REPORT 2 OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH (A-12)
Labeling of Bioengineered Foods (Resolutions 508 and 509-A-11)
(Reference Committee E)

EXECUTIVE SUMMARY

Objectives. Foods containing bioengineered (also referred to as "genetically-engineered") ingredients are prevalent in U.S. grocery stores. The belief that adverse human health effects can result from consuming bioengineered foods has prompted consumer groups to urge mandatory labeling of foods containing bioengineered ingredients. This report reviews the potential adverse health effects of bioengineered foods, and implications for labeling are addressed.

Data Sources. Literature searches were conducted in the PubMed database for English-language articles published between 2000 and 2012 using the search terms "genetically modified food," "genetically engineered food," and "bioengineered food," combined with the terms "health," "safety," and "labeling." To capture other reports, news articles and press releases, Google searches were conducted using the same search terms. Additional articles were identified by manual review of the captured literature citations.

Results. Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature. However, a small potential for adverse events exists, due mainly to horizontal gene transfer, allergenicity, and toxicity. Pre-market safety assessments are designed to identify and prevent risks to human health. Consumers overwhelmingly support labeling of foods containing bioengineered ingredients. However, the FDA's science-based labeling policies state that labels need only list such information if the bioengineered food is significantly different from its traditional counterpart, or if its production method materially changes the food's nutritional profile (for example, if it contains a common allergen).

Conclusions. Despite strong consumer interest in mandatory labeling of bioengineered foods, the FDA's science-based labeling policies do not support special labeling without evidence of material differences between bioengineered foods and their traditional counterparts. The Council supports this science-based approach, and believes that thorough pre-market safety assessment and the FDA's requirement that any material difference between bioengineered foods and their traditional counterparts be disclosed in labeling, are effective in ensuring the safety of bioengineered food. To better characterize the potential harms of bioengineered foods, the Council believes that per-market safety assessment should shift from a voluntary notification process to a mandatory requirement. The Council notes that consumers wishing to choose foods without bioengineered ingredients may do so by purchasing those that are labeled "USDA Organic."

Action of the AMA House of Delegates 2012 Annual Meeting: Council on Science and Public Health Report 2 Recommendations Adopted as Amended, and Remainder of Report filed.

REPORT OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH

CSAPH Report 2-A-12

Subject: Labeling of Bioengineered Foods (Resolutions 508 and 509-A-11)

Presented by: Lee R. Morisy, MD, Chair

Referred to: Reference Committee E (Frederick R. Ridge, Jr., MD, Chair)

INTRODUCTION

Resolution 508-A-11, introduced by the Illinois Delegation, asked that our American Medical Association (AMA) study the impact of food containing genetically engineered ingredients and take further action based on the results of the study. Resolution 509-A-11, introduced by the Indiana Delegation, asked that our AMA study the impact of mandated labeling of food containing genetically engineered ingredients and take further action based on the results of the study. Both resolutions were referred.

In a 2000 report, the Council on Scientific Affairs reviewed in depth the technology used to produce transgenic crops, as well as issues relevant to the use of bioengineered ingredients in food, including the regulatory framework, human health effects, and potential environmental impacts.[1] The Council believes that the information in its 2000 report is still current and valid, and therefore will not revisit many of those issues in this report. Rather, it will focus on the issue raised in Resolution 509-A-11, that of labeling foods containing bioengineered ingredients.

METHODS

Literature searches were conducted in the PubMed database for English-language articles published between 2000 and 2012 using the search terms "genetically modified food," "genetically engineered food," and "bioengineered food," combined with the terms "health," "safety," and "labeling." To capture other reports, news articles and press releases, Google searches were conducted using the same search terms. Additional articles were identified by manual review of the captured literature citations.

BACKGROUND

Genetic modification of plants has occurred for centuries, as farmers seek to improve yields, disease resistance, and agronomic qualities.[1,2] Genetic modification by conventional breeding techniques such as crossbreeding, selection, and hybridization can be a lengthy process requiring many generations. Examples of common foods produced through conventional genetic modification include nectarines (which are genetically modified peaches) and tangelos (genetic hybrid of tangerine and grapefruit).[3] Late in the 20th century, genetic modification techniques advanced to the molecular level with transgenic technology. Transgenic technology involves the introduction of an advantageous genetic trait into a plant or animal via the direct transfer of a gene

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or other construct conferring expression of that trait. Examples of the current use of transgenic technology are the production of corn varieties resistant to certain insects, and soybeans resistant to common herbicides.

