Vegetarian eating patterns: science, values, and food choices—where do we go from here?[1-3]

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ABSTRACT Many aspects of vegetarian diets are currently of interest from a health standpoint. It is becoming increasingly important to recognize that both values and scientific issues come into play in evaluating data on diet and nutrition. *Am J Clin Nutr* 1994;59(suppl):1255S–62S.

KEY WORDS Vegetarian, values, nutrition, malnutrition, science, biotechnology

Introduction

The proceedings of the Second International Congress on Vegetarian Nutrition present the latest scientific information available on vegetarianism. This publication permits readers to examine experts' explanations of facts relevant to vegetarian nutrition and, informed by them, to reach their own conclusions. The papers may also be more broadly useful as references for policy makers. This paper highlights some of the significant advances in the science of vegetarian nutrition, both fundamental and applied, that have occurred since the first Congress 5 y ago. Good science is the key to solving many puzzles of human health. This paper also briefly reviews the important role of personal values in diet and nutrition. Scientific facts must be considered in conjunction with values. Interpretation of factual information is influenced by the views and values of both presenters and listeners. Value judgments are particularly important in food choices and have played a role for millenniums. The practice of eating diets composed largely of vegetables, fruits, and grains even when other foods were available began in ancient times not for scientific, economic, or practical reasons, but primarily for philosophical ones. From the time of Pythagoras to the present day in Western countries, different philosophical and religious groups have advocated vegetarian diets for philosophical as well as health reasons. In Eastern countries, Jainism, Buddhism, Hinduism, Zoroastrianism, and sects in other Eastern religions have stressed vegetarianism (1).

There is also a long historical precedent for the use of animals by humans, including eating them for food, and these eating styles also involve values (2). Our earliest ancestors were probably omnivorous foragers who ate mixed diets (3), rather than solely vegetarians, fruitarians, or hunters (4). Their eating styles depended largely on what was available in their environments.

Scientific issues involving nutrition and health

Science is a method that can simply be described as "guess and test." Using this method and adequate techniques or tools, hypotheses can be tested by observations and experiments. In this way, knowledge in health science advances.

Since the first Congress, many scientific issues involving the effects of diets on health have been clarified. We have learned more about genetics. Molecular biology and the applications of gene technology in food and nutrition are here to stay (5, 6). Basic research on gene expression is expanding at an unprecedented rate. We are rapidly increasing our knowledge of nutrient-nutrient and nutrient–food constituent interactions, and also of how these interactions interrelate with genes and with other environmental factors. Nutrition research is also proceeding apace. More than a dozen large-scale clinical trials involving diet are now in progress at the National Institutes of Health, and even more are planned. The results of these studies will do much to clarify important questions that still remain about diet, health, and disease interrelationships.

At the national level, the consensus on useful, cost-effective preventive and health-promotion efforts (including, but not limited to, nutrition) is greater now than when the first Congress was held (7). The content of preventive services in health care settings has also been specified. Recommendations for implementing the National Academy of Science's report *Diet and Health* have also been issued (8). Coalitions are forming to popularize similar recommendations.

Other work that applies advances in knowledge to diet and health issues is also progressing rapidly. Although important issues remain to be clarified, a greater consensus on healthful diets

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between experts exists now than in the mid 1980s. A new edition of the Recommended Dietary Allowances has been published (9). The landmark report *Diet and Health* addressed the important issue of dietary recommendations that may reduce the risk of diet-related chronic degenerative disease (10). In simplified form, similar recommendations for healthy adults appear in the updated version of the *Dietary Guidelines for Americans* (11), in the newly issued food pyramid of the US Department of Agriculture (12, 13), and in an easy-to-read, popular text on the subject (14). Many other professional societies and expert groups, including Health and Welfare in Canada (15), have also issued reviews and recommendations that are generally in agreement with the US recommendations.

The Food and Nutrition Board has issued special recommendations for two nutritionally vulnerable groups, pregnant (16) and lactating (17) women. Special consideration is given in these reports to those who follow a vegetarian lifestyle. The *Surgeon General's Report on Nutrition and Health* (18) and the National Cholesterol Education Program's recent *Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents* (19) have further clarified nutritional recommendations for other vulnerable groups. The Food and Nutrition Board recently held a workshop on the important topic of the nutrient needs of aging Americans, and no doubt there will be more attention given to this topic in the future.

