

Health and the Dietary Guidelines



GETTING WHOLE GRAINS TO 3

January 18-20, 2006, Orlando

WHOLE GRAINS AND HEALTH



Whole grain research continues to show that the phytonutrients, vitamins, minerals, antioxidants and fiber in whole grains reduce risk of heart disease, strokes, certain cancers and obesity. Because of this compelling evidence, the 2005 Dietary Guidelines recommend that all adults increase their consumption of whole grains, on average, threefold.

This section contains the following references on whole grains and health and on the Dietary Guidelines:

Health Studies

- A sampling of six research studies from our Scientific Advisory Committee and their colleagues, adding to the weight of evidence supporting the health benefits of whole grains

Whole Grain Consumption

- Whole Grain Consumption at a Glance
- Consumer Attitudes Toward Whole Grains
- Whole Grain Consumption is Up in 2005
- How is Whole Grain Consumption Measured?

The 2005 Dietary Guidelines and Whole Grains

- How Much is Enough?
- How Much is a Serving? What is an Ounce-Equivalent?
- Dietary Guidelines Wording on Whole Grains
- Guidelines' Evolution: the Government Slowly Recognizes Whole Grains

Scientific Advisors to the Whole Grains Council

- Thumbnail biographies of the nationally-known experts who support the WGC on scientific matters.

WHOLE GRAINS REDUCE HEALTH RISKS



Recent epidemiological data and clinical studies continue to show a strong positive link between whole grain intake and a variety of important health benefits. People who eat more whole grain foods have better cardiovascular, weight, and blood sugar profiles. Many of these studies are published by members of the Whole Grains Council's Scientific Advisory Board; their names are in bold.

Cardiovascular Disease

- **Pauline Koh-Banerjee**, Eric Rimm, Frank Hu and others at the Harvard School of Public Health devised improved methods of measuring whole grain, germ and bran consumption. After studying the eating patterns of 42,850 middle-aged men for eight years, the team concluded that whole grain consumption reduced the risk of heart disease. (*American Journal of Clinical Nutrition* 2004; 80: 492-499)

- A team led by Lyn Steffen and including **David Jacobs** studied more than 15,000 middle-aged men for eleven years. Those in the quintile with a mean intake of three daily servings of whole grain had a 23-28% lower risk of total mortality and coronary artery disease (CAD) than did those in the quintile consuming almost no whole grains (mean 0.1 serving per day). (*American Journal of Clinical Nutrition* 2003; 78: 383-390.)

Weight Management

- At the Harvard School of Public Health, **Simin Liu** and colleagues found that women who ate three or more servings of whole grains daily gained significantly less weight over a twelve-year period than woman who ate refined grains. (*American Journal of Clinical Nutrition*, 2003; 78: 920-7)

- In a similar study of over 27,000 men followed for eight years, a team led by **Pauline Koh-Banerjee** found that for every 40g per day increase in whole grain intake, long term weight gain was reduced by 1.1kg. The data showed that other components in whole grains beyond bran and fiber may influence weight gain in the long term. (*American Journal of Clinical Nutrition*, 2004; 80: 1237-1245)

Diabetes

- A University of Minnesota team including **Len Marquart** and **David Jacobs** examined three prospective studies including 160,000 people, and found that those consuming the most whole grains reduced their risk of diabetes by 21-27%. Whole grain consumers also had better fasting insulin levels. In feeding studies, non-diabetics showed increased insulin sensitivity with increased whole grain consumption, and diabetics showed improved glucose control. (*Proceedings of the Nutrition Society*, 2003; 62(1): 143-9)

- Higher intakes of whole grains were associated with improved insulin sensitivity in a study of 978 middle-aged adults carried out by Angela Liese of the University of South Carolina, aided by colleagues including **Len Marquart**. Better insulin sensitivity is widely recognized as a risk-reduction factor in Type 2 diabetes and heart disease. (*American Journal of Clinical Nutrition* 2003; 78(5): 965-971)

See the end of this section for a full list of WGC Scientific Advisors.

