

Ten Years 3-MCPD and Glycidyl Esters in Edible Fats and Oils – Where we are Today?

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Ten years ago the first paper on the occurrence of 3-MCPD fatty acid esters in several edible oils has been published by Z. Zelinkova et al. About one year later, in December 2007, the Official Laboratory of Stuttgart and the Max Rubner-Institut, Detmold announced findings of 3-MCPD esters in different edible oils and fats and the German Federal Institute for Risk Assessment (BfR) published a first statement on the occurrence of 3-MCPD esters in baby food. While free 3-MCPD was known for more than 30 years as contaminant in several foods, the finding of the esters was new. Later also 2-MCPD and glycidyl esters have been identified in fats, oils and fat-containing food. The BfR assumed a 100% degradation of the esters to the free compounds in the human body resulting in the definition of an urgent need for action for the mitigation of the esters during processing. The assumption of the BfR nowadays is mostly confirmed so that the classification of the free compounds as possibly (3-MCPD) and probably (glycidol) carcinogenic by the International Agency for Research on Cancer (IARC) justify the major efforts for the reduction of the esters in food over the last ten years.

The statement of the BfR was the starting point for comprehensive research on national and international level with the aims to develop a robust and validated analytical method, to improve the toxicological assessment of the esters, to elucidate the reaction pathways and to show possibilities of mitigation. While the focus of research at the beginning of the 3-MCPD ester story was mainly on the refining process of fats and oil, today it is clear that food processing at home or in industry is a further source for the formation of the esters.

The research within the last ten years was able to give a lot of satisfactory responses to the urgent questions from 2007, but on the other side some questions are still open and new questions arise. Ten years after the first finding of 3-MCPD esters in edible fats and oils the presentation should give an overview about the state of knowledge. In this context the highlights to the relevant aspects, possibilities of the analytical methods, toxicological assessment, formation pathway, mitigation during oil and food processing will be presented to give a comprehensive overview where we are today. The 3-MCPD ester story is a nice example how the co-operation between analytics and processing works in practices with the aim to support the efforts of the industry to improve processing by mitigation of the esters after development of appropriate analytical methods.

In summary, it can be stated that we have reliable and robust methods, we know more about the reaction pathway and the toxicological assessment and the industry has several options for the mitigation of the esters during processing. The further implementation of the results into practice must be the aim in order to supply products with low amounts of the esters in the future.