

Genetically modified foods and health: a second interim statement



British Medical Association
Board of Science and Education

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March 2004

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A publication from the BMA science and education department and the Board of Science and Education

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Approval for publication as a BMA policy report was recommended by BMA Board of Professional Activities on 18 February 2004.

Acknowledgements

The Association is very grateful for the help provided by the BMA committees and many outside experts and organisations. We would particularly like to thank those experts who attended the round table meeting in June 2003.

Introduction

The advent of genetically modified (GM) technology has raised concerns about technological advances in food production to an unprecedented level and it has proved difficult to hold a balanced and objective debate. Individuals and organisations are all too readily perceived as for or against genetic modification of food crops, and this has not helped us understand the implications or make decisions based on a clear examination of risks and benefits.

The BMA produced an interim report in 1999 on the health implications of GM food crops. In accordance with our intention to keep the public informed, we held a round table meeting of experts in June 2003 and have recently reviewed the emerging evidence. In producing an update of our 1999 report, the BMA seeks to support balanced debate. As an organisation of doctors, we are not experts in agricultural techniques and crop science, but we are concerned with all issues of public health. The environment in which we live, the air we breathe, the water we drink and the food we eat, all have an impact on our health as individuals. It is this context that the following statement has been prepared.

The need for further research

A great deal of research, of varying quality, has been conducted since 1999 in the arena of genetic modification of food. However, many unanswered questions remain, particularly with regard to the potential long-term impact of GM foods on human health and on the environment. The few robust studies¹ that have looked for health effects have been short-term and specific. There is a lack of evidence-based research with regard to medium and long-term effects on health and the environment. It is clear from the public debate that this remains a matter of great public concern. If research sponsors and government are to continue to meet their responsibilities to enhance choice for growers and the public, it is crucial that the public's concerns are taken into account from the earliest possible stage of the research process.

In our view, the *potential* for GM foods to cause harmful health effects is very small and many of the concerns expressed apply with equal vigour to conventionally derived foods. However, safety concerns cannot, as yet, be dismissed completely on the basis of information currently available. The BMA has identified several areas where we believe more research is needed:

- **Allergens:** While we are not aware of any evidence that existing GM foods cause allergic reactions, it remains possible that any new food products could elicit new allergies. We appreciate that there are difficulties with carrying out research in this area, not least the lack of baseline data on food composition and consumption, and the lack of a reliable, well-validated animal model with which to test allergenicity. Further research is required to develop reliable *in vitro* methods for sensitisation events based on human tissue samples or cell cultures. Research should also be undertaken to understand how nutritional status, the plant food matrix and subsequent digestive processing may alter allergenic potential. There is evidence that the food matrix can affect the release of other nutrients during digestion and it seems likely that it can also influence the release and digestion of allergens in the digestive tract. With regard to sensitisation it is still not known whether other components in the food matrix can have an adjuvant effect on the development of IgE responses in susceptible individuals. Greater knowledge in this area will enable improved risk assessments to be made for novel foods in general, not just GM foods. In any surveillance of food/crop allergenicity (see below) it is important to consider that inhalation and skin contact may prove to be just as significant as ingestion.
- **Nutritional status:** GM foods could conceivably have different effects on those of poor nutritional status and/or those belonging to 'vulnerable groups' (notably the foetus, infants, children, pregnant and lactating women, the elderly and those with chronic disease) when compared with healthy individuals.² Whereas the GM content of the adult diet is likely to remain low, it will be

important to ensure that any food products, intended to be in large amounts by infants or other 'vulnerable groups', are subjected to rigorous processes of approval by the designated regulatory and advisory authorities.

- *Genetic transfer:* While gene transfer has been observed in the gastrointestinal tract of some mammals^{3,4} and birds,⁵ there is still great uncertainty as to the extent and the consequences of this transfer.⁶ Many consider that transfer occurs at such a low frequency that any addition to the natural pool of antibiotic resistant organisms, for example, is marginal. We consume large amounts of non-human non-GM DNA as part of our daily diet with no identifiable problems. However, research is needed to assess whether transfer of DNA from GM food is more likely to occur as it contains additional material used to assist insertion of the GM DNA in the first place.
- *Environmental impact:* Major concerns still surround the use of herbicides with GM crops and their effect on the environment. Recent UK Farm Scale Evaluations of GM herbicide-tolerant crops (GMHT)⁷ indicate that if GMHT beet and spring oilseed rape were introduced and managed as they were in the trial, a significant reduction would be expected in weed biomass and weed seed return. This would result in fewer nectar resources for pollinators and fewer weed seed resources for granivorous birds. For GMHT maize, the evaluations indicated that the opposite is expected. It is clear that there is still a need for long-term case-by-case research into the effects of GM crops on the environment and biological diversity. It must be stressed that the effects seen in the Farm Scale Evaluations were a consequence of the herbicide regimes applied and not a direct consequence of the way in which the GM crops had been engineered.

