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Department of Epidemiology Newsletter

Special Edition

Walter C. Willett, MD, DrPH

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Harvard T.H. Chan School of Public Health

164th Cutter Lecture on Preventive Medicine

Creating a Path to Understanding Diet and Health

December 9, 2016

HARVARD T.H. CHAN
SCHOOL OF PUBLIC HEALTH
Department of Epidemiology

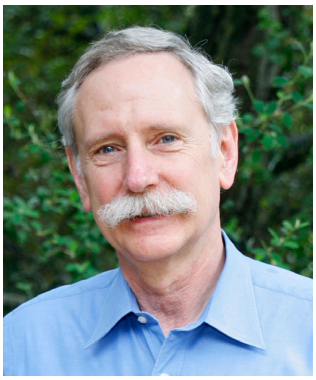
Special Edition

164th Cutter Lecture

Lecturer: Walter C. Willett, MD, DrPH

Cutter Lecture on Preventive Medicine

Since 1912, the Cutter Lecture on Preventive Medicine has been one of the most respected presentations, especially in the field of epidemiology. The lectures are administered by the Department of Epidemiology at the Harvard T.H. Chan School of Public Health according to the bequest from John Clarence Cutter, MD (1851-1909), a graduate of the Harvard Medical School. He specified that the lectures be delivered in Boston, free of charge to medical professionals and the press. Covering a range of public health topics, the lectures remain dedicated to enhancing the physical and social welfare of the world's population.



Walter C. Willett, MD, DrPH

Dr. Walter Willett is Professor of Epidemiology and Nutrition and Former Chairman of the Department of Nutrition at Harvard T.H. School of Public Health and Professor of Medicine at Harvard Medical School. Dr. Willett, was born in Hart, Michigan and grew up in Madison, Wisconsin, studied food science at Michigan State University, and graduated from the University of Michigan Medical School before obtaining a Doctorate in Public Health from Harvard School of Public Health. Dr. Willett has focused much of his work over the last 35 years on the development of methods, using both questionnaire and biochemical approaches, to study the effects of diet on the occurrence of major diseases. He has applied these methods starting in 1980 in the Nurses' Health Studies I and II and the Health Professionals Follow-up Study. Together, these cohorts that include nearly 300,000 men and women with repeated dietary assessments are providing the most detailed information on the long-term health consequences of food choices.

Dr. Willett has published over 1,600 articles, primarily on lifestyle risk factors for heart disease and cancer, and has written the textbook, Nutritional Epidemiology, published by Oxford University Press. He also has four books for the general public, Eat, Drink and Be Healthy: The Harvard Medical School Guide to Healthy Eating, which has appeared on most major bestseller lists, Eat, Drink, and Weigh Less, co-authored with Mollie Katzen, The Fertility Diet, co-authored with Jorge Chavarro and Pat Skerrett and Thinfluence, co-authored with Malissa Wood and Dan Childs. Dr. Willett is the most cited nutritionist internationally, and is among the five most cited persons in all fields of clinical science. He is a member of the Institute of Medicine of the National Academy of Sciences and the recipient of many national and international awards for his research.

Creating a Path to Understanding Diet and Health

On December 9, 2016, the Harvard T.H. Chan School of Public Health welcomed its own Walter Willett, the world's most cited nutritionist, to deliver the 164th Cutter Lecture on Preventive Medicine. He treated attendees to a fascinating retrospective of his 35-year career studying diet and disease, highlighting noteworthy milestones along his ambitious journey.

Before summarizing some of Willett's extensive contributions to nutrition and public health, it is important to mention his involvement in three groundbreaking cohort studies that provided the foundation for his research over the past several decades. The Nurses' Health Study, the Health Professionals Follow-up Study, and the Nurses' Health Study II, comprised of nearly 300,000 men and women observed from 1976 to 2000, are among the largest long-term epidemiological investigations of risk factors for major chronic diseases ever conducted.