WHOLE GRAIN CONSUMPTION AT A GLANCE

Chart 1: Whole Grain Servings Consumed in US

*Only 8% consume 3 or more servings per day, while 42% of Americans eat no whole grains.*¹

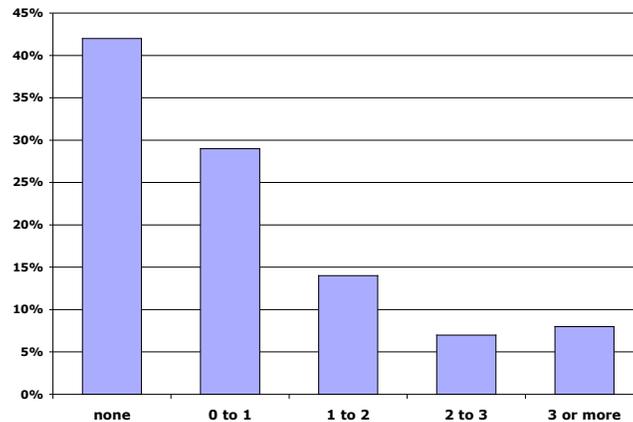
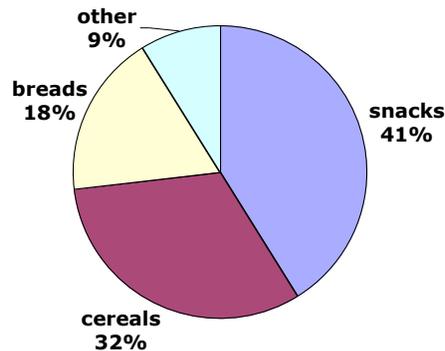


Chart 2: Whole Grain Consumption by Product Type

*Snacks and breakfast cereals together account for almost three-quarters of whole grains consumed.*¹



- Of all grains consumed by American adults, only 13% are whole grains.²
- Half of all breakfast cereals are considered whole grain, and almost half of snacks.¹
- Average whole grain intake based on 1999-2000 data fell considerably short of the three or more servings recommended daily:²

All adults	.85 servings per day
Adult males	.93 servings per day
Adult females	.78 servings per day
- Only 5% of American adults eat half their grains as whole grains. 81% eat a quarter or less of their grains as whole grains.¹

1. NHANES 1999-2002 as cited by Linda Cleveland, USDA Supervisory Nutritionist, at the "Whole Grains and Health" conference in Minneapolis in May 2005

2. NHANES 1999-2000 as cited by Eric Hentges, CNPP Director, at the "Whole Grains Go Mainstream" conference in New Orleans in November 2004.

CONSUMER ATTITUDES TOWARD WHOLE GRAIN

Oldways and the Whole Grains Council regularly track consumer attitudes toward whole grains. This page is a collection of data from academic research, marketing reports and consumer surveys from a wide variety of sources.

Consumers are eager for whole grains:

- “Whole Grain” and “Low Fat” were in a statistical tie as the most sought-after health claim on a package, beating out options like “low calorie” and “high calcium.”¹
- 58% of consumers would eat whole grains to reduce health risks (only fish (59%), broccoli (61%) and orange juice (63%) ranked higher.²
- 76% of consumers say whole grains are important for health. In the same study, 42% of respondents said that taste was most important in choosing a product, while 24% cited nutrition as most important.³

More consumers than commonly assumed already enjoy whole grains:

- Less than half of all bread consumed is white bread. One recent report put white bread at 43% of the market, with other breads – bran, multi-grain, whole grain, oat, whole wheat, etc. – at 57%.⁴
- In a recent research study, 63% of consumers agreed “a lot” and 28% agreed “a little” when asked if they thought whole grains taste good. After the group was educated about the health benefits of whole grains, their perceptions improved even further – with 79% agreeing strongly that whole grains taste good, and 20% agreeing a little.⁵
- Only 16% of Americans say the perceived taste of whole grains is a “big challenge” to including more whole grains in family meals. 30% say it’s a small challenge, while 50% say it’s not a challenge at all.⁶

Consumers are unaware of the whole grain gap in their own diets:

- 71% of consumers think they get enough whole grains, when in fact only about 10% get the recommended three servings per day.⁷
- Less than a fifth of American adults recognize that at least one-half of their total daily grain intake should be composed of whole grains.⁶

Even many health professionals don’t understand whole grains:

In a survey of registered dietitians:

- 27% of RDs thought Americans in general eat enough whole grains.⁸
- 40% of RDs could not identify common whole grain foods.⁵
- 61% of RDs thought that whole grains were the same as bran or fiber.⁸

1. 13th Annual Shopping for Health Survey, Rodale Inc and Food Marketing Institute, 2004.