The potential to create 'super weeds' also gives rise to concern. Canadian farmers found that their fields filled with stray GM crop plants known as 'volunteers'. These were resistant, not only to the substance against which the main crop was engineered, but to the other two herbicides used as well. It is possible that such 'volunteers' could turn into unradicable weeds.⁸ Furthermore, recent research has supported the contention that hybrids between GM crops and their non-GM equivalent are 'almost inevitable'.⁹

Research by the Food Standards Agency (FSA) on consumer views shows that although concern about GM foods has decreased over the past three years, many people remain unclear and/or unconvinced about the case for consumer benefits. The potential impact of GM crops on the environment and biological diversity is the issue that has given rise to most concern.¹⁰

- *Experimental design:* More research is required on how best to carry out experiments, risk assessments and surveillance studies with respect to GM crops and foods. We accept that research into the possible health effects of GM foods in this country has been limited to date by the lack of firm hypotheses regarding such effects, difficulties of defining individual consumption, and the generally low levels of consumption of GM foods.¹¹ Acquisition of baseline data on the composition, purchase and consumption of food will be imperative for nutritional and health surveillance. The FSA is encouraged to act on the suggestions made in its commissioned feasibility study¹² and ensure that a constantly updated database of nutritional information relating to food products (including GM products) is established and maintained in this country. Labelling of GM-containing foods should be continued in order to facilitate further health research and allow the public to choose whether they consume GM food or not. Robust population health surveillance in relation to consumption of all foods, including GM foods, is essential and we endorse the suggestions in the FSA feasibility study regarding the importance of linking nutritional and health surveillance data.

Risks and benefits

When seeking to optimise the balance between benefits and risks, it is prudent to err on the side of caution and, above all, learn from accumulating knowledge and experience. Any new technology such as genetic modification must be examined for possible benefits and risks to human health and the environment. As with all novel foods, safety assessments in relation to GM foods must be made on a case-by-case basis.

The BMA supports the improvement of conventional and organic farming, and appreciates the concerns about cross contamination with GM crops.¹³ While we acknowledge the potential benefits of GM crops, the evidence for real benefit is not yet sufficiently persuasive to grow GM crops at the expense of conventionally derived alternatives that can be grown at least as effectively.

Effective food security (ie freedom from hunger and fear of starvation) relies on genuine public goods that can be shared and copied freely.¹⁴ We understand the concerns being expressed about the negative consequences of allowing the private sector to dictate the price of genetically modified crops and/or pesticides and about the gradual privatisation of scientific research and its potential consequences for the independent regulatory assessment of GM technologies. While discussion of such concerns and related farming issues are beyond the scope of this present statement, we see the need for further debate about the social and health risks potentially associated with GM foods. If public mistrust is to be alleviated, it is imperative that bodies, which regulate new agricultural and food technologies, should retain full transparency in their deliberations and remain fully accountable to the public they are intended to serve.

Members of the GM jury project* were briefed on various aspects of genetic modification by a diverse group of acknowledged experts in the relevant subjects. The GM jury reached the conclusion that the sale of GM foods currently available should be halted and the moratorium on commercial growth of GM crops should be continued. These conclusions were based on the precautionary principle and lack of evidence of any benefit. The Jury expressed concern over the impact of GM crops on farming, the environment, food safety and other potential health effects.¹⁵

In addition, there should be an end to assumptions that GM crops are necessary to feed the starving, given the complex food distribution, social and economic factors that lie behind such hunger.¹⁶ While the BMA does not see a case to halt the sale of currently available GM foods, it does not feel that the argument has yet been made to allow widespread commercial planting of GM crops in this country. Our reasoning relates more to the lack of clear benefit rather than presence of unacceptable risk to health, and to the demonstrated need⁷ to assess GM crops on a case-by-case basis.

Public mistrust of science in the UK has been fostered by a number of recent scandals in relation to the application of food technology. It is of paramount importance that the communication of risk to the public is improved and that the information provided be unbiased, based on sound science and accessible. Communication of risk is about more than providing even the best information; it is a matter of two-way communication and obtaining consensus or agreement.

* Two juries of 12 to 15 people were established by selecting names at random from the electoral roll in four wards of both Gateshead and St Albans (for further information go to: www.gmjury.org)

Conclusions regarding GM foods and health

The Royal Society review (2002)¹⁷ concluded that the risks to human health associated with the use of specific viral DNA sequences in GM plants are negligible, and while calling for caution in the introduction of potential allergens into food crops, stressed the absence of evidence that commercially available GM foods cause clinical allergic manifestations. The BMA shares the view that that there is no robust evidence to prove that GM foods are unsafe but we endorse the call for further research and surveillance to provide convincing evidence of safety and benefit.

Epidemiological health surveillance will remain impractical while so few of the UK population are exposed to GM foods. In the USA where a much larger proportion of the population has been exposed, food-derived illnesses are on the increase,^{18,†} although any suggestion that this could be linked to GM foods is not supported by scientific evidence. It is noteworthy that hospital admissions for systemic allergic disorders, including food allergy, increased significantly in England between 1990-91 and 2000-01 despite very low levels of exposure to GM foods.¹⁹ However, this debate underlines the need for the UK to take steps now to improve its nutritional and related health surveillance. The BMA still considers that with several caveats (notably adequate risk assessment procedures, independent and rigorous testing of novel foods, adequate post marketing surveillance and proper regulation), genetically modified food has enormous potential to benefit both the developed and the developing world in the long-term. Continuing sound scientific research will provide the only means of eliminating the uncertainty that still surrounds the environmental and health impact of GM crops.

† The incidence of foodborne illness caused by most pathogens under active surveillance decreased during 1996-2001. However, the proportion of outbreaks caused by fruits and vegetables has increased (Centres for Disease Control and Prevention, USA).

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