer on the benefits of whole grains versus refined grains. Dr. Simin Liu concluded that “replacing refined grains and potatoes with whole grains and minimally processed products, along with the increasing intake of fruits and vegetables, offer a simple strategy

to lower dietary glycemic load and insulin demand that can ultimately reduce the risk of both type 2 Diabetes Mellitus and Coronary Heart Disease”.

Many short term epidemiologic experiments suggest a positive role of whole grain in the fight against the epidemic of obesity. Several short term studies have suggested that long-term consumption of whole grains may increase satiety and reduce energy consumption and, thus contribute to weight loss, Other studies have suggested that whole grains, not refined grains, was inversely associated with body weight and body fat reduction. (Ludwig, et. al 1999).

The inherent high dietary fiber of most whole grains may help to prevent weight gain by increasing appetite control through delaying carbohydrate absorption. (Porikos, et. al.1982). According to McKeown, et. al) alternately, the lower postprandial glucose and insulin levels associated with higher whole grain intake may lead to weight loss, especially among overweight and obese individuals.

There is mounting supporting scientific evidence that whole grains can help fight obesity. Kansas State University undertook a 12-year study of middle aged professional female nurses. Results are presented in the American Journal of Clinical Nutrition. This study concluded that, “weight gain was inversely associated with the intake of high-fiber whole grains. Those women who ate more whole grains consistently weighed less than those who consumed less whole grain. The women in this research who were most overweight benefited the most from eating more whole grains. There is a large body of evidence which supports the positive effects of whole grains on disease treatment and prevention.

Whole grains became part of the human diet about 10,000 years ago and most of the world's population has relied on whole grains as a main part of their diet. Eating whole grains has been shown to reduce the risks of cancer, heart disease, stroke, diabetes and obesity.

### **Can The Consumer Identify A “Whole Grain” Product?**

The consumption of whole-grain foods hinges on getting meaningful messages to consumers about why they should incorporate these foods into their existing diets.

Dietitians and other health professionals play an important role in promoting whole-grain foods to clients. In an unpublished survey which was conducted by General Mills, 73% of dietitians thought that consumers were not eating enough whole grains; however, 61% thought that the benefits of bran or fiber were the same as for whole grains. In focus group interviews conducted by the United States Department of Agriculture, health professionals thought that whole grains were important but felt unsure of their ability to explain the benefits or help clients choose whole-grain products.

A study was done to test the hypothesis that these components would be significant in explaining dietitians' intentions to promote whole-grain foods. As was shown in this study, the theory of planned behavior proposes that the intention to promote whole-grain foods was influenced by (a) attitude, promoting whole grains will result in health benefits for clients, (b) normative beliefs, beliefs of other dietitians and health professionals and the motivation to comply with those beliefs, and (c) perceived behavioral control perception of barriers to promoting whole-grain foods and self-efficacy.

A total of 776 surveys of 2,000 were returned, resulting in a low response rate of 39%. Attitudes toward the benefits of whole grains were very positive, with greater than

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69% agreeing or strongly agreeing that background research substantiates the benefits of whole grains for normal bowel function and for the prevention of heart disease, diabetes, and cancer. Almost all (97%) of the dietitians believed that it was likely or very likely that health professionals thought they should promote whole grains. A majority (89%) wanted to comply with this normative belief, suggesting that the influence of other dietitians and health professionals is highly predictive of intention.

In general, knowledge related to correctly identifying a whole-grain product was low. Only 60% were correct in identifying whole-grain products according to a corresponding sample food label. Only 21% identified the current recommendation, although 42% indicated they did not know there was a recommendation. Significant variance was not additionally explained by variables external to the theory of planned behavior: knowledge, exposure to whole-grain information, or experience as a dietitian.

Results from the current study indicate that future education for dietitians should focus on increasing self-efficacy regarding the ability to promote whole grains. Because normative beliefs were very important in predicting intention, continuing education efforts within groups or overseen by supervisors may be helpful. Although not predictive of intention, increasing knowledge about how to identify whole-grain products and increasing awareness of the whole-grain recommendation may also be needed to improve self-efficacy as part of continuing education for dietitians.

It has been found that only limited correct knowledge about the benefits of whole grains exist among consumers. It is also believed that health professionals do not always stress and or incorporate this topic in their client education. There is a need to develop child targeted education campaigns since children sometimes influence household food

purchases. Education and promotion efforts of whole grains are necessary to overcome the confusion of competition from food manufactures that use several different labels to indicate that a product contains whole grain.

Health professionals and nutritionists can play a big role in educating consumers on the benefits of whole grains in the diet because people often turn to them for advice on nutrition and disease prevention. A link is needed between health professionals, industry experts and the media for an outreach educational campaign to educate consumers on the benefits of whole grains in the diet. Additional research is also needed to better understand the relationship between whole grains and health.