Diet- and lifestyle-related effects on health

In studies of the health effects of different dietary patterns it is difficult to separate out effects that are due to eating patterns from those that are the result of other differences in lifestyles. Vegetarians and nonvegetarians differ in aspects of lifestyle that affect health, such as smoking, physical activity, weight, energy intake, and the use of alcohol, coffee, and medications. However, there are also considerable differences within each group. Most of the data on morbidity and mortality are from studies of Seventh-day Adventists and other groups of vegetarians who differ from omnivores in lifestyle factors other than just diet. Comparisons are not yet available between these vegetarian groups and nonvegetarian populations who consume diets with moderate amounts of animal foods, with other lifestyle factors held constant. Unless, and until, such data are available, the benefits or risks in terms of health cannot be attributed solely to animal-food intakes or the lack thereof. Clearly, all of us have much to learn about healthy lifestyles from the vegetarian groups that avoid smoking, alcohol abuse, and sedentary living.

Data on the effects of differing dietary patterns are difficult to interpret from observational studies because quasiexperimental, rather than randomized, designs must be used. Intercorrelations between foods and nutrients further complicate the interpretation. Experimental studies in which one or only a few factors are varied are needed to more completely elucidate the cause and effect relationships between diet and biological variables.

Expert recommendations

What do experts say we should eat with respect to animal and plant foods? They make only general recommendations, suggesting that whatever pattern is chosen should provide essential nutrients and meet any special individual needs imposed by age and physical condition. They also suggest moderation, variety, and balance with respect to other dietary constituents to reduce risks of other diet-related disease. With these provisos, the expert recommendations are broad enough to include both well-balanced vegetarian and omnivorous diets.

Knowledge of nutrition science, physiology, and food composition permits the construction of myriad healthful diets. Each eating pattern has pros and cons (20), including unmodified omnivorous diets, modified omnivorous diets, meatless patterns (21), vegetarian, and vegan patterns (22, 23). Good health is probably easier to achieve on some patterns than on others. However, beyond the need to assure that deficiencies, imbalances, and excesses in nutrients are avoided, food choices are individually made. They are dictated largely by our particular value systems, economics, and taste.

Eating patterns that include animal foods

Animal foods have many positive aspects. They are good sources of high-quality protein and many are high in energy and nutrient density. They are good sources of highly bioavailable iron (24), zinc (25), and manganese, and reliable sources of vitamins B-12 (all animal foods, especially meat and poultry), vitamin D (liver, vitamin D–fortified milk), and certain other nutrients such as thiamin (pork), calcium (milk), vitamin B-6 (meat), vitamin A (butter), riboflavin (especially milk and milk products, liver, pork, and meat), and tryptophan, which can be converted in the body to niacin (26–29). The nucleotides in meats and poultry may also be beneficial to health. Fatty ocean fish and their oils are rich in ω-3 polyunsaturated fatty acids.

However, eating patterns that include very high amounts of fatty animal foods are linked to several different chronic degenerative disease risks. Animal foods remain as the major contributors of total fat, saturated fat, and cholesterol in American diets. They are also low in fiber and certain other nutrients that are essential to good health. Preparation and processing can substantially alter the final nutrient value of animal products (30). Those who wish to include animal foods in their diets can meet current federal recommendations for healthy intake targets if they make wise choices and observe moderation in fat, saturated fat, and cholesterol intakes. Useful strategies include the consumption of lean meats, egg whites or egg substitutes, lower-fat cheeses, and skim milk, with occasional inclusion of higher-fat meats. The use of soft margarine and polyunsaturated oils further reduces saturated fatty acid intakes (31).

Eating patterns largely or solely based on plant foods

Diets that are predominantly based on plant food are generally moderate in calories and protein, lower in total fat, saturated fat, and cholesterol, and higher in polyunsaturated fatty acids than most animal foods. Plant-food diets are also higher in dietary fiber, magnesium, folic acid, antioxidant nutrients such as vitamin E, vitamin C, and the carotenoids, and possibly other biologically active substances (eg, phytoestrogens) that may have beneficial dietary effects. Many vegetarians also avoid alcohol, smoking, sedentary lifestyles, caffeine-containing foods, spices, highly refined and processed foods, and stressful situations.

Some, but probably not all, of these practices also promote overall health.

