Ad hoc meeting with Industry _16 Nov 2022

Protein safety assessment

GMO Unit

Trusted science for safe food

efsa
European Food Safety Authority

Regulation 503 requirements

Toxicity assessment of NEPs:

- Case by case approach. Depending on knowledge on protein's source, function or activity and history of human or animal consumption
- If history of safe consumption is duly documented, specific toxicity studies not needed
- Where specific testing is required, the applicant shall provide
  - Molecular and biochemical characterisation of the NEP
  - Bioinformatics searching for homology to proteins known to cause adverse effects
  - Stability of the protein, e.g. influences of temperature, pH
  - Degradation of the NEP to proteolytic enzymes (pepsin test)
  - 28 day toxicity study, depending on the outcome additional targeted investigation may be needed

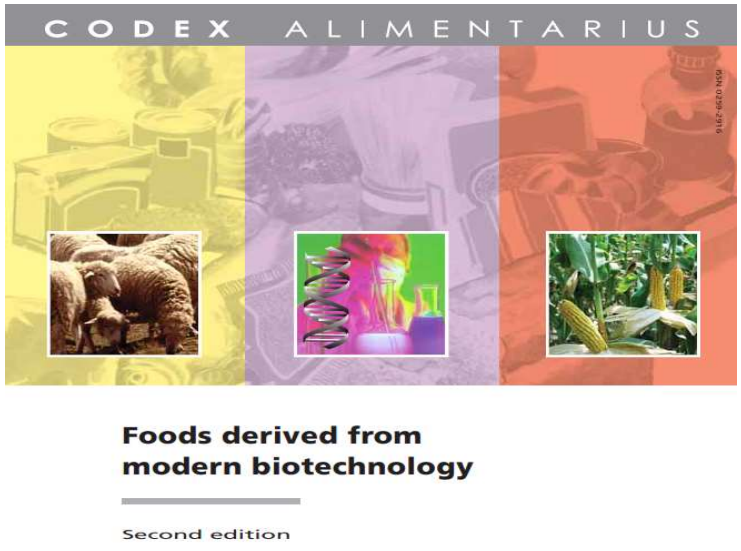
Allergenicity assessment of NEPs:

- Case by case approach. The approach shall include:
  - Bioinformatics searching for homology with know allergens
  - Specific serum screening, cases where there is a sequence homology or structure similarity and where the source of the gene is considered allergenic
  - Pepsin resistance and *in vitro* digestibility tests
  - Additional studies, if needed

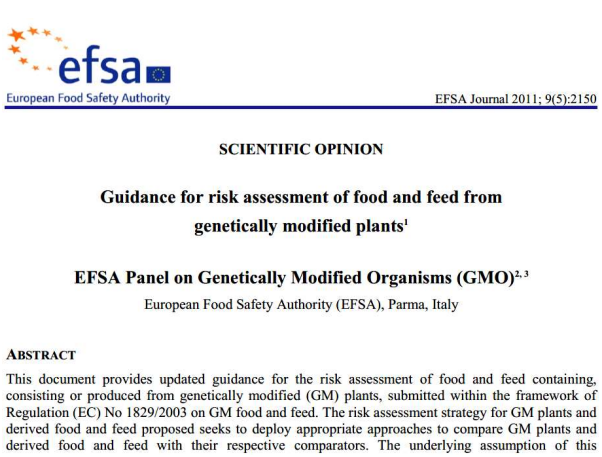
Where are these principles coming from?

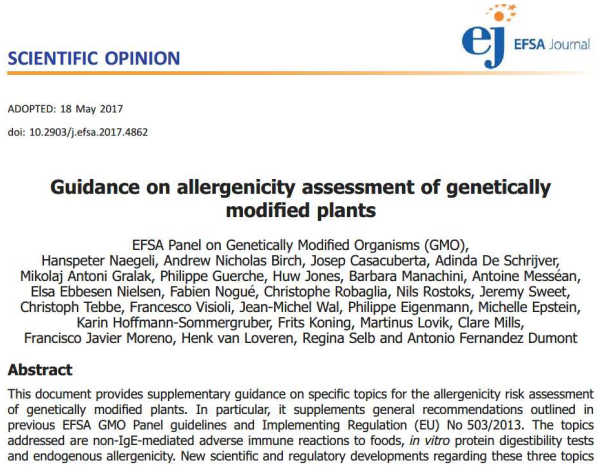
GUIDELINES FOR PREDICTION

Codex Alimentarius 2003-2009

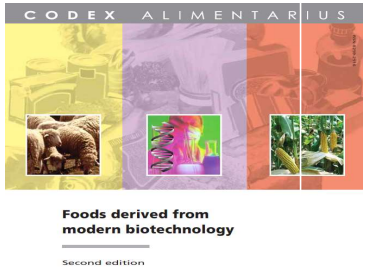


EFSA GMO Panel (2011, 2017)