2. Steve Sanger, CEO of General Mills, presentation at the “Whole Grains & Health” conference in Minneapolis, May 2005.

3. ConAgra study cited by Judi Adams of the Grain Foods Foundation in her presentation at the “Whole Grains & Health” conference in Minneapolis, May 2005.

4. “The U.S. Market for Whole Grain/High Fiber Foods,” April 2005, MarketResearch.com

5. Mark Kantor, PhD, Asst. Professor of Nutrition, University of Maryland, presentation at the “Whole Grains & Health” conference in Minneapolis, May 2005.

6. “Whole Grains at Home Meals” survey of 2051 adults, December 2005, sponsored by the Whole Grains Council and Knorr®-Lipton® Sides™ Made with Whole Grains.

7. Adalia Espinosa, MS, RD. WIC Nutrition Coordinator, General Mills Bell Institute of Health and Nutrition, presentation at the “Whole Grains & Health” conference in Minneapolis, May 2005.

8. Marla Reicks, PhD, RD, Department of Food Science and Nutrition, University of Minnesota, presentation at the “Whole Grains & Health” conference in Minneapolis, May 2005

WHOLE GRAIN CONSUMPTION UP IN 2005



According to ACNielsen data, sales of whole grain products rose markedly in 2005.

Sales Q1 2005 compared to Q4 2004:

Category	Increase
Frozen whole grain prepared foods	+ 168%
Whole grain pasta	+ 27.4%
Whole grain cereal	+ 8.3%
Whole grain bread & baked foods	+ 7.4%

Sales 12 months ending June 30, 2005 compared to previous 12 months:

Category	Increase
Whole grain cookies	+ 1364%
Whole grain muffins	+ 287%
Whole grain buns (fresh)	+ 23%
Whole grain bread & baked foods	+ 18%
Whole grain crackers	+ 10%
All products with whole grain claims	+ 6% (52 wks ending 8/13/05)

Whole Grains Council members have experienced similar healthy sales increases throughout 2005, as reported below.

Our 100% rye breads — our Rye-Ola breads — are up 8.3% for 2005, as compared to 2004. These are very dense, European-style whole grain breads, and not as widely distributed as some of our lighter breads; we're surprised and delighted with this increase.

Joan Rubschlager, Rubschlager Baking Corp., 773-826-1245

According to Spins data for 52 weeks ending November 5, 2005, natural cold cereal in the conventional channel is growing at 12.8%. Nature's Path as a Brand is growing at 23.5%, almost double that of the category. We have 12 of the top 100 selling cereals, 10 of which are whole grain with an average growth rate of 46.68%.

Maria Emmer-Aanes, Director of Marketing, Nature's Path Foods, 604-248-8856

We are very pleased with the performance of our wholegrain cereal this past year, with sales up over 24%. We anticipate even stronger growth in 2006, with the addition of our two new cereals, Organic Weetabix Crispy Flakes & Organic Weetabix Crispy Flakes & Fiber, both an excellent source of whole grains.

Kent Spalding, Director of Marketing, Barbara's Bakery, 707-765-2273

Hodgson Mills, a leading manufacturer of whole grain pasta, reports that as a category, total Pasta unit sales (individual packages) in the U.S. were down 2.8% for the 12 month period ending May 2005. Hodgson Mill's pasta sales were up 20.3% during the same time period.

Paul Kirby, VP Sales & Marketing, 217-347-0105

HOW IS WHOLE GRAIN CONSUMPTION MEASURED?

Tracking Americans' consumption of foods is an inexact science at best. There are three main sources of consumption data available, each with its own strengths and drawbacks. Only one of these sources – supermarket scanner data – is compiled quickly enough to have already reported the rise in whole grain consumption during 2005.



What America Eats (NHANES)

Before 2002, USDA and DHHS (the Department of Health and Human Services) carried out separate food consumption surveys. USDA's was known as the Continuing Survey of Food Intakes by Individuals (CSFII), while DHHS's was called the National Health and Nutrition Examination Survey (NHANES). Now the two are combined under the name "What America Eats" as part of NHANES, and USDA and DHHS work together to collect and analyze the data.