### **Ways To Identify “Whole Grain” Products**

There are several ways to identify a food that is made from whole grains. The brown color of a product is a common way used by many consumers to identify whole grain products. However this method is not a reliable one. Bread and other products can be colored with food coloring or molasses and may contain little or no whole grain. A “whole grain product” contains all three parts of the kernel. Refining removes the bran and the germ leaving only the endosperm so 25% of the grain’s protein is lost along with 7 key nutrient To make it easier for individuals to identify foods that are made with “whole grains”, The Whole Grains Council has created an official packaging symbol called the “Whole Grain Stamp” which helps consumers identify real whole grain product. The stamp has been introduced on whole grain products in supermarket shelves since mid 2005. However, the use of this stamp has not been well publicized. In addition,

the consumer might not understand how to translate this stamp into practice when purchasing foods. (See stamp in Figure 2).

**Figure 2 Whole Grain Stamps**

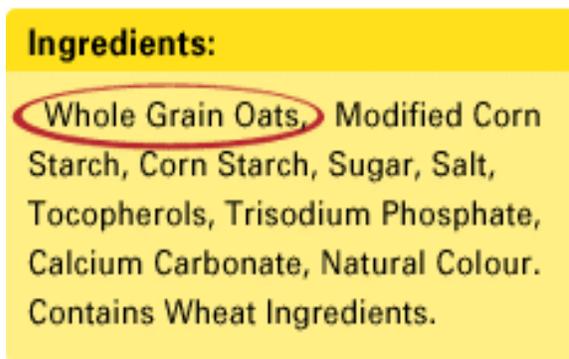


Good Source	Excellent source	100% Excellent Source
Half serving of	Full Serving of	Full Serving and all
Whole grains	Whole Grains	Ingredients are Whole Grains

Many companies have designed and have been using their own symbols to indicate if a product is made from whole grain. The use of so many symbols only further confuses the consumer. If the consumer understands the meaning of the “whole grain Stamp” it should be easy to find a product which contains three servings of whole grains. The consumer can either choose three foods with the “Excellent Source Stamp” or select six foods labeled “Good Source”. The “Excellent Source Stamp” tells consumers that a food contains a full serving of whole grain in each labeled serving, while the “Good Source” Stamp contain half of a serving. Whole grains come in several different forms. One must read labels to know if the product is made from whole grains. Whole grain (i.e. whole wheat) must be the first ingredient listed. **(See figure 3)** The first ingredient that is mentioned is the ingredient that is in the largest quantity of that product. Therefore, if

the first ingredient contains the word “whole grain” the product is predominantly made of whole grains. If only the second ingredient listed is a whole grain, the product may contain as little as 1% or as much as 49% whole grain (in other words, it could contain a little bit of whole grain, or nearly half) (Reaping 2005). One can also check the dietary fiber content of the label to make sure the product has a minimum of 2 grams of fiber per serving. Another way by which whole grain can be identified in a product is to look for products that have the FDA regulated health claim: “Diets rich in whole grains and other plant foods and low in fat, saturated fat and cholesterol may reduce the risk of heart disease and some cancers.”

**Figure 3 Ingredient Label**



There are some other ways to identify if a food is made with whole grains. Products advertise as “whole grains” sometimes use a small grain symbol, or the word “whole grain” is stated on the package. (See figure 4) The consumer should look for words that say whole grain, 100% whole wheat, oatmeal, wild and brown rice. If these terms appear on labels, it means that the product contains all the nutrients of the whole grain. Words such as, bran, multi-grain, cracked wheat, stone ground, and seven grain mean that some

parts of the grain are missing, and the product is not necessarily made from all whole grains. There are many names on products that can be deceiving.

Figure 4 Whole Grain Symbols



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Another way to determine how much whole grain is in a product is to check the Nutrition Fact Label. Choose products that have a high percentage of fiber in “Daily Values” section of the product label. See figure 5

<b>Nutrition Facts</b>	
Serving Size 1/3 Packet (17g)	
Servings Per Container 30	
<b>Amount Per Serving</b>	
<b>Calories 70</b>	<b>Calories from Fat 15</b>
<b>Total Fat</b>	1.5g
Saturated Fat	0.5g
<b>Cholesterol</b>	0mg
<b>Sodium</b>	80mg
<b>Total Carbohydrate</b>	13g
<b>Dietary Fiber</b>	1g
Sugars	5g
<b>Protein</b>	1g
<b>% Daily Value</b>	
Protein 6%	Vitamin A 70%
Vitamin C 0%	Calcium 6%
Iron 10%	Thiamin 20%
Riboflavin 20%	Niacin 20%
Vitamin B6 25%	Folate 15%
Phosphorus 8%	Magnesium 15%

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If there is a large quantity of fiber, then one is getting a large quantity of whole grains. Here are a few more helpful descriptions from the article “Healthful Whole Grains” written by Mary Heck Higgins:

- 100% wheat- This phrase means that the only grain contained in the product is wheat. The food may not contain whole grains
- Multi-grain- A word that means the product contains more than one kind of grain. The food may not contain whole grains
- Stone Ground- This term refers to grain that is coarsely ground and may contain the germ, but not the bran. Often refined flour is the first ingredient, not whole grain flour
- Pumpernickel- Is coarse dark bread, made with rye, and wheat flours. In the United States it usually does not contain mostly whole grain flours.