Food crops produced through transgenic technology are often referred to as "GMOs" (genetically modified organisms). Since plants that are genetically enhanced through conventional breeding techniques can also be considered genetically modified, the Food and Drug Administration (FDA) uses the terms "bioengineered" or "genetically engineered" to refer to transgenically-produced plants. For clarity and consistency with FDA regulatory documentation, this report uses the term "bioengineered" to refer to foods produced through transgenic technologies.

To date, more than 80 transgenic crops have undergone regulatory clearance in the U.S.; however, only about a dozen are currently marketed for human consumption.[4,5] The most common transgenic crops in the U.S. are soybeans, corn, sugar beets, and cotton (for cottonseed oil). Each of these crops makes up approximately 90% of the total amount planted each year.[6] Transgenic varieties of rapeseed (for canola oil), papaya, and squash are also common in the U.S. food supply. It is estimated that approximately 70% of processed foods sold in U.S. grocery stores contain ingredients derived from transgenic crops.[7]

Approval of the first transgenically-produced animal intended for human consumption has been under consideration by the FDA for several years.[8] The animal is an Atlantic salmon containing a growth hormone gene from the Chinook salmon and a gene from the ocean pout that activates the transgenic growth hormone gene year round. As a result, the salmon grows to market size in 16-18 months rather than 3 years.

Intense debate has surrounded bioengineered foods, with critics arguing that safety data are lacking and the potential human health effects of consuming bioengineered foods have not been fully explored. Several groups have called for mandatory labeling of foods containing bioengineered ingredients so that consumers are able to avoid such foods if desired. In this report, the potential adverse health effects of bioengineered foods are reviewed and implications for labeling are addressed. More detailed descriptions of transgenic crop production methods and traits, environmental concerns, and potential benefit for global food production can be found in the Council's 2000 report.[1]

AMA POLICY ADDRESSING LABELING OF BIOENGINEERED FOODS

AMA Policy H-480.958 "Genetically Modified Crops and Foods" (AMA Policy Database; see Appendix) is broad, covering the belief that regulatory oversight of bioengineered foods should be science-based and involve systematic safety assessments, supporting research into environmental consequences, and encouraging unbiased information and education of consumers. With regard to labeling, the policy states that "as of December 2009, there is no scientific justification for special labeling of genetically modified foods, as a class, and that voluntary labeling is without value unless it is accompanied by focused consumer education."

POTENTIAL HUMAN HEALTH EFFECTS OF BIOENGINEERED FOODS

Bioengineered foods have been consumed for close to 20 years, and during that time, no overt consequences on human health have been reported and/or substantiated in the peer-reviewed literature.[1,9,10] However, a small potential for adverse events exists. These potential events are centered around horizontal gene transfer, allergenicity, and toxicity.

Horizontal gene transfer

Horizontal gene transfer (HGT) is the process by which an organism transfers genetic material to another organism other than its offspring and which is followed by integration and expression of the genetic material.[11] This process is common among bacteria and other prokaryotes.[12] Speculation that HGT could occur between ingested bioengineered food and enteric bacteria present in the human mouth, stomach, and gut has been expressed. Of special concern are bioengineered foods made from transgenic plants that express antibiotic-resistance markers (ARMs), which are employed during the development of the transgenic plant to select for those that have incorporated the transgene.[13] When humans ingest food derived from plants that express an ARM, it is theoretically possible that the ARM could be taken up and stably integrated into enteric bacteria through HGT, resulting in bacteria that are resistant to specific antibiotics. This situation has never been reported, although studies point to its possibility. The *epsps* transgene, which confers resistance to a common herbicide, survives intact through the small intestine of humans when bioengineered food made with Roundup Ready soybeans (resistant to the herbicide glyphosate, commonly called Roundup®) is consumed. [14] Also, M13 bacteriophage DNA has been shown to survive transiently in the gastrointestinal tract of mice and is able to enter the bloodstream.[15] However, these studies demonstrate only the ability of certain DNA molecules to resist degradation by salivary and gastric enzymes; no studies to date have demonstrated the ability of the DNA molecules to become stably integrated into the bacterial genome by HGT.[16]