Survey participants are asked to report everything they ate on two consecutive days. Data are then separated into food components and analyzed, so that a grilled cheese sandwich, for instance, is logged as specific amounts of bread, cheese and butter/margarine. NHANES relies on subjects' own descriptions of foods and quantities and is therefore widely thought to *underestimate* both total calories and less healthy foods. Data collected in 2001-2002 are now being released as reports; we summarized some recent NHANES data on the page "Whole Grain Consumption at a Glance." *For more information, see www.cdc.gov/nchs/about/major/nhanes/faqs.htm.*



Food Supply Data (FSD)

The Economic Research Service (ERS) of the USDA annually tracks the amount of food available for human consumption, by logging and analyzing beginning and ending inventories, exports, etc. Per capita consumption is derived by dividing available food quantities by the total US population on July 1 of a given year. This is also known as "disappearance data." Although ERS adjusts for losses and waste, FSD is usually thought to *overestimate* consumption.

FSD also does not log several categories of whole grain foods not made from flour, such as Shredded Wheat, popcorn, and some corn chips, and does not include less common grains like amaranth, buckwheat, millet, kamut, quinoa, spelt and triticale. *For more information, see www.ers.usda.gov/data/foodconsumption/.*



Supermarket Scanner Data

Private research firms like IRI and Nielsen regularly capture sales data from supermarket scanners. These data are often the most reliable and up to date, but they also have limitations. Scanner surveys usually do not include fresh bakery items, nor do they include stores with under about \$2m in sales – leaving out smaller specialty groceries and health food stores where many whole grains are sold. Some supermarket scanner data appear on the page "Whole Grain Products: Sales Rise in 2005"

For more information see:

Information Resources (IRI): www.infores.com/public/us/default.htm

AC Nielsen: www2.acnielsen.com/site/index.shtml

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2005 DIETARY GUIDELINES AND WHOLE GRAINS

The new Dietary Guidelines recommend different amounts of calories and foods according to an individual's age and activity level. The servings of whole grains recommended for most (typically sedentary) Americans are in Table 1 below:

**Table 1: Minimum Whole Grain and Maximum Total Grain Servings
2005 Dietary Guidelines for Americans Recommendations**

age	Range of servings girls and women	Range of servings boys and men
2-3	1.5 – 3	1.5 - 3
4-8	2 - 4	2.5 - 5
9-13	3 - 5	3 - 6
14-18	3 - 6	3.5 - 7
19-30	3 - 6	4 - 8
31-50	3 - 6	3.5 - 7
51+	3 - 5	3 – 6

2005 Dietary Guidelines for Americans.

The first number in the "range of servings" column is the minimum whole grain servings; the second is the maximum total grain servings.

According to the Guidelines, the Whole Grains figure (the first of each pair of numbers in the table above) "is the minimum suggested amount of whole grains to consume... More whole grains up to all of the grains recommended may be selected, with offsetting decreases in the amounts of other (enriched) grains."

The Guidelines define a serving as any of the following amounts, for products where virtually all the grain ingredients are whole grains:

- 1/2 cup cooked rice, bulgur, pasta, or cooked cereal
- 1 ounce dry pasta, rice or other dry grain
- 1 slice bread
- 1 small muffin (weighing one ounce)
- 1 cup ready-to-eat cereal flakes

The Guidelines do not offer any suggestions for finding and enjoying whole grains in products that mix whole grains with enriched/refined grains.

The most reliable way to buy these foods is to trust the Whole Grain Stamp to be sure you're getting your recommended whole grain servings. The "Excellent Source" and "100% / Excellent Source" Stamps denote foods offering a full serving of whole grains, while the "Good Source" Stamp identifies those foods offering a half serving of whole grains.

HOW MUCH IS A SERVING? WHAT IS AN "OUNCE-EQUIVALENT?"

The Dietary Guidelines actually say Americans should eat a specified number of "ounce-equivalents," instead of servings. Because "ounce-equivalent" is a confusing term for many people, some clarification is sorely needed.

Background. The USDA defines "a grain serving" as "the grams of grain product containing 16 grams of flour." (*Pyramid Servings Database, 3.2.2.1 (p. 3-13)* at www.ba.ars.usda.gov/cnrg/services/section2.pdf.)