### **Ways To Incorporate Whole Grain Into The Diet**

It seems that one of the hardest things for most people, especially those who lead a very busy lifestyle is eating healthy. A balanced diet is very important in order to maintain good health and ward off diseases. Better health begins with good nutrition and this includes eating the correct number of servings of whole grains on a daily basis.

There are many ways to incorporate whole grains into the diet. Here are some suggestions. In the article “Healthful Whole Grains”, Mary Meck Higgins, suggests these ideas:

- Since there are over thirty whole grain cereals, choose either an easy ready-to-eat or ready-to-cook cereal for breakfast

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- Pour some dry cereal into a bag, or grab a whole grain cereal bar as a snack
- Choose whole grain breads, tortillas, bagels, pita pockets, and rolls
- Try whole grain muffins or corn bread made with whole grain corn meal
- Pop popcorn
- Add whole grains to mixed dishes. Try adding pearl barley, wild or brown rice to soups, stews, or casseroles
- Add oats to cookies or other desserts
- Try substituting whole grain flour for  $\frac{1}{4}$  to  $\frac{1}{2}$  of the white flour called for in recipes
- Choose whole grain pasta (macaroni, spaghetti, noodles), pancakes or waffles for a change of pace
- Try a hot or cold whole grain side dish (such as pilaf or stuffing) using brown or wild rice, kasha, bulgur, or pearl barn

According to health experts, there are many ways whole grains can be incorporated into a person's diet. Simple small transitions from refined products to whole grain products, done daily will change ones diet into a healthier way of eating. If changing to whole grains is a problem on the budget, then just replace one refined item with one whole grain item at a time until it doesn't affect costs.

### **Whole Grains: How Much Is Recommended?**

It is important to mention all the benefits of adding whole grains to our diets. Whole grains reduce the risk of many major diseases such as heart disease and high cholesterol, bowel disorders, stroke, high blood pressure, obesity, and Type 2 diabetes.

Whole grains also satisfy hunger and provide the energy our bodies need. The Food Guide Pyramid advises us to eat 6 to 11 servings of grains a day, with several being whole grains (Higgins 2002).

The new 2005 Dietary Guidelines for Americans recommend that all adults eat half of their grains as whole grains- that is 3 to 5 servings of whole grains daily. The health evidences and benefits of whole grains in the diet have also convinced The American Heart Association, The Department of Health and Human Services, and The Healthy People 2010 Report to recommend at least 3 servings of whole grains per day. Yet the average American eats less than one daily serving of whole grains, and over 30% of Americans never eat whole grains at all (Reaping 2005).

The USDA recommends getting 3 ounces of whole grain each day which is roughly ½ of the overall recommendation of breads and cereals. The consumption of whole grains has been shown to lower cholesterol is generally linked to the maintenance of good health. Everyone should do as directed by the USDA: include a minimum of 3 ounces of whole grain in their diet. Whole grains can be crushed, rolled, flaked and cooked without losing their nutritional value. Whole grain foods contain the entire grain which is packed with essential nutrients. Each part of the grain contributes important nutrient, but the “whole grain” offers the most nutritional benefits.

### **Conclusion**

Future metabolic studies can help to increase our understanding of the effects of grains on body processes. Disease prevention and intervention studies can also expose more protective roles of whole grains and their relationships with other foods. The professional organization such as American Heart Association, and The American Cancer

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Society and The American Diabetes Association need to form more partnerships with researchers to enable larger scale studies on the effects of grains on specific diseases. Research shows that with better life choices, people can reduce the development of many types of cancers, coronary heart disease, obesity and many other diet related diseases.

The earlier Adventist Health Studies in 1960 and 1976 were among the first epidemiological studies to discover many links between diet and health. In November 2005, The National Geographic Magazine published an article titled “The Secrets of Longevity” in this article it was pointed out that an individual who practiced the teachings of the Seventh-day Adventist Faith are known for living longer than the average non-Seventh-day Adventist. Several studies have reported that the average Seventh-day Adventist lives about 10 years longer than a non-Seventh-day Adventist.

One of the factors cited for good health and longer life of the practicing Seventh-day Adventist is their plant based diet which is usually high in grain products. The Adventist health Study-1 demonstrated that 5 simple diet and lifestyle habits have extended their lives by as much as 10 years in both men and women. These are: Regular exercise. Eating a plant-based diet. (rich in whole grains). Eating small amounts of nuts regularly. Maintaining normal body weight and not smoking.

If Americans incorporate whole grains into their eating habits, many diet-related diseases can be minimized and prevented and people will live healthier and longer lives. For people who already have health problems, making dietary changes can improve the quality of life. This is done, by improving the immune system, which in turn supplies the stamina to fight disease. It was Thomas Edison who said “The doctor of the future will give no medicine, but will interest his patient in the care of human frame, in diet and in

the cause and prevention of disease. Hippocrates also said, “Let your food be your medicine, and your medicine your food”.

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Published by the Forum on Public Policy

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