Some consumers have reported concerns that consumption of bioengineered foods means that humans will ingest the "foreign" DNA present in transgenes.[11] A DNA sequence of particular concern is the cauliflower mosaic virus 35S promoter, commonly used to direct expression of plant transgenes. This promoter is efficient and functional in a variety of organisms, and it has been suggested that it might lead to inappropriate overexpression of genes in species into which it is transferred and promote HGT, or recombine with dormant endogenous viruses present in humans, leading to new infectious viruses.[17] However, almost all genomes of human endogenous retroviruses contain lethal mutations that prevent replication and production of viral particles.[11] Also, the cauliflower mosaic virus is present naturally in approximately 10% of cabbages and cauliflowers, and so is regularly ingested by humans. No adverse consequences from the consumption of this virus have been reported.[11]

Several factors limit the possibility of HGT of plant transgenes into enteric bacteria.[13] First, depending on the type of food, DNA is broken down during food processing. Second, if it survives food processing, it is then subjected to degradation enzymes in the saliva and gastrointestinal tract when consumed. Third, if DNA were to be taken up by enteric bacteria, it would be subjected to bacterial restriction enzymes that cleave foreign DNA. Further, for stable integration and expression to occur, the DNA fragment would have to be homologous to bacterial DNA (to allow for recombination), and would have to be inserted near the proper regulatory sequences that drive expression. The combination of these barriers results in a nearly impossible chance for stable integration. Nonetheless, in an effort to avoid any chance of enteric bacteria becoming antibiotic resistant, selection methods that do not confer such resistance have been developed and are now commonly used.[18,19] AMA Policy H-480.958 supports these alternative selection methods.

It should be noted that all foods, even those that are not bioengineered, contain varying amounts of DNA, both from the ingredients themselves and from microorganisms present in the food. To the extent that HGT, although unlikely, could potentially occur, bacteria present in non-bioengineered foods have as much potential to carry out HGT as bacteria present in bioengineered food.[2]

Toxicity

A serious concern voiced by consumers and others is whether the protein products of transgenes themselves might be toxic to humans, or whether those proteins may induce unintended effects on plant metabolism that could lead to upregulated expression of toxins. This concern was heightened with the publication of a 1999 study reporting negative effects in the gastrointestinal tract of rats fed with potatoes expressing a lectin transgene conferring insecticide activity.[20] However, the experimental design of this study is widely regarded as flawed, with subsequent studies unable to reproduce the findings.[11] Further studies using the same transgene found that observed differences in blood biochemistry, hematology, immunological parameters, and organ weights were not adverse, and likely to be caused by increased water uptake in the rats consuming food containing the lectin transgene.[21] The potential toxicity of lectins has been widely documented, and for that reason, no transgenic plants carrying lectin genes have been commercialized.

Other studies have examined potential toxicity of transgenic crops. In one, mice fed Roundup Ready soybeans had modifications in the nuclei of hepatocytes, suggesting that bioengineered soybeans are able to modify the metabolic activities of hepatocytes.[22] In another, results suggested that bioengineered soybeans can influence the function of pancreatic acinar cells in mice.[23] However, these studies too have been criticized as being tainted by important flaws.[11] In contrast, other groups have demonstrated that neither Roundup Ready soybeans nor Bt corn (expressing a transgene that acts as an insecticide) have any negative effects in mice.[24,25] The same is true for several other transgenic varieties of soybeans and corn fed to rats.[25-30] Relevant for humans, the processing of bioengineered foods intended for consumption leads to a complete loss of functional activity for most transgenic proteins.[31]

Before bioengineered foods reach the market, producers perform safety assessments to evaluate potential toxicity. The safety assessments are based on the concept of "substantial equivalence," which involves a thorough comparison of the new transgenic crop with its conventionally bred counterpart that is generally accepted as safe based on a history of human consumption.[1,32,33] If the transgenic crop possesses similar levels and variations of critical nutrients and toxicants as its conventional counterpart, it is considered to be substantially equivalent; the presence of novel DNA or protein does not itself qualify as a difference.[1] Any defined differences subject the transgenic crop to additional testing.[1,32] Newer profiling techniques that aim to increase the probability of detecting toxicants and unintended effects are increasingly being employed.[2,11]

