

Genetically modified foods and children potential health risks

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Abstract. – *Aim.* Professor Pusztai was publicly humiliated over claims that genetically modified (GM) Frankenstein food may be harmful. He was stripped of his post and described as 'muddled' by his superiors after he referred to experiments in which rats had been damaged when fed genetically-altered potatoes. Who is in an unsound scenario, supported by verbal expressions ("substantially"), should even more expend further effort in conducting scientific investigation into the safety of GM varieties of plants.

Observations. Of particular concern is the exposure of infants and children to GM foods (GMFs) because of their possible increased susceptibility for untoward effects. Several examples stress that the ascertainment of human disease emerged after certain materials were widely used. Studies show that some compounds were not adequately tested for toxicity before their commercial introduction, whereas proper premarked testing would have prevented a prolonged exposure.

Conclusions. Too often the toxicity of these substances is untested and the potential hazards that they may pose to children have not been examined. Nobody has evaluated whether intrauterine and infant exposure to GMFs may have profound permanent and irreversible consequences even in adult life. In this paper we analyse issues pertaining to children's health that have been largely ignored.

Key Words:

Doctor Pusztai, Frankenstein' food, Science dependence, Environmental hazards, Genetically modified foods, Hydrolysate formulas.

Introduction

It seems that in recent times it comes into fashion to perpetrate unexpected and sudden dismissals. Professor Pusztai was sacked

on the spot because he allegedly published "incomplete or falsified results"¹. The message is that GMFs have not been thoroughly investigated about safety¹. Doctor Lundberg was dismissed in 24 hours as 17-year Editor of JAMA, and for what it seems a futile reason² We have meta-analysed 208 pediatric cases and added 40 personal cases of severe reactions to the so-called hydrolysate formulas (HFs), derived from cow milk (CM) which are prescribed for feeding babies or children allergic to CM. Several reactions were IgE-mediated, all in all in 132 children, aged 20 days-15 years) to casein HFs (1 case of shock, 5 of anaphylaxis, 7 of generalized urticaria, 1 apparent life-threatening event) (+ 2 localized), and in 70 children aged one month-15 years to whey HFs (either extensively or partially) (1 case of shock, 10 of anaphylaxis, 13 systemic reactions, 2 apparent life-threatening events)³⁻⁵. It is noteworthy that when HFs were first marketed the "experts" of this area have several times assured that such reactions were 5 or 6 at the most, and that they could provoke only rarely a limited reaction⁶. Do not be surprised therefore, if somebody calls "falsified" or "unreliable" Pusztai's papers, or accuses Lundberg of inappropriately and inexcusably interjecting into a leading journal, sharing nothing with science or medicine.

We understand that the criticism addressed to Professor Pusztai has included also the invention of a work of his on GM potatoes that was rejected by an unknown Journal because it was badly designed, poorly carried out, and reported inaccurately interpreted experiments¹. In the letter cited above Pusztai finally explained that it was an internal report containing no such details. However, dark clouds bloom around HFs⁷.

Environmental Hazards for Children

The recent debate on GMFs has triggered controversial, but not unfounded discussions. A GM plant is derived from rDNA technology that contains genetic material from outside that particular plant species. Such problem is lively sensed by the industries producing foods for infants and young children, since several parents are worried about this neologism, which they read on the labels of a number of commercial products on supermarket shelves. The Frankenstein' food stems from the development of techniques for genetic manipulation of foods, thus carrying an obvious risk for food-allergic children⁸. For example the introduction of fish proteins into potatoes to enable storage of the vegetable below 0°C⁸ or of allergenic proteins from Brazil nuts in soybean, for nutritional purposes⁹ can trigger serious anaphylactic reactions in fish-allergic children or, respectively, in babies allergic to Brazil nut following a soy-based diet. Reduction in allergenicity has been tried by chemical or physical treatment of CM-based formulas, however, HFs have triggered several reactions⁵. A successful reduction of allergenic content has been obtained by changing the relative ratio of the normal constituents of a food, as was the case with the development of hypoallergenic rice¹⁰. Reassuring reports on HFs appeared in 1984, but 16 years after the first report⁶ our study has finally been published, and probably somebody will try to paint us as inaccurate and alarmist.

