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Reply to Letter to the Editor

## Response to "Food Standards Australia New Zealand's" comments

### 1. Introduction

Comments from Dr. Gorst et al. on our study [1] were reviewed. As these comments come from an employee at Food Standards Australia New Zealand, we felt that our response is necessary to avoid misinterpretation of our study. In general, critics have focused on four points: (1) the term "pesticides associated to genetically modified foods (PAGMF)"; (2) the approach followed in our study; (3) potential sources of detected pesticides; and (4) the sensitivity of detection method for Cry1Ab toxin.

### 2. Pesticides associated to genetically modified foods (PAGMF)

In our study, we were interested to pesticides that were used by the food industry for making plants tolerant to pesticides or producing their own pesticides. Thus, we have plants that tolerate glyphosate and glufosinate and another that produce Bt-toxins which are toxic to certain insects. Obviously, these pesticides can be found in other areas of agriculture such as organic foods. However, this does not deprive them of the character of pesticides associated to genetically modified foods (PAGMF), especially the use of organic foods by the population is really rare.

### 3. The approach followed in the study

Since the pesticides in question are both in GM and organic crops, comments suggest that the best approach would be to trace the same pesticide in both the blood and GM foods eaten by the same person. This is very relevant. However, as the labeling of GM foods is not mandatory and systemic, the question is how to identify the various products derived from GM foods we eat. This may be easy in a study using experimental animals, but today this is impossible in humans.

### 4. Potential sources of detected pesticides

Except certified organic foods free of GM crops, it is difficult to talk about conventional foods that are without products derived from GM plants. This confirms the overlap of conventional and GM foods. Our exposure to pesticides in question come mainly from GM crops for the following reasons: (1) normal plants that are not genetically modified cannot resist to the toxicity of glyphosate and glufosinate; (2) The use of glyphosate and glufosinate in lawns or other similar activities is banned in most municipalities in industrialized countries; and (3) GM plants that produce Bt-toxins do it within the plant and continuously, thereby protecting toxins against degradation by sunlight and elimination by washing. Conversely, Bt-toxins that are powdered on the surface of non-GM plants are easily degradable and removable.

It should be noted that our use of organic foods is still insignificant, while our conventional and GM foods merge more and more. Thus, only further studies will clarify the source (or sources) of our exposure to these pesticides (organic foods, conventional/GM foods, intestinal bacterial flora, intestinal cells, all these elements or other?).

### 5. The sensitivity of detection method for Cry1Ab

Depending on the choice of the primary antibody, it is easy today to detect and quantify Cry1Ab, Cry1Ac, both and other Cry toxins. Experts from Monsanto, the producer of Bt-transgenic plants, have recognized that it is possible to detect Bt-toxins in blood. For more details regarding the analysis of Cry1Ab toxin, glyphosate and its metabolite AMPA, see our response to comments from Monsanto [2]. For the analysis of glufosinate and its metabolite 3-MPPA, see our response to comments from Bayer CropScience [3]. The ELISA applied in our study have provoked reactions mainly due to frustrations caused by the scarcity of information provided by Agdia (Elkhart, IN, USA), the manufacturer of the ELISA kit. The main application of this kit is to verify whether a transgenic plant (seeds or leaf) produces the toxin of interest and thereby validating its good functionality. The presence of such toxin results in specific color, describing the result as positive vs. negative. For this related-plants application, Agdia recommended standard ranges from 0.1 ng/ml to 10 ng/ml. However, in our development of the analytical method, we found that we were able to detect levels of 0.02 ng/ml (20 pg/ml) Cry1Ab in human serum (easily verifiable by any laboratory). This limit of detection (LOD) corresponds to a limit of quantification (LOQ) of 0.07 ng/ml (70 pg/ml). Interestingly, we note that even using the LOQ as an alternative solution to zero, the main findings of this study are not changed. We agree to consider the study of Lutz [4] recommending caution with the ELISA as method of quantification, however false positives cannot reach between 69 and 93% frequency.

On the other hand, the question that has arisen is "can we consider a concentration of 0.14 ng/ml (140 pg/ml) Bt-toxin as safe for human fetuses, when the sensitivity of our method detection reaches 0.02 ng/ml (20 pg/ml)? Can we consider a concentration of 0.14 ng/ml (140 pg/ml) as null (zero), when we know that major hormones in human reproduction act at similar levels or lower (i.e. GnRH: 0.02 ng/ml, estrogen: 0.1–0.3 ng/ml and progesterone: 1–15 ng/ml)? In other words, when a same

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concentration could explode the gut of a lepidoptera larva measuring between 0.5 and 3 mm, can we be worried about a human embryo which has the same size (0.4 mm) on the tenth day of pregnancy?

## 6. Conclusion

Our main findings are that the Bt toxin does not degrade in the digestive tract, it is taken up into circulation and it is distributed to all organs. Whether the Bt toxin comes from natural insecticidal formulation, not only the safety of Bt toxin GM crops is in question, but that of the formulations containing Bt. Since the apparition of this research, a first on humans, comments have been addressed, but not be based on comparative investigations on humans. For a subject as serious as the safety of foods in 2011, it is worrying that we have only studies on plants or cows to transpose on humans. This reveals the urgent need to undertake more studies to provide satisfactory answers to all. More reassuring answers to our future grandchildren, especially.

## Conflict of interest

None.

## References

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