Consumers, however, don't eat grams of flour. They eat complete foods containing many ingredients – and the whole grain content of these foods varies widely. So it's often difficult to know how much food to eat to be sure of consuming 16g of whole grain for each serving.

Eating an ounce to get 16g of whole grain. An ounce is equal to 28.35 grams. For many prepared whole grain foods like cereals, breads and muffins, each ounce of food contains about 16g of whole grain. The remaining 12+ grams are made up of water, sugar, fat, and other ingredients. Bread, for instance, tends to be about 40% moisture. A typical one-ounce (28.35g) slice of bread, then, would get about 11g of its weight from water, leaving just 17g of "actual ingredients." Most of this is grain, so a slice made entirely with whole grain flour would contain about 16g – one serving – of whole grain.

When the Dietary Guidelines advise eating a specific number of "ounce-equivalents," they are advising you to eat about an ounce of most whole grain foods in order to be certain you get the 16g or more of whole grain that constitute a minimum serving. The "ounce-equivalent" is meant to be a handy rule-of-thumb for consumers.

However, the ounce-equivalent rule-of-thumb only works reliably with products made entirely from whole grains. Some popular new breads, for example, are made with a mixture of refined and whole wheat flour, with as little as 4g of whole grain in each one-ounce slice. Consumers eating three "ounce-equivalents" of this bread would get only 12g total of whole grain, rather than the 48g minimum (3 servings of 16g each) recommended by the Dietary Guidelines.

The solution? Trust the Stamp. The Whole Grains Council has developed a consumer-friendly solution to address this confusion: the Whole Grain Stamp. This stamp system clearly indicates whole grain content to consumers, and makes it quick and easy to recognize products to reach the recommended 48g or more (3 servings) of whole grains each day. Consume three foods marked "Excellent Source" or six marked "Good Source" and you're sure to "get your whole grains to 3."

Good Source
A half serving
of whole grains



At least 8g
whole grain per la-
beled serving

Excellent Source
A full serving
of whole grains



At least 16g
whole grain per
labeled serving

100% Excellent Source
A full serving
of whole grains



At least 16g whole grain
per labeled serving
AND no refined grain

DIETARY GUIDELINES WORDING RECOMMENDING WHOLE GRAINS

In addition to the recommendations on servings, the Dietary Guidelines include several paragraphs on whole grains, including these three.

"In addition to fruits and vegetables, whole grains are an important source of fiber and other nutrients. Whole grains, as well as foods made from them, consist of the entire grain seed, usually called the kernel. The kernel is made of three components – the bran, the germ, and the endosperm. If the kernel has been cracked, crushed, or flaked, then it must retain nearly the same relative proportions of bran, germ, and endosperm as the original grain to be called whole grain.

"In the grain-refining process, most of the bran and some of the germ is removed, resulting in the loss of dietary fiber (also known as cereal fiber), vitamins, minerals, lignans, phytoestrogens, phenolic compounds, and phytic acid. Some manufacturers add bran to grain products to increase the dietary fiber content. Refined grains are the resulting product of the grain-refining processing. Most refined grains are enriched before being further processed into foods. Enriched refined grain products that conform to standards of identity are required by law to be fortified with folic acid, as well as thiamin, riboflavin, niacin, and iron. Food manufacturers may fortify whole-grain foods where regulations permit the addition of folic acid. Currently, a number of whole-grain, ready-to-eat breakfast cereals are fortified with folic acid...

"Consuming at least 3 or more ounce-equivalents of whole grains per day can reduce the risk of several chronic diseases and may help with weight maintenance. Thus, daily intake of at least 3 ounce-equivalents of whole grains per day is recommended by substituting whole grains for refined grains. However, because three servings may be difficult for younger children to achieve, it is recommended that they increase whole grains into their diets as they grow. At all calorie levels, all age groups should consume at least half the grains as whole grains to achieve the fiber recommendation. All grain servings can be whole-grain; however, it is advisable to include some folate-fortified products, such as folate-fortified whole-grain cereals, in these whole-grain choices." (*page 25, 2005 Dietary Guidelines for Americans*)

The final Dietary Guidelines were based on evidence gathered by the Dietary Guidelines Advisory Committee. This committee strongly recommended that "transition foods" containing both whole and refined grains offer the most promised in increasing consumption of whole grains. This committee advised,