Allergenicity

The transgene expressed by transgenic crops has the potential to encode a protein that is allergenic to humans. Potential allergenicity problems have occurred in two documented cases. In both, pre- and post-market safety procedures effectively halted exposure.[11] The first case involves a transgenic soybean intended for use in animal feed; the soybeans were engineered to express a methionine-rich protein from the Brazil nut. Pre-market testing verified that the transgenic protein was able to bind to Immunoglobulin E (IgE) from people allergic to Brazil nuts, an indication that the protein is an allergen. As a consequence, and even though it was only intended for animal feed, the transgenic soybean variety was never commercialized.[34] The second case involved a variety of corn engineered to express Cry9C, an insecticidal protein. The corn was approved for use as an animal feed, but not for human consumption because upon pre-market testing, Cry9C showed some attributes associated with an allergen.[11] Traces of the transgenic corn were detected in some human food products, and after publication of the contamination, some consumers reported adverse effects. However, extended evaluations made by independent institutions could detect no direct implication of Cry9C in the incidents.[35,36] This variety of corn is no longer commercialized.

To date, no evidence has supported an increased degree of allergenicity of bioengineered foods compared to their non-bioengineered counterparts.[9-11,37] This is due in part to the safety assessments to which bioengineered foods are subjected prior to marketing.[33] Thorough pre-market evaluation is considered to be the most effective tool to protect the public. Current safety assessments are based on a "weight-of-evidence" approach, where each food product is evaluated on a case-by-case basis using a number of elements.[38,39] These elements are:

- Source of the transgene: Does the gene encoding the new protein come from a commonly allergenic source such as a food (e.g., peanut, hazelnut, eggs, or milk), respiratory allergen (e.g., pollen or dust mite), or contact allergen (latex)?
- Protein sequence: How closely does the sequence of the newly introduced protein match that of a known allergen?
- IgE-testing: Does the protein encoded by the transgene bind IgE-antibodies from people known to be allergic to the source of the transgene?
- Stability testing: Is the expressed protein highly resistant to digestion by pepsin?
- Abundance: Is the protein abundant and stable in the food?

For each bioengineered food product, the results of these elements are aggregated and interpreted to determine potential allergenicity.[38] It should be noted that absolute avoidance of all risk is not achievable. Thus the safety assessments that have been developed focus on avoiding risks that are predictable and likely to cause common allergic reactions. Research to examine more effective methods of allergenicity assessment is ongoing.[9,40,41]

LABELING OF BIOENGINEERED FOODS

FDA labeling policy

The FDA regulates food labeling using an approach designed to provide consumers with information relative to health, nutrition, and safety. The Federal Food and Drug Cosmetic Act (FD&C Act) lays out the FDA's science-based labeling policy; all foods, whether or not they are derived from transgenic crops or animals, are subject to the policy.[42,43] The FDA has the authority to initiate regulatory action if a product fails to meet the requirements of the FD&C Act.[3]

Three key provisions in the FDA's labeling policy pertain to the issue of labeling bioengineered foods. First, the law requires that all food labels include a name that accurately describes the basic nature of the food.[3,43] Regarding bioengineered foods, name changes are only appropriate when the food is significantly different from its traditional counterpart, such that the common or usual name no longer adequately describes the new food. Changes to the name of the product are not appropriate if the resulting bioengineered food is not materially different from its traditional counterpart (i.e., unless the bioengineered food differs in nutritional quality, taste, etc.).

