



Press release – December 12, 2018

MON 810 and NK603 GM Maize: No Effects Detected on Rat Health or Metabolism

A diet based on MON 810 or NK603 transgenic maize does not affect the health or metabolism of rats, under the conditions of the GMO 90+1 project¹. This unprecedented study performed by a research consortium led by Inra brought together a number of partners², including Inserm. The research was performed as part of the Risk'OGM program funded by the French Ministry of Ecological and Inclusive Transition. For six months, rats were fed a diet containing either GM maize (MON 810 or NK603) or non-GM maize, in varying concentrations. The researchers, using high-throughput biology techniques, did not identify any significant biological markers related to the transgenic maize diet. Neither did anatomic pathology examination reveal any alteration of the liver, kidneys or reproductive system of the rats fed diets containing these GMOs. This research, published on December 10, 2018 in *Toxicological Sciences*, does not reveal any harmful effects related to the consumption of these two types of GM maize in the rat even after lengthy periods of exposure.

The researchers used two well-known types of GM maize: MON 810, which produces the protein Bt rendering it resistant to certain insects, and NK603 in which the modification of a gene renders it resistant to glyphosate. For 6 months, the rats were fed a diet containing either transgenic maize or non-GM control maize. This time period, which is double that of the test required by European regulations, is equivalent to one third of the average lifespan of rats.

The objective of the researchers was to test for early biomarkers of biological function alterations in rats fed GM maize over periods of 3 and 6 months. For that, they used two ultra-sensitive high-throughput techniques: transcriptomics (gene expression) and metabolomics (study of the compounds derived from the body's functioning). These techniques were used to identify and measure metabolites (amino acids, sugars and other small molecules) and to characterize the expression of messenger RNA and cellular microRNA. These methods are capable of detecting a broad spectrum of metabolic variations. The researchers identified markers able to differentiate the MON810 and NK603 diets. However, following the six-month period of the experiment, no significant differences were identified between the GM and non-GM diets, from the biological point of view.

In addition, in the rats fed the GM diets, anatomic pathology techniques (macro- and microscopic study of the tissues to detect potential abnormalities) revealed no alteration of the organs, particularly the liver, kidneys and reproductive system. As such, the researchers did not detect any harmful effects of the MON810 and NK603 maize diets on the health and metabolism of the rodents, even after a lengthy exposure period.

Reference

Xavier Coumoul, Rémi Servien, Ludmila Juricek, Yael Kaddouch-Amar, Yannick Lippi, Laureline Berthelot, Claire Naylies, Marie-Line Morvan, Jean-Philippe Antignac, Desdoits-Lethimonier Christèle, Bernard Jegou, Marie Tremblay-Franco, Cécile Canlet, Laurent Debrauwer, Caroline Le Gall, Julie Laurent, Pierre-

Antoine Gouraud, Jean-Pierre Cravedi, Elisabeth Jeunesse, Nicolas Savy, Kadidiatou Dandere-Abdoulkarim, Nathalie Arnich, Franck Fourès, Jérôme Cotton, Simon Broudin, Bruno Corman, Annick Moing, Bérengère Laporte, Florence Richard-Forget, Robert Barouki, Peter Rogowsky, Bernard Salles; **The GMO90+ project: absence of evidence for biologically meaningful effects of genetically modified maize based-diets on Wistar rats after 6-months feeding comparative trial**, *Toxicological Sciences*, , kfy298, <https://doi.org/10.1093/toxsci/kfy298>

Scientific contact:

Bernard Salles
GMO 90+ Project Coordinator
"Food Toxicology" Joint Research Unit, Inra-INP-Purpan-ENVT-Université Paul Sabatier
"Human Nutrition" and "Animal Health" Scientific Divisions
Inra, Occitanie-Toulouse
bernard.salles@inra.fr

Inra press contact: presse@inra.fr or +33 (0)6 89 33 80 11

¹ The GMO 90+ project

In 2010, the French Ministry of Ecology launched the Risk'OGM program, in the context of the 2008 law on genetically modified organisms for the establishment of a new legal and regulatory framework based notably on the principle of a triple evaluation of the impact of GMOs - from the health, environmental and socioeconomic standpoints. To set this dynamic in motion and fulfil public authority requirements in terms of expertise, guidance and completed research on GMOs, two calls for research proposals were held, in 2010 and 2013, respectively.

The GMO 90+ project was selected during the 2013 call for proposals, with the following scope: to test for biomarkers predictive of biological effects in the study of the subchronic toxicity (3 and 6 months) of GMOs in the rat. Driven by a consortium pooling the various scientific competences, the purpose of this research was to determine whether the feeding of rats with genetically-modified maize led to metabolic changes which could be linked to early effect biomarkers (measurable biological characteristic). The objective was to provide key data which could be used in risk evaluation processes.

<http://recherche-riskogm.fr/fr/page/gmo90plus>

² List of project partners:

- 1-Toxalim (Research Centre in Food Toxicology), Université de Toulouse, INRA, ENVT, INP-Purpan, UPS, Toulouse, France.
- 2-INSERM UMR-S1124, Toxicologie Pharmacologie et Signalisation cellulaire, Université Paris Descartes, USPC, Paris, France
- 3- Centre de Recherche sur l'Inflammation (CRI), INSERM UMRS 1149, Paris, France.
- 4- Laberca, ONIRIS, UMR INRA 1329, Nantes, France
- 5- Université de Rennes, Inserm, EHESP, Irset (Institut de recherche en santé, environnement et travail) - UMR_S 1085, Rennes, France.
- 6- Methodomics, France.
- 7- Institut de Mathématiques de Toulouse, UMR5219 - Université de Toulouse, CNRS - UPS IMT, Toulouse, France.
- 8- Anses, Maisons-Alfort, France.
- 9- Profilomic, Saclay/Gif sur Yvette, France
- 10- UMR1332 Biologie du Fruit et Pathologie, INRA, Université de Bordeaux, Villenave d'Ornon, France.
- 11- UR 1264, MycSA, INRA, Villenave d'Ornon, France.
- 12- Laboratoire Reproduction et Développement des Plantes, University Lyon, ENS de Lyon, UCB Lyon 1, CNRS, INRA, Lyon, France
- 13- CRO CitoxLAB, Evreux.