Apart from classical examples showing that a proper, definitive assessment of the toxicity of the related substances came only after decades of their authority-approved use, including DDT and thalidomide, a further example of unrecognized toxicity is the Alar story.

Alar, a synthetic chemical largely used from 1968 until 1989 on certain food crops, acted as a crop growth-retardant, delaying ripening and hence prolonging crop life. Also Alar was not exhaustively tested before commercialization. The first reports of carcinogenicity using poor data were overlooked, but in 1989 pediatricians and scientists of governmental agencies fully documented that Alar presented the greatest cancer risk to pre-schoolchildren¹¹.

A large variety of pesticides are widely used in agriculture and in human foods (Figure 1). They should be substances intended for preventing, destroying, repelling, or mitigating any pest¹², however their adverse effects could fill a textbook¹³. However, from a pediatric perspective no strict maximum residue concentrations (MRC) for each individual contaminant has been as yet defined, albeit it should have been established (UE directives) by January 1999¹³. US environmental legislation dates back to the 1970s, but in 1993 was issued a NRC (National Research Council) report specifically devised for protecting infants and children from pesticide exposure¹⁴. The report emphasized that children are different from adults in terms of exposure and sensitivity to various xenobiotics because they are growing and their internal organs are developing and maturing, also due to their distinctly different behavioral and eating patterns¹⁴. At least the MRC should be defined¹², however times are not ripe.

Elements of Caution

The UE is now pressed by multinationals insisting on the removal of the decision to mark the presence of GMFs on product labels, unless their rate was lesser than 1%: who has so sophisticated weighing-machines to precisely measure 1%?, who has money enough to buy such precision instruments? The sensitizing substances are measured in µg¹⁵. We have demonstrated that one drop of CM can trigger anaphylactic shocks in babies¹⁶.

The "own-goals" of the multinational industries producing GMFs are now countless: Monsanto only recently should have discovered that, in the GM soybean produced seven years ago to the FDA to get the official permission to commercialize soybean, there were two more genes in addition to the 3 that were denounced: a 166% increase. According to Monsanto such genes remained "dormant" during seven years, were completely inactive: not only we object, which analysis the Monsanto has done to affirm this truth, but also whether they have evaluated the world consequences, being soybean a natural ingredient of a myriad of GMFs.