"In practice, when a person selects a mixed grain bread or cereal, he gets *both* a whole grain portion and an enriched grain portion. Because of the desirable baking properties of enriched flour, these mixed grain products are often appealing to consumers who do not choose to eat 100 percent whole grains. ... While many are not entirely whole grains, they provide some whole grains in the diets of those who might not otherwise select any. The proposed Pyramid food patterns suggest that half of all grain servings be whole grains. This approach allows these mixed products to fit readily into a person's food choices." (*2005 Dietary Guidelines Advisory Committee Report, Appendix G2, page 16-17*)

The Whole Grain Stamp system developed by the Whole Grains Council and now in use by scores of food companies is the key to assisting consumers desirous of increasing their whole grain consumption.

THE US GOVERNMENT SLOWLY RECOGNIZES WHOLE GRAINS

The official US Dietary Guidelines have slowly evolved. Whole grains were first mentioned in its recommendations in 2000, and were accorded much great emphasis in the new 2005 Dietary Guidelines for Americans.

1980, 1985 **“Eat foods with adequate starch and fiber.”**

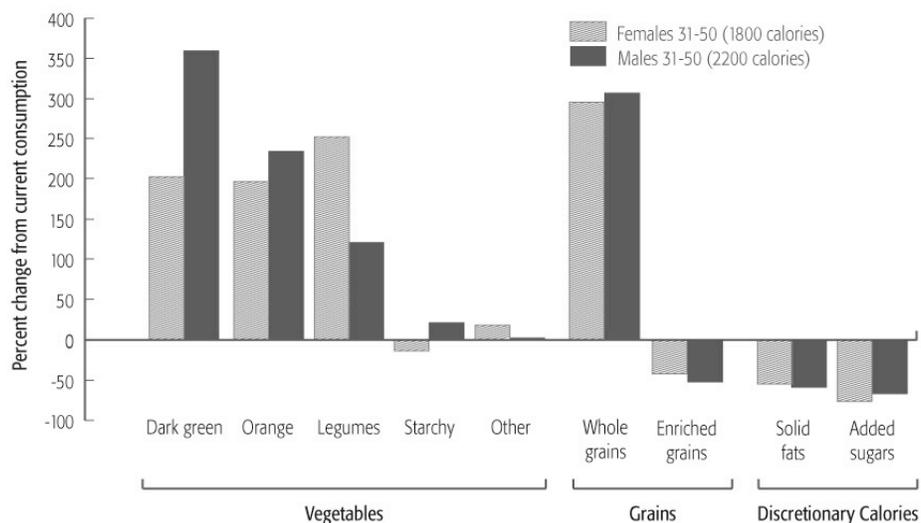
1990 **“Choose a Diet with Plenty of Vegetables, Fruits, and Grain Products.”**
The Guidelines moved away from words like “starch” and “fiber” to give consumers a clearer idea of the actual foods that should grace their plates. The report cited “increased evidence that some of the benefit from a high-fiber diet may be from foods providing the fiber, not from fiber alone.”

1995 **“Choose a Diet with Plenty of Grain Products, Vegetables, and Fruits.”**
In recognition that grain formed the base of the 1992 Pyramid graphic, the Guidelines reversed the order of the words in this key sentence.

2000 **“Choose a Variety of Grains Daily, Especially Whole Grains.”**
Whole grains are now mentioned by name for the first time, but with no specific guidance on daily consumption. The Committee’s report said, “Recent research has found that people who consume higher amounts of whole grains have a low risk for cardiovascular disease, and possibly some forms of cancer, than do people who have a low intake of whole grains. This apparently beneficial association of a dietary pattern higher in whole grains is related to factors distinct from their fiber content.”

2005 **“Consume 3 or more ounce-equivalents of whole-grain products per day, with the rest of the recommended grains coming from enriched or whole-grain products. In general, at least half the grains should come from whole grains.”** *The newest Guidelines give preference to whole grains, with language quoted in full on the previous page of this section.*

The 2005 Dietary Guidelines recommended that adults cut their consumption of enriched grains by about 50%, while raising their consumption of whole grains by around 300%



SCIENTIFIC ADVISORS TO THE WHOLE GRAINS COUNCIL

Scientific Advisors to the Whole Grains Council support the work of the WGC through their ongoing research into the health benefits and the scientific properties of whole grains. They also assist the WGC and its members by answering questions from WGC staff and members, as well as from journalists.