Second, significant differences in food arising from production processes must be disclosed in labeling.[3,43] Thus, if the transgenic production method materially changes a food's nutritional profile or results in a safety concern, this must be disclosed on the label. For example, if a bioengineered food were to contain a commonly recognized allergen not present in its non-bioengineered counterpart, the presence of the allergen must be stated on the label. Under this provision, the FDA cannot require labeling based solely on differences in the production process if the resulting products are not materially different or do not pose a safety risk. While the definition of a "material difference" is not specified in the FD&C Act, precedent guides the FDA in its interpretation of the term.[3] Generally, the FDA has limited the scope of the materiality concept to

information about the attributes of the food itself. The fact that a food or any of its ingredients were produced using transgenic methods is not considered material, and therefore does not constitute information that must be disclosed in labeling. The FDA therefore has neither a scientific nor a legal basis to require such labeling.[3,42]

Third, the FDA allows voluntary labeling about production methods as long as the labeling is not false or misleading.[3] In 2001, the FDA released a Draft Guidance for Industry to provide information to manufacturers wishing to use informative statements about whether foods contain bioengineered ingredients.[44] Examples of acceptable statements for foods that do not contain bioengineered ingredients are: "This product does not contain ingredients that were produced using biotechnology" or "This oil is made from soybeans that were not genetically engineered." The FDA discourages the use of acronyms such as "GMO-free" since some consumers may not know what the acronym stands for, and since "genetically modified" can refer to conventional techniques to alter genotype.

The FDA believes that its current labeling policies, combined with pre-market safety assessments, are sufficient to ensure the safety of bioengineered foods.[3] Before marketing foods with bioengineered ingredients, companies voluntarily notify the FDA, leading to a two-part consultation process between the agency and the company that initially involves discussions of relevant safety issues and subsequently the company's submission of a safety assessment report containing test data on the food in question.[45] The FDA has considered making the pre-market notification process mandatory, but has stated that it does not believe such a rule is needed since the voluntary process has fully protected the public.[46,47] To date, all manufacturers of bioengineered foods intended for marketing have engaged in the voluntary notification process.[7]

Although the approval procedures for transgenic animals intended for human consumption are different than those for transgenic plants, the same labeling principles apply. Thus, if bioengineered food produced from a transgenic animal is materially different from its non-bioengineered counterpart in its nutritional or safety profile, it must be labeled as such. As in the case of bioengineered foods produced from transgenic plants, the FDA does not consider the methods used to develop the animal as "material."[48]

Consumer perspectives on labeling

Fears that bioengineered foods pose a safety threat to consumers, as well as a "right to know" what is being consumed and to be afforded the choice to avoid bioengineered foods, are the basis for arguments that bioengineered foods should be labeled as such.[42] Several surveys have attempted to characterize consumers' wishes with regard to labeling bioengineered foods. In surveys asking whether consumers are satisfied with U.S. food labeling policies, only 18% report that information is missing; among this group, only 3% report that information about bioengineering should be included in the label.[49] However, when direct questions about labeling of bioengineered food are asked of consumers, such as whether they support mandatory or voluntary labeling policies, the overwhelming majority favor mandatory labeling policies.[7,50-52]

Consumer groups have been outspoken in their support of a mandatory labeling policy for bioengineered foods.[53,54] A petition calling for mandatory labeling was submitted to the FDA by the Center for Food Safety in the fall of 2011 and more than 400 organizations have expressed their support for the "Just Label It" campaign.[55,56] The FDA responded in the spring of 2012, saying that it had not yet made a decision on the petition and would continue to consider it. Others have criticized the FDA's approval and labeling policies as inadequate in the face of advancing plant and animal transgenic technologies and have called for reform.[57,58] Additionally, more than a dozen

states and the U.S. House and Senate have considered legislation focused on mandatory labeling of bioengineered plants and animals. Only Alaska has passed a law, requiring that bioengineered salmon be labeled (bioengineered salmon are not currently marketed).

Mandatory labeling of foods would involve significant costs, especially the costs of testing for the presence of bioengineered ingredients, segregating the crops, and monitoring for truthfulness of labeling and enforcement of the regulations that exist.[59,60] These costs would likely be passed to the consumer; it is estimated that mandatory labeling would increase the average household's annual grocery bill by $140-$200 per year.[7,50] Surveys of U.S. consumers reveal that while some are willing to pay a premium for foods that do not contain bioengineered ingredients, the majority of consumers are not willing to pay for increases commensurate with the costs of mandatory labeling policies.[50,61,62]

Regarding consumers' "right to know" argument, courts have found that consumer curiosity alone is not enough to require special labeling.[63,64] The reasoning behind these rulings is that 1) special labeling places an unfair financial burden on industries that would have to investigate, document, and label the "level" of bioengineering in their product; 2) it may mislead consumers into thinking that bioengineered foods are less safe than their conventional counterparts; 3) it places a burden on the FDA itself, which would have to divert resources away from safety-based labeling to address consumer curiosity; and 4) it places no end on the information consumers could request manufacturers to disclose.