Vegetarian diets also possess disadvantages. If all animal foods are avoided, vitamin B-12 intakes are unlikely to be adequate unless foods fortified with vitamin B-12 or vitamin supplements are used. Because folic acid intakes are usually high in vegetarian diets, megaloblastic anemia that is due to vitamin B-12 deficiency may be masked in vegans, increasing the risk that the deficiency will remain undetected. Vitamin D deficiency may arise in vegans or other vegetarians who omit from their diet vitamin D–fortified milk and milk products, or vitamin D–fortified soy formulas or milks, particularly during the growing years. From a practical standpoint in Western countries, protein quality is rarely a problem if energy intakes are adequate and complementary plant proteins are selected. However, plant proteins are rarely complete in themselves. Naturally occurring plant sources of calcium, iron, and zinc are less highly bioavailable than the same sources in animal foods. Vegetarian diets and high fiber intakes are often associated with high levels of oxalates and phytates, which may reduce the absorption and bioavailability of iron, calcium, and zinc.

Concerns about vegetarian diets have traditionally centered around issues of not getting enough, rather than getting too much. The nutritionally vulnerable groups, such as infants and young children, have been singled out for particular concern. Several studies on their growth now exist; however, these studies suggest that making generalizations can be hazardous. Growth depends greatly on diet, but the influence that diet has varies from no discernible effects on growth in many semivegetarian and lactoovovegetarian patterns to decreased growth in some vegan or near-vegan patterns (32–38).

Questions that still remain

Of particular importance in this conference was the exploration of the roles of various eating patterns in altering chronic degenerative disease risks. Questions about optimal dietary patterns in this regard are interesting scientifically, but also have important dietetic and economic implications. Food habits are notoriously difficult to change. For those who are not motivated by other values, the fewer dietary alterations that are required, the greater the likelihood of adoption of nutritional recommendations for health.

From the scientific standpoint, then, what can be said about animal- and plant-food dietary patterns and their effects on health? At present, the strongest evidence from clinical and experimental studies is nutrient- or substance-specific (eg, specific to certain fatty acids, cholesterol, or dietary fiber) rather than solely food- or commodity-specific (eg, specific to meat rather than nonmeat, or plant rather than animal food) (22, 39, 40). The hypothesis is that the effects of foods and eating patterns on health are largely explained by the nutritive substances they are known to contain or lack. Admittedly, this is a reductionist approach, but it is useful for advancing knowledge through experiment. It has been conclusively demonstrated that many positive health benefits can be achieved by changing dietary intakes of these nutritive substances, rather than by totally changing foods or eating patterns.

However, the paradigm has its limitations. It must not be forgotten that some dietary constituents that have potent effects on health are only now being identified. Not all of these substances are available in vitamin pills or other supplements. Therefore, it is possible that eating patterns may have different effects than the sum of all the individual nutrients or other substances we consider important today. This important issue requires much additional study and research. Whether the effects on health of these differences are additive or multiplicative, or whether they conform to some other pattern, remains to be determined.

For example, there is now a great deal of evidence about many beneficial metabolic effects that result from low-fat, low saturated fat, high-fiber diets. These include the reduction of hyperlipidemia and also of coronary artery disease risk (41). Ornish (42, 43) has shown not only dramatic effects on serum lipid concentrations, but also regression of symptomatic atherosclerosis in people consuming diets that are extremely low in fat (eg, 10% of energy from fat), very low in saturated fat and cholesterol, high in fiber, and vegetarian, when these diets are coupled with exercise, abstinence from smoking, and meditation. Whether the very low amounts of fat, saturated fat, and cholesterol in the diet and the high amounts of fiber are enough to bring about regression, or whether a vegetarian diet is also necessary, is not known. To you who are vegetarian, this point may not be important, but to nonvegetarians, it is.

There is also the question of whether low-fat, high-fiber diets, nonmeat patterns, or other dietary factors alter the risk for hormone-dependent cancers. At present, the evidence is mixed. Eating patterns that are low in fat, high in fiber, and high in fruits and vegetables may be associated with lower risks for certain cancers such as those of the colon. For example, in the Nurses' Health study, higher intakes of animal fats were found to increase colon cancer risks, whereas fiber intakes were not found to be protective (44). Colon cancer risk may also have been increased in women who ate diets that were high in fat because of other variables such as low intakes of fiber or other substances from fruits and vegetables, differences in energy intakes that were not accounted for by adjustments in analysis, higher intakes of other factors in meat such as carcinogens, or differences in physical activity. Complex interactions probably exist between many of these factors (45, 46).

