Exploring the formation of Advanced Glycation End Products (AGE) in different reaction conditions

Sonja Visentin, Claudio Medana, Cosmin Butnarasu

Molecular Biotechnology and Health Sciences Department – University of Torino - Via Nizza, 52 - 10126 Torino (ITALY)

E-mail: sonja.visentin@unito.it

The rapid increase in metabolic diseases, which occurred in the last three decades in both industrialized and developing countries, has been related to the rise in sugar-added foods and sweetened beverages consumption. An emerging topic in the pathogenesis of metabolic diseases related to modern nutrition is the role of Advanced Glycation End products (AGEs). AGEs can be ingested with high temperature processed foods, but also endogenously formed as a consequence of a high dietary sugar intake Evidence also in humans suggest that the impact of dietary AGEs on different signalling pathways can contribute to the onset of organ damage in liver, lung, intestine, cardiac muscle and the brain, affecting not only metabolic control, but global health (1) . (AGEs) are generated in the late stages of Maillard reaction in foods and biological systems. These products are mostly formed by the reactions of reducing sugar or degradation products of carbohydrates, lipids, and ascorbic acid. In recent years, the Maillard reaction has gained considerable importance in areas as diverse as human pathology and flavour chemistry (2). This reaction, also called non-enzymatic browning or glycation, is of outstanding importance for the formation of colour, aroma and flavour precursors in foods. The majority of literature considers the Maillard reaction as a series of subsequent and parallel reactions–the early, advanced and final Maillard reaction steps. The molecules involved in these reactions are carbonyl and amino compounds, which include reducing carbohydrates and the free amino groups of amino acids, peptides or proteins. Maillard reaction products (MRPs), especially early stage MRPs and melanoidins, are currently gaining a lot of attention due to their reported health-promoting properties and their potential to be used as functional food ingredients. It is often not clear which specific biological function is assigned to which MRP, due to the large amount of MRPs formed during the reaction and difficulties in their purification and identification.

In this work we investigated by searching for AGE products that are formed in different reaction conditions (targeted metabolomics) and by evaluating the interaction of AGE products with mucin as a model of intestinal barrier for adsorption.

KEYWORDS AGEs, Maillard Reaction, Metabolic Diseases, HR-Mass Spectrometry

REFERENCES

1. M. Snelson, M. T. Coughlan Nutrients (2019) 11, 215-227.

2. S. Visentin; C. Medana; A. Barge; V. Giancotti; G. Cravotto Organic & Biomolecular Chemistry (2010) 8, 2473-2477.