In Europe, all food with bioengineered ingredients must be labeled as such. Several other countries have also adopted mandatory labeling policies.[59,65] Examination of these policies reveals that mandatory labeling fails to result in consumer choice because stores have chosen not to sell foods with bioengineered ingredients, rather than be seen as supportive of bioengineered foods. In countries that have adopted mandatory labeling, it is often difficult, if not impossible, to find food items bearing such labels.[66] This is considered to be unfair to those who prefer to buy presumably lower-cost bioengineered foods.[66]

Consumers wishing to avoid bioengineered foods can purchase foods that are certified USDA Organic. This labeling term indicates that no bioengineered ingredients were used in the food.

CONCLUSION

Despite strong consumer interest in mandatory labeling of bioengineered foods, the FDA's science-based labeling policies do not support special labeling without evidence of material differences between bioengineered foods and their traditional counterparts. The Council supports this science-based approach, and believes that thorough pre-market safety assessment and the FDA's requirement that any material difference between bioengineered foods and their traditional counterparts be disclosed in labeling, are effective in ensuring the safety of bioengineered food. To better detect potential harms of bioengineered foods, the Council believes that pre-market safety assessment should shift from a voluntary notification process to a mandatory requirement. The Council understands that some consumers may wish to choose foods that do not contain bioengineered ingredients, and notes that consumers may do so by purchasing food products that are labeled USDA Organic.

RECOMMENDATION

The Council on Science and Public Health recommends that the following statement be adopted in lieu of Resolutions 508-A-11 and 509-A-11, and the remainder of the report be filed:

That Policy H-480.958 “Genetically Modified Crops and Foods” be amended by insertion and deletion as follows:

Bioengineered (Genetically ~~Modified~~ Engineered) Crops and Foods

(1) Our AMA recognizes the continuing validity of the three major conclusions contained in the 1987 National Academy of Sciences white paper "Introduction of Recombinant DNA-Engineered Organisms into the Environment." [The three major conclusions are: (a)There is no evidence that unique hazards exist either in the use of rDNA techniques or in the movement of genes between unrelated organisms; (b) The risks associated with the introduction of rDNA-engineered organisms are the same in kind as those associated with the introduction of unmodified organisms and organisms modified by other methods; (c) Assessment of the risk of introducing rDNA-engineered organisms into the environment should be based on the nature of the organism and the environment into which it is introduced, not on the method by which it was produced.)

(2) That federal regulatory oversight of agricultural biotechnology should continue to be science-based and guided by the characteristics of the plant or animal, its intended use, and the environment into which it is to be introduced, not by the method used to produce it, in order to facilitate comprehensive, efficient regulatory review of new ~~genetically modified~~ bioengineered crops and foods.

(3) Our AMA believes that as of ~~December 2009~~ June 2012, there is no scientific justification for special labeling of ~~genetically modified~~ bioengineered foods, as a class, and that voluntary labeling is without value unless it is accompanied by focused consumer education.

(4) Our AMA supports ~~efforts for the~~ mandatory pre-market systematic safety assessments of ~~genetically modified~~ bioengineered foods and encourages: (a) development and validation of additional techniques for the detection and/or assessment of unintended effects; (b) continued use of methods to detect substantive changes in nutrient or toxicant levels in ~~genetically modified~~ bioengineered foods as part of a substantial equivalence evaluation; (c) development and use of alternative transformation technologies to avoid utilization of antibiotic resistance markers that code for clinically relevant antibiotics, where feasible; and (d) that priority should be given to basic research in food allergenicity to support the development of improved methods for identifying potential allergens. The FDA is urged to remain alert to new data on the health consequences of bioengineered foods and update its regulatory policies accordingly.