Some evidence suggests that dietary fat intake may be associated with risk of breast cancer, but other data suggest the opposite, indicating that more study is needed (47–50). There is also some evidence that cyclical mastopathy is reduced in women who consume low-fat, high-carbohydrate diets (51). Other studies, including the Nurses' Health Study, suggest that alcohol intake is associated with risk (52, 53), but that fat intake is not (54).

Current risk-reduction guidelines for heart disease suggest moderation, not elimination, of meat and other animal foods (55, 56). Similarly, cancer risk-reduction guidelines do not suggest elimination of animal foods, although they do suggest moderation in dietary fat intakes and an eating pattern similar to that recommended in the *Diet and Health* Report (10), which emphasizes moderate amounts of lean animal foods (57–59). Clinical trials now being conducted by the National Institutes of Health should provide information for updating this information in the next several years.

Case in point: low-fat, high-fiber diets

Much of our group's research has involved testing the effects of diets that are low in fat, high in fiber, and that contain moderate

amounts of meat and other animal foods, but are not necessarily vegetarian. There are complex problems involved in discovering which dietary constituents are causing metabolic changes even when only two constituents of diet are varied, much less when entire patterns are varied. There is little doubt that manipulations of fat and fiber have effects on hormone metabolism, including sex hormones (60). For example, we found that fat and fiber were associated with low plasma and urinary estrogen concentrations and high fecal estrogen excretions (61, 62). Changes from high-fat, low-fiber diets to low-fat, high-fiber diets result in reduced urinary excretion of 16-hydroxylated estrogens and increased urinary excretion of 2-hydroxylated estrogens (63). In experimental animals, high estradiol 16α-hydroxylation is associated with mammary tumors, and women with breast cancer have higher 16α-hydroxylase activity than do normal women (64). Low-fat diets are also associated with relative increases in urinary 16-hydroxylated estrogens and relative decreases in 2-hydroxylated estrogens in some studies. Low fat intakes probably affect the enterohepatic circulation of estrogens, thereby reducing the pool of estrogens circulating in the body (65). Compared with diets that are high in fat and protein, diets that are high in complex carbohydrate and fiber-rich whole-grains and legumes are associated with lowered concentrations of sex hormone–binding globulin, higher percentages of free non–protein bound estradiol, and higher percentages of free non–protein bound testosterone, thereby possibly resulting in higher bioavailability of the hormones at the target tissue level. Also, such diets increase urinary catechol estrogen excretion and increase urinary ratios of 2-hydroxyestradiol to 4-hydroxyestrone; catechol estrogen formation may be a risk factor for breast cancer.

It is unclear whether the effects we have observed are due to low intakes of fat and high intakes of fiber or perhaps are in part due to high intakes of other substances that are found in fruits and vegetables that also vary in these experimental diets. We know that the observed effects are not due to alcohol intakes, exogenous hormones, or changes in body fat, because these factors were controlled for in these experiments.

Our current working hypothesis is that low fat and high fiber intakes appear to have separate and interactive effects on hormone metabolism. But nonsteroidal estrogens of dietary origin, particularly those derived from plants, may also influence hormonal events (64, 66–69).

Can science and values be separated?

Scientific advances often have philosophical, social, and economic impacts. Scientists' views (like those of other human beings) are often value-laden. Is it possible, then, to trust scientists' interpretations of their findings, or are these interpretations too subjective to be trusted? I suggest that in the areas of their particular expertise, scientists' views are, or should be, relatively objective and are worth listening to. The farther scientists stray from their areas of technical competence, however, the less likely it is that their expertise gives them an advantage in sorting out the facts. However, the scientific method is a useful way of evaluating evidence, even though individual scientists may not be good evaluators. Peer review is also essential. And new summarization techniques such as meta-analysis are also helpful.

The essence of a pluralistic society such as ours is that a variety of different values are recognized. In contrast to scientific issues, values are not subject to empirical testing. They are not, nor will they ever be, objectively verifiable; by their very nature, they do and should involve a good deal of subjectivity. On some issues that involve values, all or most citizens probably agree. On others, there is little consensus. Some of the issues that involve values on which there has been much debate and disagreement lately are discussed below.

Back to basics or food engineering?