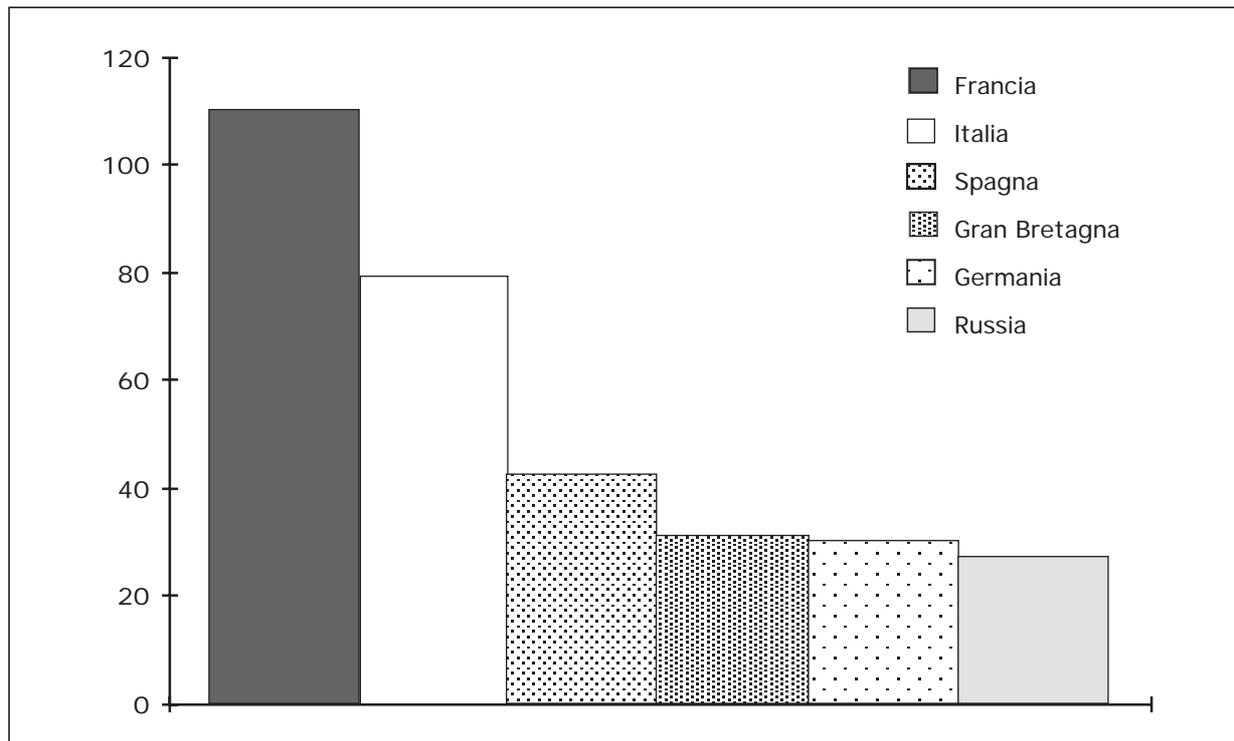


Figure 1. Pesticides consumed in some European countries (t × 10³). Data FAO

The zenith (of own-goals) was reached with 550% of honey cans containing pollen traces, that were GM pollens¹⁷, therefore contraindicated for children with respiratory allergy and/or oral allergic syndrome¹⁸, and with GM canola transported by the wind on fields with biological farming¹⁹.

Another discussed procedure regards transgenic fish developed by several organizations to stock aquaculture farms. The specific traits are enhanced growth rates, increased product efficiency, disease resistance and expanded ecological ranges. To achieve these desired traits, the fish eggs are injected or fused with the DNA of other species. One of the genes experimented with, is the human growth hormone gene. This gene has been inserted into the common carp, crucian carp and loach, resulting in a dramatic increase in the growth of these fish. In addition, is being experimented the insertion of a cold water tolerance gene from a fish, such as the ocean pout, into the Atlantic salmon. By doing this, the researchers expect to extend the range of the salmon to the coastal regions in northern Canada. The researchers working on these transgenic fish freely admit that an accidental release into the

natural environment is a possibility, and that the methods of minimizing the damage from such an occurrence need to be addressed²⁰.

Further, the globalisation of agriculture is leading to an increase in malnutrition in the Third World, as the most fertile ecosystems are diverted to luxury export crops, and as domestic markets are destroyed due to dumping of subsidised agricultural commodities²¹.

However, at least in Italy, the consumers are ready to prefer natural foods: 75% of citizen interviewed²² blame the Government's inadequacy to insure clear norms about GMFs, and 60% declares that nobody guarantees the foods we consume. The most astonishing result is that 61% of the interviewed citizens has no idea as to what the GMFs are!

Nobody could have foreseen years ago, when GMFs were first marketed that a Canadian Committee²³ could reveal that much more severity is necessary before allowing the cultivation of new crops, that is transgenic foods, especially regarding human mistakes. In addition, the commercial interests which bind research to industry are on trial, since such a relationship discourage the scientists to evaluate appropriately the risks

related to GMFs. Finally, the scientists have denied the frequently repeated concept, assuring that a “minimal” quantity is safe. And we return to the introduction of the gene of Brasil nuts in the soybean gene to prove reactions to soybean in nut-allergic patients⁹, therefore the product has been withdrawn (Sampson, personal communication).

Conclusion

Table I shows the location of 1445 fields where GM cultivations are experimented. French Amis de la Terre have published a map indicating the locations of experimental field trial sites²⁴. Nevertheless, GMFs are already on supermarket shelves. An estimated 60% of processed foods on sale, for example, in the UK contain GM corn grown in the US. Big business is insisting for licences to produce the crops in the UK, but at present only Government-approved test sites growing GMFs are allowed. And none of the crops is authorized to be sold to the public. However, educating consumers has gen-

Table I. Number of fields where transgenic cultivations are experimented.

