Final Report Summary - ICARE (Impeding neo-formed Contaminants Accumulation to Reduce their Health Effects)

Heat treatment of foods is a key process in the agro-food industry; it mainly results in the development of a large range of flavours and tastes through the Maillard reaction. However, some of these Maillard products called neo-formed contaminants are currently suspected to have deleterious health effects. The recent discovery of neo-formed acrylamide in a variety of fried and baked foods has highlighted the fact that agro-food enterprises and especially Small and medium-sized enterprises (SMEs) are poorly prepared to face this emerging issue. Because of a lack of knowledge and inappropriate analytical and technological tools, SMEs are presently not able to control the impact of the different steps of the process on the NFC level.

The main results of the project can be assigned to three different topics, all part of a global problematic related to management of the risk associated to absorption of neoformed contaminants via heat processed food. The clinical studies have evidenced for the first time under realistic conditions and with reliable analytical techniques that Maillard products present in regular diet are absorbed significantly in healthy humans. The level of Maillard products, including NFC, ingested through the diet conditions the inner exposure to those compounds, as revealed by significantly higher plasma ad urine concentrations. In turn, the modification in inner exposure to NFC consecutive to ingestion of heat-processed food, is associated to quantifiable metabolic changes in agreement with results obtained in animal studies. In infants, such as in young adults, the main changes evidenced concern the increase in oxidative stress, and the lower insulin sensitivity following ingestion of Maillard products through the diet. Such changes are rapid (one month) and long lasting.

These important and new results demonstrate the importance to improve the quality of processed food regarding NFC levels, and the need for controlling the contamination levels in all the products concerned. Identification of the contribution of each food product to the total exposure to NFC gives indications on those products that will need to be surveyed in view to decrease the exposure rate to NFC: fried products, severe-heat treated cereal products, including biscuits, toasted dough, and bread.

Regarding infant feeding, breastfeeding is recognised as the optimal method. Differences in blood and urine parameters of the breast- versus formula-fed infants may be explained by the high protein content of the formulas in comparison with breast milk as well as the level of Maillard products absorbed from the infant formulas. Most of them diminish when milk is only a supplement to diversified diet. Despite of this observation it is suggested that hypoallergenic hydrolysed formulas should not be indicated just as general preventive approach to potential unsubstantiated allergies.

The levels of NFC in European food products are very variable. Part of this variability results from differences in ingredients and recipes, and part from different processing parameters. Depending on the food product concerned, controlling the ingredients or raw material is the best strategy (potato crisps), but for others decreasing the process temperature is easier (biscuits, bread crisps). Combination of the two strategies induces a synergic impact.

Generally including a first drying process before grilling or frying can be of interest to decrease the final heat treatment
severity. Limiting the final browning is another trend to develop progressively in order not to later the consumer acceptability for the product. These parameters could be considered as different aspects of a global strategy for good manufacturing practices, without appealing to new additives such as asparagine, citric acid, leavening agents, etc. whose use compromise the final sensorial attributes of the food.

The development and validation of a new sensor allowing rapid, reliable, sensitive assessment of NFC in the food product at line in the industrial site will allow to provide SMEs with an innovative and easy tool for the control of NFC in the final product. This device will also help identifying the critical steps in the process, or evidencing the insufficient quality of some ingredients as part of a new quality control strategy.

**Related information**

<table>
<thead>
<tr>
<th>Result In Brief</th>
<th>Healthier heat-processed foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents and Publications</td>
<td>Final Report - ICARE (Impeding neo-formed Contaminants Accumulation to Reduce their Health Effects)</td>
</tr>
</tbody>
</table>

**Reported by**

ASSOCIATION DE COORDINATION TECHNIQUE POUR L'INDUSTRIE AGROALIMENTAIRE
PARIS
France

See on map

Last updated on 2011-04-14
Retrieved on 2019-07-01

© European Union, 2019