We all agree on the goal of achieving health through diet, but the different means we use to reach that goal reflect a clash of values. Some people prefer to eat lower on the food chain and return to unprocessed (or lightly processed) basic foods. Others are fascinated with the potential of a "food engineering" or "designer foods" approach, but most take a middle road. For example, if reducing fat is the goal, preparation, reformulation, and breeding techniques can be used to alter the fat content of foods. Today, food science and food technology also make it possible to modify or synthesize lipids with specific characteristics. Many ingredients that can substitute for some or all of the fat in fabricated foods are now on the market or are in development. Starch-, cellulose-, or protein-based fat mimics are compounds that simulate the mouth feel of fats without the energy content of fat. Fat substitutes are molecules with physical and thermal properties that resemble those of fat, which can be used to replace fats in all applications, even frying. Views about the best way to lower fat intake will vary, even after health and safety concerns have been satisfied. The optimal approach for each person will depend on one's entire constellation of values, including taste and economics.

Biotechnology

Biotechnology is a term used to refer to the application of several new genetic engineering techniques to modify traits in animals and plants. One such technique is recombinant DNA technology, which permits the isolation a of specific gene and insertion of the gene in a carrier so that it can enter the plant, animal, or bacterial cell in which it is to be placed. The new DNA allows transgenic manipulations and endows the host cell with new properties. Other techniques involve production of monoclonal antibodies, which allows the production of large amounts of specific proteins with human uses, and the growth of cells in culture. The way we view these developments also depends on our values. Many positive effects on health and well-being may result from the appropriate application of these technologies. But they must be used with care.

The appropriate use of biotechnology as it applies to plants raises questions that are still being resolved. Then senator Albert Gore Jr stated, "For every use of biotechnology there is a potential misuse. For every benefit, there is a potential hazard. The challenge is to know when we are about to go too far with the technology and when the drawbacks outweigh the advantages" (70).

One concern about biotechnology is whether it will detract from the nutritional value or quality of the food. Nutritional traits are often not those targeted for improvement so it is important to avoid inadvertent decreases in amounts of an important nutrient.

Another concern about biotechnology is the safety and best methods of characterization of the genetic material and its ex-

pression products. The development of such plant products must include considerations such as preventing the introduction of an allergen not commonly found in the plant, or increasing the concentration of naturally occurring toxicants or other potentially hazardous substances. It is also important to ensure that genetically altered crops are free from some fatal flaw that could remain unnoticed until after their adoption. Previous experience demonstrates the need for caution.

Recently the Food and Drug Administration (FDA) issued the *Statement of Policy: Foods Derived from New Plant Varieties, Including Plants Developed by Recombinant DNA Techniques* (71). The FDA indicated that it will regulate such foods under existing statutes and regulations, and that label disclosure is not demanded. The FDA guidelines address the concerns raised above and suggest guidelines for dealing with them. Limited applications of biotechnology in the food industry are now a reality. Commercial uses are expanding and are likely to increase further in the future. However, additional and important questions remain, many of which involve values as well as issues of science or safety. These questions must be sorted out on a product by product basis.

Which genetic traits to pursue and develop first is a question in itself that involves values related to nutrition, food processing, food quality, public health, and environmental benefits. The efficiencies resulting from a "gene revolution" could set off another round of overproduction in agriculture, as happened during the green revolution, especially if all the development concentrates on production instead of on consumer benefits such as nutritional value and affordability. If a technology is very expensive, its use may also bring about social and economic disruption in the field of agriculture and worsen the lot of the poorest farmers at the expense of larger farmers and agribusinessmen. Thus, the ultimate outcome might bring about little improvement in the health and nutrition of the very poor. Gussow (72) argues that biotechnology will likely be used for profit rather than for more humanistic purposes. She seeks ways to improve the lot of the Third World poor and other needy groups through responsibility and control of these biotechnological processes. Her concern is also to safeguard against the possibility of severe mistakes. She says, "Genetic engineering can change our relationship to nature and to each other as profoundly as the industrial revolution. It is a technology that we as citizens of a democracy are morally obliged to attend to. And it is none too soon to begin" (72).

There are also legal concerns involving ownership of genes and thus property rights over genetic materials, just as patents have existed for years for other technologies. The potential environmental effects of some genetically engineered plants are another source of concern. For example, some people fear that new crops or livestock may disrupt the ecological balance because they have no natural enemies.

All the stakeholders, including industry, scientists, the public, and policy makers must consider all of these issues and come to some accommodation that considers these societal goals.

Animal welfare and the use of animals in research

Over the past 5 y the issues of animal welfare and the appropriate use of animals in research have received increasing attention. The humane treatment of animals is an appropriate goal that I believe all of us are ethically obliged to support.

