A new dark side of the Maillard’s products

JL Wautier

Since the first description of non enzymatic glycosylation of amino acid, the advanced glycation end products (AGE) or products of glycoxidation or glycotoxins have been shown to be involved in various pathological disorders including diabetes mellitus, renal failure and aging [1].

The AGE results from a reaction between carbohydrates and free amino groups of protein [2]. The interaction of AGE with the receptor (RAGE) alters endothelial cell functions and increases vascular permeability [3]. Furthermore it may create an inflammatory reaction in the vascular wall favoring atherosclerosis development. AGE formation reduced the elastic properties of the vascular wall and may participate in rheumatoid arthritis [4].

Two recent publications demonstrate that Maillard’s products may also be at the origin of acrylamide formation [5, 6]. Acrylamide is considered as a potential cancer-causing agent. Products of the Maillard reaction are responsible for much of the flavor and color generated during baking and roasting.

The amino acid which is almost exclusive in acrylamide formation is asparagine. This could explain the occurrence of acrylamide in cooked plant-based foods, such as cereals and potato which are rich in this amino acid. In potato used for the manufacture of potato crisps, the major free amino acid asparagine. It is also at a high concentration in wheat flour and in protein rye variety.

This new finding further underline the importance of AGE present in foods which are partly absorbed and frequently stored in the organism. These findings promote to change our diet and avoid products of the Maillard reactions present in various beverage, dishes. Could we be clever enough to find new ways of cooking limiting the glycoxidation without destroying our pleasure in eating.

The scientific committee on food of the European commission had made some recommendations [7]. The Committee recommends that levels of acrylamide in food should be as low as reasonably achievable. However, given the current lack of detailed knowledge about a number of aspects in relation to acrylamide and food safety, the Committee at this stage can only offer general advice on the scientific issues relevant to risk management.

Considerable variations in acrylamide levels have been observed within each food group analysed so far. This suggests that it may be possible to reduce the levels by changing the methods of production and preparation.

The Committee is of the opinion that several principles can be already applied in order to minimise human dietary exposure to acrylamide. To this end the Committee endorsed the interim advice given by the FAO/WHO Consultation (WHO, 2002):

- food should not be cooked excessively, i.e. for too long or at too high a temperature. However, all food — particularly meat and meat products — should be cooked thoroughly to destroy foodborne pathogens;
- the information available on acrylamide so far reinforces general advice on healthy eating. People should eat a balanced and varied diet, which includes plenty of fruit and vegetables, and should moderate their consumption of fried and fatty foods;
- the possibilities for reducing the levels of acrylamide in food by changes in formulation, processing and other practices should be investigated;
- an international network “Acrylamide in Food” should be established inviting all interested parties to share relevant data as well as ongoing investigations.

References


7. European Commission Scientific Committee on Food (SCF). Opinion of the scientific committee on food on new findings regarding the presence of acrylamide in food (SCF/CS/CNTM/CONT/4 Final, July 3, 2002).