

EFSA opinion on acrylamide

30 June 2015

On 4 June 2015, the European Food Safety Authority (EFSA) released its scientific opinion on acrylamide in food. The conclusion was that based on evidence from animal studies, dietary exposure to acrylamide potentially increases the risk of developing cancer for consumers in all age groups.

Acrylamide forms particularly in plant-based, carbohydrate-rich foods during high temperature cooking (usually above 120 °C) as a consequence of the Maillard reaction. The Maillard reaction is a reaction between a reducing sugar (such as glucose, fructose or lactose) and an amino acid (the building block of protein) that results in the “browning” and characteristic flavours of certain foods, cooked at high temperatures. Besides these sensory changes, the Maillard reaction can also result in the formation of undesirable substances such as acrylamide. Additionally the ingredients, storage and processing conditions also greatly influence acrylamide formation in food.

The risk assessment of acrylamide was carried out by EFSA’s Panel on Contaminants in the Food Chain (CONTAM). To assess dietary exposure to acrylamide, the panel evaluated the occurrence of acrylamide in foods and beverages available in the European market, based on data from 43,419 food commodities, analysed and collected since 2010. Acrylamide produced during preparation of food in the home and in restaurants was also considered, as preferences in home-cooking can have a substantial impact on dietary acrylamide exposure (e.g. degree of potato browning when frying). Fried potato products, coffee, biscuits, crackers and breads are the main dietary sources of acrylamide.

The panel undertook a rigorous review of available scientific research on acrylamide and glycidamide (one of its breakdown products in the body) provided by animal and human studies. These included original study reports, previous evaluations and information submitted following public calls for data. Although results from human studies provide limited and inconsistent evidence, EFSA concluded that based on animal studies, acrylamide and glycidamide are genotoxic (i.e. can damage DNA, our genetic material) and carcinogenic (can cause cancer). Since acrylamide is present in a wide range of everyday foods, this concern applies to all age groups but children may experience more exposure to acrylamide relative to their lower body weights.

A Margin of Exposure (MOE) was calculated by comparing the margin between the level of acrylamide that causes cancer in animal studies and the estimated human exposure. For substances that are genotoxic and carcinogenic, a MOE of 10,000 or higher would be of low concern from a public health point of view. The MOEs for the cancer-related effects of acrylamide range from 425 for adults, to 50 for high consuming toddlers. These ranges indicate a concern for public health and require measures for minimising exposure to acrylamide.

EFSA also considered other effects of acrylamide on the nervous system, pre- and post-natal development and male reproduction. These effects were not considered to be a concern at current levels of dietary exposure.

Reducing exposure to acrylamide in food

EFSA highlighted a number of recommendations published by national authorities (e.g. [US-Food and Drug Administration](#) and the [German Federal Office for Consumer Protection and Food Safety](#)) and the food industry for mitigating acrylamide concentration in food. One such initiative to reduce acrylamide in various food categories is the development of the [FoodDrinkEurope 'Acrylamide toolbox'](#), which provides steps that can be implemented by food manufacturers as well as by consumers at home to reduce acrylamide levels in their foods. The Toolbox, first developed in 2006, is a dynamic concept and is regularly updated as new mitigation methods are introduced.

For more information please see:

1. European Food Safety Authority. (2015) [Scientific Opinion on acrylamide in food](#). EFSA Journal 13(6):4104.
2. European Food Safety Authority. (2015) [EFSA explains Risk Assessment: Acrylamide in food](#)
3. US-Food and Drug Administration. (2013). [Draft guidance for industry: acrylamide in foods](#)
4. German Federal Office for Consumer Protection and Food Safety. [Concept of minimising acrylamide contents in foodstuffs.](#)