Country	No.
France	443
Italy	233
United Kingdom	179
Spain	140
Holland	109
Germany	105
Belgium	99
Sweden	53
Denmark	40
Finland	22
Greece	19
Portugal	12
Ireland	4
Austria	3

From NIH data.

erated sufficient market pressure to force most large supermarket chains to fully stop stocking GMFs²⁴. In the UK and Austria FoE have published guides informing shoppers how to avoid GMFs in their supermarkets²⁴. A joint FAO/WHO commission has

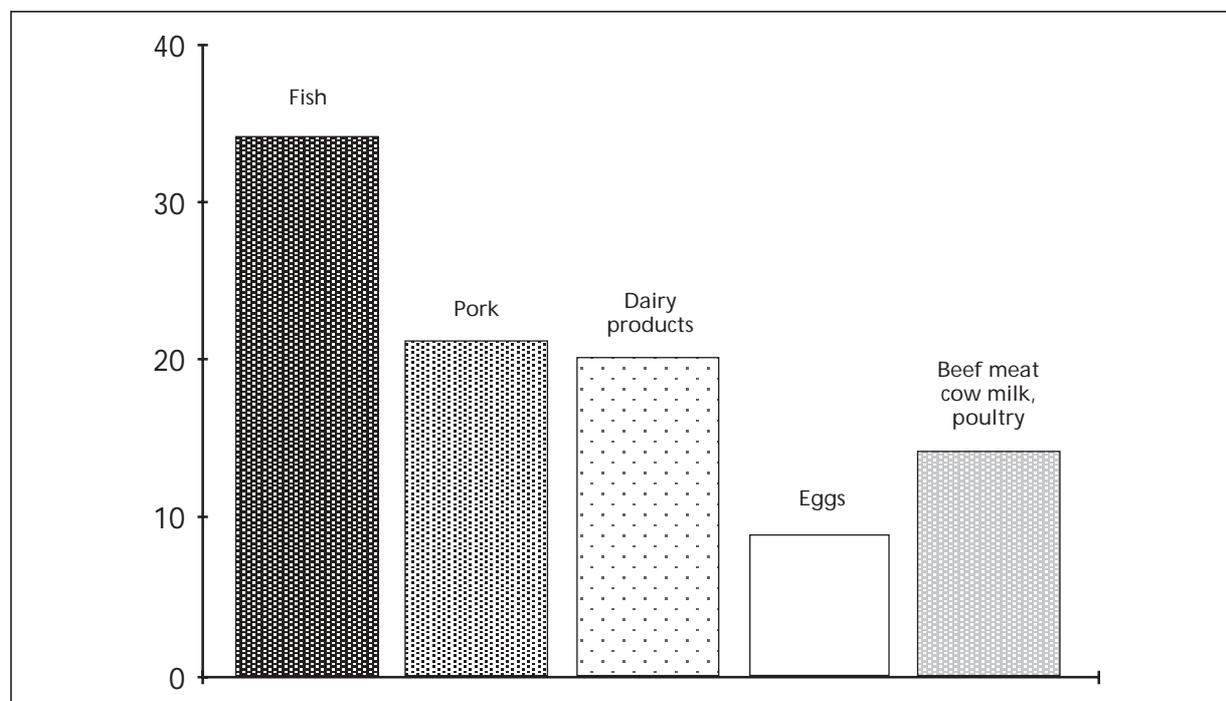


Figure 2. Foods potentially containing dioxin. Note: According to WHO the tolerable dioxin threshold is = 1-4 pg/kg/day; the allowed exposure/day is 2 pg/kg. Source: Istituto Superiore di Sanità.

proposed new labelling procedures of foods of potentially allergenic nature²⁵. We feel that these recommendations shall not stop transgenic pollution, and may prove insufficient for HFs, since highly sensitive babies may react to traces of allergen residues in the HFs^{3-5,7}.

However, food safety has been undermined by dioxin (Figure 2) deriving from manipulation of animal fodders, including a mixture of fats of uncertain provenance (also residues of machine oil?) and triturated carcasses; the allowed levels have been recently doubled. We remind that most Spanish commercial pharmacologic preparations stem from whey of beef bone or other products that can be contaminated with CM proteins. If the infant is highly sensitive he may react to the products with severe manifestations²⁶.

Once again little work has been done to protect unaware consumers and parents of infants and young children. We deem very urgent that it is clearly specified whether foods to be sold in supermarkets are Frankenstein's food or not. This is feasible only in countries where governments are not pro GMFs.

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