Insights and Perspectives on Dietary Modifications to Reduce the Risk of Cardiovascular Disease 1–4

David J. Baer,5* Beth H. Rice Bradley,6 Penny Kris-Etherton,7 Andrew Mente,8 and Marcia de Oliveira Otto9

5USDA Agricultural Research Service, Beltsville Human Nutrition Research Center, Beltsville, MD; 6Dairy Research Institute, Rosemont, IL; 7Department of Nutritional Sciences, Pennsylvania State University, University Park, PA; 8Department of Clinical Epidemiology & Biostatistics, McMaster University, Hamilton, ON, Canada; and 9Department of Epidemiology, Harvard School of Public Health, Boston, MA

ABSTRACT

This article summarizes presentations from “Insights and Perspectives on Dietary Modifications to Reduce the Risk of Cardiovascular Disease,” a symposium held at the ASN Annual Meeting and Scientific Sessions in conjunction with Experimental Biology 2014 in San Diego, CA on 26 April 2014. Presenters reviewed historic and current evidence on the relation between diet and cardiovascular disease (CVD) to identify gaps in knowledge, discuss the promises and pitfalls of macronutrient replacement strategies in the diet, and suggest various options for issuing dietary guidance aimed at reducing the burden of CVD morbidity and mortality. Observational studies and clinical trials indicate that overall diet quality have a marked impact on health benefits, which is shifting the emphasis on recommending healthful dietary patterns to focusing only on single nutrients or foods. Adv. Nutr. 5: 553–555, 2014.

Cardiovascular disease (CVD) is the leading cause of death in the United States and other industrialized countries, with the estimated global health care costs associated with CVD exceeding $800 billion in 2010. Diet and lifestyle modifications are public health targets aimed at reducing the risk of CVD. For instance, a dietary recommendation to decrease LDL cholesterol, a predictive biomarker for CVD, is to reduce total and saturated fat intake. Similarly, another dietary recommendation aimed to decrease elevated blood pressure, an important risk factor for CVD, is to reduce sodium consumption. Interestingly, whereas the unadjusted death rate from CVD in the United States steadily declined since the 1960s, the intake of fat (energy percent) and sodium (milligrams per day) remained relatively constant. However, the percentage of the population taking statins increased dramatically over the past 3 decades.

1 This article is a summary of the symposium, “Insights and Perspectives on Dietary Modifications to Reduce the Risk of Cardiovascular Disease” held 26 April 2014 at the ASN Scientific Sessions and Annual Meeting at Experimental Biology 2014 in San Diego, CA. The symposium was sponsored by the American Society for Nutrition (ASN) and supported by an unrestricted educational grant provided by the Dairy Research Institute, an unrestricted educational grant provided by the Dairy Research Institute, and Kellogg’s (all to D.J.B.).

2 Supported by the California Walnut Commission, the Almond Board of California, and Kellogg’s (all to D.J.B.).


4 This is a free access article, distributed under terms (http://www.nutrition.org/publications/guidelines-and-policies/license/) that permit unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

* To whom correspondence should be addressed. E-mail: David.Baer@ars.usda.gov.

Descriptive statistics such as these delivered by the chair of the symposium, Dr. David Baer, opened the dialog for the session. Dr. Baer asked several questions. Were nutrition-related reduction targets for fat and sodium feasible, scientifically meaningful, or necessary? In the United States, where <15% of the population has high total serum cholesterol, do current recommendations make scientific sense?