Challenges in the assessment:



- Complexity in the testing of some proteins
- When there is a large number of individual proteins to test
- The need to minimize use of animals
- Proteins with hits to allergens and toxins (very low % of similarity to allergens/toxins and/or of dubious relevance)
- ……

Development needs – protein safety

Ongoing developmental projects on the topic:

- Protein toxicity prediction

https://etendering.ted.europa.eu/cft/cft-display.html?cftId=8841
https://etendering.ted.europa.eu/cft/cft-display.html?cftId=10487

- Protein allergenicity prediction

https://etendering.ted.europa.eu/cft/cft-display.html?cftId=8829

- HLA-DQ peptide modelling software

https://etendering.ted.europa.eu/cft/cft-display.html?cftId=4505

- AOP-celiac disease

https://www.efsa.europa.eu/en/call/outsourcing-external-report-preparatory-work-development-adverse-outcome-pathways-relevant

Development needs – protein safety

- **Allergenicity doc**

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 2 December 2021

doi: 10.2903/j.efsa.2022.7044

Scientific Opinion on development needs for the allergenicity and protein safety assessment of food and feed products derived from biotechnology

EFSA Panel on Genetically Modified Organisms (GMO),
Ewen Mullins, Jean-Louis Bresson, Tamas Dalmay, Ian Crawford Dewhurst, Michelle M Epstein, Leslie George Firbank, Philippe Guerche, Jan Hejatko, Hanspeter Naegeli, Fabien Nogué, Nils Rostoks, Jose Juan Sánchez Serrano, Giovanni Savoini, Eve Veromann, Fabio Veronesi, Antonio Fernandez Dumont and Francisco Javier Moreno

Abstract

This Scientific Opinion addresses the formulation of specific development needs, including research requirements for allergenicity assessment and protein safety, in general, which is urgently needed in a world that demands more sustainable food systems. Current allergenicity risk assessment strategies are based on the principles and guidelines of the Codex Alimentarius for the safety assessment of foods derived from 'modern' biotechnology initially published in 2003. The core approach for the safety assessment is based on a 'weight-of-evidence' approach because no single piece of information or experimental method provides sufficient evidence to predict allergenicity. Although the Codex Alimentarius and EFSA guidance documents successfully addressed allergenicity assessments of single/

- **Synthetic bio doc**

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 20 June 2022

doi: 10.2903/j.efsa.2022.7410

Evaluation of existing guidelines for their adequacy for the food and feed risk assessment of genetically modified plants obtained through synthetic biology

EFSA Panel on Genetically Modified Organisms (GMO),
Ewen Mullins, Jean-Louis Bresson, Tamas Dalmay, Ian Crawford Dewhurst, Michelle M Epstein, Leslie George Firbank, Philippe Guerche, Jan Hejatko, Francisco Javier Moreno, Fabien Nogue, Nils Rostoks, Jose Juan Sanchez Serrano, Giovanni Savoini, Eve Veromann, Fabio Veronesi, Josep Casacuberta, Matias D Zurbriggen, Antonio Fernandez, Jose Angel Gomez Ruiz, Andrea Gennaro, Nikoletta Papadopoulou, Anna Lanzoni and Hanspeter Naegeli

Abstract

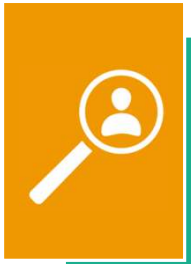
Synthetic biology (SynBio) is an interdisciplinary field at the interface of molecular engineering and biology aiming to develop new biological systems and impart new functions to living cells, tissues and organisms. EFSA has been asked by the European Commission to evaluate SynBio developments in agri-food with the aim of identifying the adequacy and sufficiency of existing guidelines for risk assessment and determine if updated guidance is needed. In this context, the GMO Panel has previously adopted an Opinion evaluating the SynBio developments in agri-food/feed and the adequacy and sufficiency of existing guidelines for the molecular characterisation and environmental risk assessment of genetically modified plants (GMPs) obtained through SynBio and reaching the market in the next decade. Complementing the above, in this Opinion, the GMO Panel evaluated the adequacy

Thank you very much

Stay connected

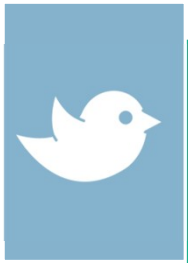
Subscribe to

efsa.europa.eu/en/news/newsletters
efsa.europa.eu/en/rss



Receive job alerts

careers.efsa.europa.eu – job alerts

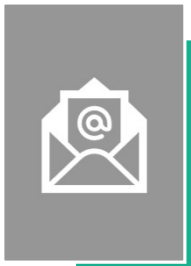


Follow us on Twitter

@efsa_eu
@plants_efsa
@methods_efsa
@animals_efsa

Follow us Linked in

Linkedin.com/company/efsa



Contact us

efsa.europa.eu/en/contact/askefsa