Fundamental Methodologies Empower Discovery

Reflecting on one of his early and perhaps "most important" papers, Willett remarked on the significance of maintaining constant energy balance in nutrition experiments involving the substitution of one food item for another. During this time, he also discovered that in order to accurately observe the health effects of a particular dietary factor, the replacement component must be evaluated relative to a specific nutrient. Comparing a substitution with every element in the diet prevents discovery of food choices that have the greatest potential impact on health outcomes. For example, if a saturated fat like butter is replaced with an unsaturated fat like olive oil, it will yield more beneficial results than those derived from replacing the butter with a caloric source like refined starch, sugar, or red meat.

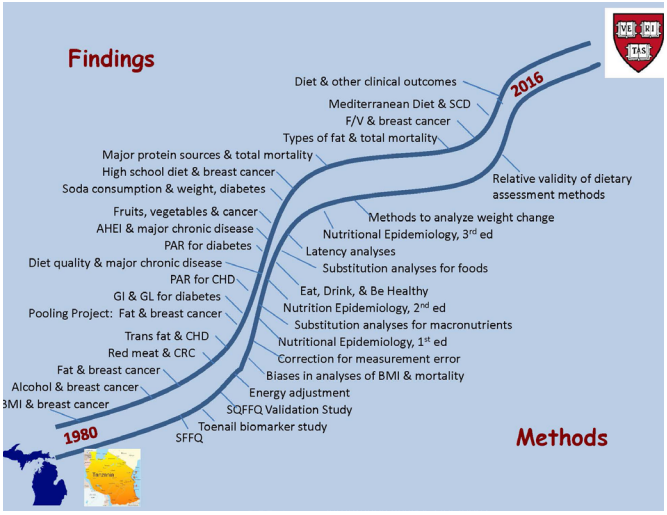
Another formative discovery that would drive Willett's life work occurred when HSPH nutritionists introduced the college scientist to standardized food frequency questionnaires (FFQs) for collecting and assessing dietary intake data. This tool would eventually replace what were known as "gold standard" manual-entry food records. Willett and others later found that one-week diet records deliver about the same accuracy as FFQs, but the cost ratio is 1000:1! The advent of FFQs represented a significant advancement in accurate, cost-effective data collection and analysis in large epidemiological studies. Optical scanning technology allowed scientists to do numerous repeated measurements and powerful analyses of multiple cohorts over extended periods of time.

From Controversy to Consensus

The young Willett certainly did not set out to be a contrarian, but the trajectory of his career set him on a path of discovery that repeatedly challenged conventional wisdom and debunked some broadly held beliefs about diet and health.

His first health outcomes-focused paper in 1985, examining what is now known as body mass index (BMI) and associated risk of breast cancer, delivered surprising findings that remain difficult to fully understand today. The study revealed that a higher BMI is inversely related to breast cancer risk in premenopausal women. In a paper Willett published a few years ago, he and colleagues shared additional enlightening data documenting that high school girls who ate legumes, nuts, poultry, and eggs in place of red meat had a lower risk of developing premenopausal breast cancer—findings that emphasized the significant impact of adolescent diet on long-term health outcomes.

Not All Fats Are Created Equal



In the 1980s and 1990s, most Americans believed that dietary fat was a primary cause of cancer. However, in a 1987 study and a more extensive 1996 paper published in the New England Journal of Medicine, Willett refuted at least part of the conventional wisdom, finding no evidence that total fat intake increased breast cancer risk. This was one of several instances in which Willett would have to endure initial backlash from the scientific and medical communities, but, over time, his findings were verified and ultimately accepted. In a 1993 study, Willett and colleagues found a definitive association between trans-fat intake (mostly from industrial partial hydrogenation) and coronary heart disease (CHD) in women, upsetting food manufacturers and the American Heart Association, which was then focused on saturated fat as the prevailing "unhealthy" fat in the U.S. diet. Again, once the uproar subsided, consensus was achieved.

In a recent study reflecting several decades of data, Willett conducted another analysis on types of dietary fat. While findings were consistent with earlier studies, new insights included the decisive identification of trans-fat as the worst kind of fat, and the discovery of a stronger inverse relationship between unsaturated fat versus carbohydrates and mortality risk. The conclusive finding that type of fat is more important than total fat intake was a significant milestone since the official recommended restriction on all fat had driven people to eat a lot of unhealthy carbohydrates. Additionally, while some of the patterns noted in the recent paper first emerged in Willett's 1997 study on CHD, scientists are now finding evidence that type of fat in the diet has implications for a much broader range of health consequences, including neurodegenerative diseases.