Dr. Penny Kris-Etherton opened her talk with the 2013 AHA/American College of Cardiology Guideline on Lifestyle Management to Reduce Cardiovascular Risk (AHA/ACC Guidelines) (1). She reminded the audience that the summary of recommendations for lifestyle management, including a dietary pattern that achieves 5–6% of calories from saturated and trans fat, are aimed at adults who would benefit from lowering their LDL cholesterol. The AHA/ACC Guidelines are not population-wide recommendations. The recommendations are based on strong evidence ratings and encourage dietary patterns that emphasize a variety of foods, such as vegetables, fruits, and whole grains, as well as low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils, and nuts, and limits the intakes of sweets, sugar-sweetened beverages, and red meats. Strong evidence also indicates that these same dietary patterns are advised for adults who would benefit from lowering their blood pressure. Dietary patterns that fit into the AHA/ACC Guidelines include the Dietary Approaches to Stop Hypertension eating plan, the USDA food pattern, and the AHA diet.
Taking a closer look at prospective and clinical trials intended to assess dietary modifications and risk of CVD, Dr. Kris-Etherton noted that a simple nutrient reduction can have unintended consequences depending on what that nutrient is that is being replaced. For example, when saturated fat is replaced with carbohydrate in the diet, heart disease risk does not change; when saturated fat is replaced with polyunsaturated fat in the diet, heart disease risk decreases (2). Dr. Kris-Etherton also cautioned against the simplicity of applying single-nutrient approaches to public health at a time when evidence on dietary patterns often does not align with expected outcomes. Whereas cheese is 1 of the food sources of saturated fat and sodium in the American diet, cheese and whole-milk dairy products are associated with a reduced risk of CVD in meta-analyses of prospective and clinical study data (3). One clinical trial showed that cheese did not raise LDL cholesterol as would be expected based on its saturated fat content (4). A recent meta-analysis identified a possible inverse association between dairy-derived saturated fats, pentadecanoic acid and heptadecanoic acid, and heart disease, demonstrating that not all saturated fats are equivalently linked to heart disease risk (5). The conclusion drawn from Dr. Kris-Etherton’s talk was that food-based components of dietary patterns contain nutrients to avoid, such as saturated fat and sodium, but also contain nutrients to encourage, such as calcium, vitamin D, and potassium, as is the case of dairy products. Thus, new education strategies to implement overall healthy dietary patterns without just focusing on single foods or nutrients are needed to teach health professionals and the consumers they reach.

Dr. Andrew Mente picked up the dialog regarding a food vs. nutrient approach to dietary guidance by first presenting NHANES data that indicated that the start of the obesity epidemic in America coincided with the introduction of the Food Pyramid. The question being raised was “Did guidance contribute to the epidemic, help slow the epidemic, or have no effect at all on the epidemic?” Whereas the Dietary Guidelines for Americans have been calling for a reduction in fat intake, results from the Women’s Health Initiative trial indicate that low-fat diets were not associated with changes in cardiovascular outcomes. Thus, a focus on a single nutrient, such as fat, may achieve modest changes in diet at best, which brought the efficacy and sustainability of single-nutrient focused dietary guidance into question.

Dr. Mente also brought conventional dietary wisdom into question when he debunked the long-held belief that population-wide sodium reduction would reduce CVD in the United States. Recent data indicating that current population sodium intakes are within a range that poses no risk for human health were presented (6,7). These data indicate that a single-nutrient approach to dietary guidance may be too simplistic. However, studying the effect of dietary patterns on human health takes into account the contribution of a mixed diet to overall health.

Several large prospective studies detected an inverse association between prudent or Mediterranean dietary patterns and mortality risk (8–12). Noteworthy is that dietary patterns show stronger relations with mortality than single nutrients or foods, again illustrating that a nutrient approach to dietary guidance may be too simplistic, and in fact, a food-only approach may be as well (10,13).

Dr. Marcia de Oliveira Otto presented the argument that it is important to look for evidence from studies evaluating the effects of diet on CVD outcomes or mortality rather than just intermediary risk factors, such as blood lipids. A review of the literature on macronutrient replacement indicates that dietary fats have divergent effects on lipid fractions (14). Replacement of carbohydrates with SFA showed modest favorable effects on HDL cholesterol and unfavorable effects on LDL cholesterol and overall no harmful effect on the total-to-HDL cholesterol ratio (14), which is a better marker of CVD risk compared with any blood lipid measurement in isolation. Replacement of carbohydrates with PUFA showed favorable effects on HDL and LDL cholesterol, leading to a substantial reduction of the total-to-HDL cholesterol ratio and consequently CVD risk. In addition, the food source of saturated fat may be more relevant to CVD risk reduction efforts than the nutrient per se. A recent study published by Dr. Otto showed that higher consumption of saturated fat from meat sources increased the risk of CVD, whereas greater intakes of saturated fat from dairy products reduced the risk of CVD (15). Therefore, shifting to an overall healthy dietary pattern may be more relevant to cardiovascular health than just focusing on potential effects of individual nutrients.

In conclusion, observational studies and clinical trials indicate that overall diet quality has a substantial impact on cardiovascular health. This is the basis for contemporary dietary recommendations that emphasize healthy dietary patterns rather than single nutrients or foods. The challenge for nutrition research is to explore the complex interaction of nutrients in foods, understanding that nutrients in the context of a total diet may have different effects than those observed in isolation. Thus, focusing on foods and dietary patterns allow for more effective recommendations for CVD prevention.

Acknowledgments
All authors read and approved the final manuscript.

References