(5) Our AMA supports continued research into the potential consequences to the environment of ~~genetically modified~~ bioengineered crops including the: (a) assessment of the impacts of pest-protected crops on nontarget organisms compared to impacts of standard agricultural methods, through rigorous field evaluations; (b) assessment of gene flow and its potential consequences including key factors that regulate weed populations; rates at which pest resistance genes from the crop would be likely to spread among weed and wild populations; and the impact of novel resistance traits on weed abundance; (c) implementation of resistance management practices and continued monitoring of their effectiveness; ~~and~~ (d) development of monitoring programs to assess ecological impacts of pest-protected crops that may not be apparent from the results of field tests; and (e) assessment of the agricultural impact of bioengineered foods, including the impact on farmers.

(6) Our AMA recognizes the many potential benefits offered by ~~genetically modified~~ bioengineered crops and foods, does not support a moratorium on planting ~~genetically modified~~ bioengineered crops, and encourages ongoing research developments in food biotechnology.

(7) Our AMA ~~recognizes that the~~ urges government, industry, consumer advocacy groups, and the scientific and medical communities ~~have a responsibility~~ to educate the public and improve the availability of unbiased information and research activities on ~~genetically modified~~ bioengineered foods ~~and of research activities~~. (CSA Rep. 10, I-00; Modified: CSAPH Rep. 1, A-10) (Modify Current HOD Policy)

Fiscal note: Less than $500

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Appendix. AMA Policy on Bioengineered Foods

H-480.958 Genetically Modified Crops and Foods

(1) Our AMA recognizes the continuing validity of the three major conclusions contained in the 1987 National Academy of Sciences white paper "Introduction of Recombinant DNA-Engineered Organisms into the Environment." [The three major conclusions are: (a)There is no evidence that unique hazards exist either in the use of rDNA techniques or in the movement of genes between unrelated organisms; (b) The risks associated with the introduction of rDNA-engineered organisms are the same in kind as those associated with the introduction of unmodified organisms and organisms modified by other methods; (c) Assessment of the risk of introducing rDNA-engineered organisms into the environment should be based on the nature of the organism and the environment into which it is introduced, not on the method by which it was produced.)

(2) That federal regulatory oversight of agricultural biotechnology should continue to be science-based and guided by the characteristics of the plant, its intended use, and the environment into which it is to be introduced, not by the method used to produce it, in order to facilitate comprehensive, efficient regulatory review of new genetically modified crops and foods.

(3) Our AMA believes that as of December 2009, there is no scientific justification for special labeling of genetically modified foods, as a class, and that voluntary labeling is without value unless it is accompanied by focused consumer education.

(4) Our AMA supports efforts for the systematic safety assessment of genetically modified foods and encourages: (a) development and validation of additional techniques for the detection and/or assessment of unintended effects; (b) continued use of methods to detect substantive changes in nutrient or toxicant levels in genetically modified foods as part of a substantial equivalence evaluation; (c) development and use of alternative transformation technologies to avoid utilization of antibiotic resistance markers that code for clinically relevant antibiotics, where feasible; and (d) that priority should be given to basic research in food allergenicity to support the development of improved methods for identifying potential allergens.

(5) Our AMA supports continued research into the potential consequences to the environment of genetically modified crops including the: (a) assessment of the impacts of pest-protected crops on nontarget organisms compared to impacts of standard agricultural methods, through rigorous field evaluations; (b) assessment of gene flow and its potential consequences including key factors that regulate weed populations; rates at which pest resistance genes from the crop would be likely to spread among weed and wild populations; and the impact of novel resistance traits on weed abundance; (c) implementation of resistance management practices and continued monitoring of their effectiveness; and (d) development of monitoring programs to assess ecological impacts of pest-protected crops that may not be apparent from the results of field tests.

(6) Our AMA recognizes the many potential benefits offered by genetically modified crops and foods, not support a moratorium on planting genetically modified crops, and encourage ongoing research developments in food biotechnology.

(7) Our AMA recognizes that the government, industry, and the scientific and medical communities have a responsibility to educate the public and improve the availability of unbiased information on genetically modified crops and of research activities. (CSA Rep. 10, I-00; Modified: CSAPH Rep. 1, A-10)