Check out all of the photos from the event here.

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What We Know Versus What We Do

In 2000, Willett and others published a study about prevention of coronary heart disease in women through healthy diet and lifestyle. Based on 14 years of data from the Nurses' Health Study (NHS), researchers concluded that nonsmokers with a BMI lower than 25 who walked every day and consumed a healthy diet had a very low risk of developing heart disease. In fact, they determined that 82 percent of CHD could be prevented if people adopted this lifestyle. What was most surprising is that only 3 percent of the cohort participants were practicing these healthy habits.

A year later, in a similar study on type 2 diabetes, the scientists again found that the disease would be nearly preventable if women adopted a healthy diet and lifestyle. But, again, only 4 percent of those observed fell into the low-risk group. Like the earlier study, there was a huge gap between what was known about the connection between modifiable risk factors and positive health outcomes versus what people were actually doing.

Part of the problem resulted from the fact that many were following U.S. dietary guidelines that did not reflect emerging understanding about what constituted a healthy diet. Also, nobody was looking at whether people who followed the guidelines achieved better health outcomes. So Willett and others decided to apply the criteria defined in the U.S. Department of Agriculture (USDA) Healthy Eating Index to men and women in the three major cohort studies. They found very little association between adherence to the official guidelines and positive health outcomes, which instigated closer examination and subsequent modification of the Healthy Eating Index.

For starters, Willett and colleagues created the Alternate Healthy Eating Index. In a 2002 study, they examined specific types of fat and forms of carbohydrates, and were able to prove a strong inverse relationship between adherence to their alternate guidelines and cardiovascular disease.

The Misleading Fruit and Vegetable Panacea

In addition to the evils of dietary fat, another prevailing message in the popular culture in the early 2000s espoused eating more fruits and vegetables to reduce cancer risk. Americans were advised they could cut their risk in half by eating five servings a day. In a 2004 study analyzing fruit and vegetable intake, scientists found a clear link between consuming five servings a day and a reduced risk of cardiovascular disease… but not cancer.

Like fats, not all vegetables are created equal. In a 2015 study coauthored by Willett, researchers found that while most vegetables are inversely related to weight gain, corn, peas, cabbage, and potatoes are associated with increased weight. These findings are significant, particularly in lieu of what is currently served in most school cafeterias and the country's obesity epidemic. In a not-yet-published analysis of vegetable intake and breast cancer risk, Willett and his team found that certain vegetables reduce breast cancer risk more than others, while fruit has little to no impact. Willett acknowledges the decades required to achieve this level of granularity, but he's not surprised by the results.

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> **"Vegetables are totally different in terms of composition, so there's no reason to believe all should have the same relationship with health outcomes. We certainly don't want to dedicate ourselves to eating lots of vegetables yet miss out on consuming the ones that are most beneficial."**

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Diet and Health: A Complex Relationship

Misconceptions about dietary fat causing cancer and fruit and vegetables preventing it, and misalignment between dietary guidelines and health outcomes highlight the lack of clarity in what remains a challenging area of scientific research. At the same time, significant progress has been achieved in the field of nutritional epidemiology. We know that diet is a major modifiable determinant in health outcomes. Increased adherence to the Willett's Alternate Healthy Eating Index has resulted in one million fewer premature deaths, a nearly 9 percent reduction in cardiovascular disease, and a 20 percent reduction in diagnosed diabetes over the past several years—the first drop in incidence following a steady major increase since 1980.

The journey continues. Willett and others have provided a platform for scientists and practitioners in many clinical disciplines to analyze outcomes, advance methodologies, and improve patient care and public health. Future efforts must include closer examination of early life exposures and long latencies, a broader understanding of the intricacies of the human brain, and measurable progress in closing the gap between diet and health knowledge and practice. Returning to this concept of what we know versus what we do, in closing, Willett warned that if we do not acknowledge and explore the connections between food, sustainability, and climate change, nothing else will matter.

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