Some of us at this conference, including myself, spend a good deal of our time doing experiments and clinical trials with humans. Our engagement in such pursuits indicates that we believe that the use of animals, including humans, in research is justifiable. We accept the need for human experimentation committees, sound experimental designs, and ethical treatment of those of our fellow humans who are kind enough to volunteer for these studies. I am particularly indebted to many vegetarians who have allowed us the privilege of studying them. But many experiments cannot be conducted on humans, and for many diseases there is a need for research on experimental animals if human health is to be advanced (73). When animals are used in research, the appropriate and humane use of animals is also mandatory (74). Scientists are ethically obliged to minimize any pain or distress that laboratory animals may experience. Scientists must accept this obligation and strive to ensure that their use contributes to the advancement of scientific knowledge. Mistreatment of experimental animals is not acceptable. Institutional review boards help to ensure that this will not happen. These review boards and scientists are becoming even more sensitive to animal pain and distress than they were formerly. They are attempting to weigh the costs of animal research against the anticipated benefits to human health and welfare. Finally, scientists have an obligation to be accountable to society for how they use animals in research, and to become even more active in assuring that violations are prevented (75).

Others do not believe that animal research is justified. The attendees of this conference are unlikely to be of one mind on this issue or other questions of values, such as whether animal products should be eaten or whether animals have rights similar to those of humans. The belief that animals have rights similar to those of people is an expression of spiritual or religious values. There is no factual scientific basis for such an assertion. Differences in beliefs and expressions of value must be recognized and respected. However, those who want to eliminate the use of animals for research or food production also have an obligation to society. They must not express their views by resorting to violence or illegal acts.

Ecology, sustainability of resources, and environmental concerns

There is little doubt that many Americans are wasteful in their use of natural resources and in their treatment of the environment. However, some writings about the health effects of environmental pollution are overstated (76). Food safety is not the primary reason for ecological concerns. Arguments about economics, about the competition between animals and man for limited grain resources, and about the need to eat lower on the food chain have also received much attention (77). While we may disagree on the particulars, most of us can agree that we must give greater consideration to the biosphere in the next century than we did in the past. Carelessness seems to be on the decline, and concern for the environment is gradually gaining ground not only among vegetarians but in the larger society.

Following the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, Prime Minister Gro Harlem Brundtland of Norway emphasized the triple problems of preserving the biosphere, reconciling our lifestyles to more sustainable patterns of development, and controlling population growth. She said, "We are compelled to manage the most im-

portant global transition since the agricultural and industrial revolutions: the transition to sustainable development; how to reconcile human activities and human numbers with the long term carrying capacity of this finite earth. Developing countries require environmental space for their development. For them, the future is essentially about development and justice. For them, the environment is vital, as it is for us. But they will not accept the unequal burden that seems to be asked of them, to be caretakers of our common responsibilities for future generations, while we who have been destroying nature and raising our standards of living through unsustainable patterns of growth are not ready to take our share [in paying] . . . the bill of repair.'' She further stated that she had been ''stunned to see how the Rio Conference seemed to fail to make workable decisions on how to curb population growth'' (78).

I doubt that the answer to world hunger and malnutrition lies solely or even mostly in reduced animal food consumption in developed countries. However, we all must act to lessen and eliminate hunger in the world as well as hunger here at home. Each of us who shares concerns about world hunger, ecology, sustainability, and the environment must find ways to act on our concerns whether by recycling garbage and refuse, by eating lower on the food chain, by becoming vegetarians, by limiting the number of children, by not having an automobile, by increasing our charitable contributions, or by other choices. As a nation, we need to make some important decisions about sustainability in our relationship with the environment with respect to food and also to other natural resources. We must also become more generous in our aid to less fortunate countries and work more actively to eliminate hunger.

Where do we go from here?

We must not have dietary hubris, or overweening pride, that there is only one eating pattern (ours) that is best for health or morals. Many different eating patterns can sustain good health, including those with moderate amounts of meat (20, 79), without meat (80, 81), with some animal foods (82), and with no animal foods (83–85), provided that careful selections are made and that needs for nutrients and other beneficial substances such as fiber are met. We must continue both basic research and specific studies on the effects of various eating patterns on human health and disease. We must continue civilized discussions on the values we share and on those on which we disagree and avoid ''dietary imperialism.'' And we must meet again, at the next congress on vegetarian nutrition.

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