Contact Courtney Davis, Media Manager for Oldways and the Whole Grains Council, at 617-896-4888 or Courtney@oldwayspt.org to arrange an interview with any of our Scientific Advisors.

JOANNE SLAVIN, PHD CHAIR OF THE SCIENTIFIC ADVISORY COMMITTEE; PROFESSOR OF NUTRITION AND FOOD SCIENCE, UNIVERSITY OF MINNESOTA (MINNEAPOLIS)
Joanne received her BS, MS and PhD from the University of Wisconsin-Madison, in dietetics and nutrition. She specializes in nutrition across the lifecycle, human nutrition, sports nutrition, dietary fiber, the role of diet in disease prevention, phytoestrogens from flax and soy, and whole grains. She continues to conduct human feeding studies that measure relevant biomarkers for chronic disease prevention.

JAMES ANDERSON, MD, PROFESSOR OF MEDICINE AND CLINICAL NUTRITION, UNIVERSITY OF KENTUCKY (LEXINGTON, KY)
Jim directs the Health Management Resources (HMR®) program (a weight loss program) and is director of the University of Kentucky's Metabolic Research Group. He founded the HCF Nutrition Research Foundation in 1979 to disseminate educational material and formed an exclusive network of physicians, the Obesity Research Network, which performs clinical research in the area of obesity. Jim divides his time between research, teaching, private practice and administration.

R. GARY FULCHER, PHD
HEAD OF THE DEPARTMENT OF FOOD SCIENCE, UNIVERSITY OF MANITOBA (WINNIPEG)
Gary received his BA and MSc in biology from Carleton University in Ottawa, and his PhD in botany from Monash University in Australia. Gary was a Senior Research Scientist with Agriculture Canada and an adjunct professor at the School of Medicine at the University of Ottawa, before joining the faculty of the University of Minnesota in 1989. Gary was awarded the Lifetime Achievement Award: Food Structure and Function Division, by the American Oil Chemists Society, in 2002 and filled the General Mills Chair in Cereal Chemistry and Technology, Department of Food Science and Nutrition, at the University of Minnesota from 1989-2004. Gary is a fellow of the American College of Nutrition.

VICTOR FULGONI III, PHD
PRESIDENT, NUTRITION IMPACT (BATTLE CREEK, MI)
Prior to joining Nutrition Impact, Dr. Fulgoni worked for the Kellogg Company as Vice President of Food and Nutrition Research. At Kellogg he helped develop their long-term research program and was intimately involved in the company's research and regulatory efforts to gain health claim approval from the US FDA regarding soluble fiber from psyllium and the risk of heart disease. Dr. Fulgoni completed his Bachelors degree at Rutgers University and his Ph.D. at the University of Tennessee with a major in animal nutrition and a minor in statistics.

JUDITH HALLFRISCH, PHD
NUTRITION CONSULTANT (BALTIMORE, MD)
Judy received her MS and PhD in Nutritional Sciences from the University of Maryland. She was principal investigator of the Gerontology Nutrition Study of the Baltimore Longitudinal Study of Aging at the National Institute on Aging. Judy also spent many years at USDA's Beltsville Human Nutrition Research Center, where she studied the beneficial and detrimental effects of recent changes in the US diet on health and performance in humans and animals; examined interactions among macro nutrients, antioxidant vitamins, and minerals on bioavailability of nutrients and tested ARS-developed fat replacers in humans for acceptability and potential for reduction of risk for disease. Now retired from the USDA, Judy works as a private nutrition consultant.

DAVID R. JACOBS, PHD PROFESSOR OF EPIDEMIOLOGY, UNIVERSITY OF MINNESOTA SCHOOL OF PUBLIC HEALTH (MINNEAPOLIS, MN)

David received his BS in Mathematics from Hofstra and his PhD in Mathematical Statistics from Johns Hopkins. His research interests include cardiovascular disease epidemiology, biometry, diet, physical activity, low serum cholesterol and noncardiovascular disease, nutritional epidemiology and whole grains.

JULIE MILLER JONES, PHD, CNS, LN

ENDOWED CHAIR IN SCIENCE, COLLEGE OF ST. CATHERINE (ST. PAUL, MN)

Julie received her BS from Iowa State and her PhD from the University of Minnesota. A gifted speaker and teacher, Julie has received St. Catherine's "outstanding faculty award" three times. Her research interests include women's issues (body image and osteoporosis), food safety, and whole grains and health.

PAMELA KEAGY, PHD

NUTRITION CONSULTANT (LAFAYETTE, CA)

Pam has recently retired from USDA's Western Regional Research Center in Berkeley California. While with USDA-WRCC she worked on many research projects including a study of total folate in cereal products. Since her retirement from USDA, she has been working as a private nutrition consultant and as chair of AACC's Approved Methods Committee, which is responsible for maintaining an active, appropriate and scientifically sound program for developing analytical methodology for use in cereal-related laboratories.

PAULINE KOH-BANERJEE, ScD

Pauline was most recently an Assistant Professor in the Department of Preventive Medicine, University of Tennessee Health Science Center. She received her ScD in nutritional epidemiology from the Harvard School of Public Health. Her research is focused on the role of dietary and lifestyle factors in the development of obesity and type 2 diabetes, including the effects of carbohydrate quality. In her work at HSPH, she collaborated on the development of the first comprehensive whole grain database that quantifies whole grain, bran, and germ intakes in grams of consumption.

RIU HAI LIU, PHD, MD

ASSOCIATE PROFESSOR, DEPT. OF FOOD SCIENCE, CORNELL UNIVERSITY (ITHACA, NY)

Rui Hai Liu received his Ph.D. in Toxicology from Cornell University. He also holds a M.D. in Medicine and a M.S. in Nutrition and Food Toxicology from Harbin Medical School in China. His recent publications include an analysis of phytochemicals and antioxidant activity in different wheat varieties. His research program focuses on diet and cancer, effects of functional foods/nutraceuticals on chronic disease risks and aging, active agents in herbal remedies for cancer and hepatitis and the health benefits of phytochemicals in fruits, vegetables and whole grains.

SIMIN LIU, MD, ScD ASSISTANT PROFESSOR, DEPARTMENT OF EPIDEMIOLOGY, HARVARD MEDICAL SCHOOL; DIRECTOR OF NUTRITION RESEARCH, DIVISION OF PREVENTIVE MEDICINE, BRIGHAM & WOMEN'S HOSPITAL (BOSTON, MA)

Simin received his MD at the Jinan University School of Medicine, then earned his MPH and ScD degrees from Harvard's School of Public Health. Simin's research is at the interface of nutrition and genetics/genomics and focuses on their interplay in affecting major chronic diseases in human populations. By examining large and high-quality prospective cohorts of middle-aged women and men (i.e., the Nurses' Health Study, the Women's Health Study, the Physicians' Health Study), Simin and his collaborators have studied how dietary, life-course, and genetic factors may influence the development of chronic diseases. Within the common theme of insulin resistance, several specific diet-disease relations have been identified in this effort. Specifically, his group has identified dietary glycemic index and load and intake of whole grains, fruits and vegetables, and dietary fiber as significant predictors for future risk of type 2 diabetes and coronary heart disease (CHD).

LEN MARQUART, PHD, RD ASSISTANT PROFESSOR OF NUTRITION AND FOOD SCIENCE, UNIVERSITY OF MINNESOTA (MINNEAPOLIS)

Len has a BS in nutrition from Syracuse Univ., and an MS and PhD from the University of North Carolina in Human Nutrition/Exercise Physiology. Before coming to UMN, he was Senior Scientist at General Mills' Bell Institute. His research interests and published papers are in the areas of whole grains and health; factors influencing barriers, motivations and consumption of whole grain foods; the effects of processing on taste, nutritional content and efficacy of whole grains.

LLOYD W. ROONEY, PHD PROFESSOR OF AGRONOMY AND OF FOOD SCIENCE & TECHNOLOGY, TEXAS A&M UNIVERSITY (COLLEGE STATION, TX)

Lloyd has a BS and PhD from Kansas State University. The technology, nutrition, and processing of cereal-based food products is the main research focus of Lloyd's laboratory. He investigates processes to reduce fat content of snacks and other foods while maintaining desirable flavor and texture for consumer consumption, as well as genetic manipulation to develop new cereal varieties with improved processing quality and nutritional value. He also studies the interaction of starches and other components in foods and the effect of processing on the nutritional value of foods and feeds.