

# Editorial



## The Maillard Reaction in Food and Medicine

The main objective of the this COST Action 927 on *Health Implications of Thermally Processed Foods*, chaired by Professor Vincenzo Fogliano from the University of Naples Federico II, Italy, is to improve the nutritional quality and safety of heat-processed foods, considering as well the consumers needs and preferences.

One of the key tasks for COST 927 is to gain basic knowledge about the formation of health beneficial and harmful compounds formed during the heat-treatment of various foods. Analytical protocols for the chemical characterisation and quantitation of novel markers of thermal treatment will be developed. The health effects of compounds formed during the heat treatment of foods will be investigated in *in vitro* studies, in animal feeding experiments as well as in controlled human trials and epidemiological studies on large populations.

After the health effects of the chemically characterised markers of heat treatment have been proven, the processing conditions of the respective food items will be optimised in order to lower the contents of harmful compounds and to increase the amounts of health beneficial ingredients.

Finally, suggestions will be given to the EC food regulatory authorities to improve the safety and the traceability of thermally treated foods.

The scientific activities carried out in the frame of this COST action are divided into the following five working groups (WG), each of them chaired by a European expert in the respective field:

WG 1: Analytical methods, formation pathways and EU regulation (WG leader: Dr. F.J. Morales, Instituto del Frío, Madrid / Spain)

WG 2: Biological methods, risk assessment, consumer perception (WG leader: Dr. S. Salvini, CSPO – Scientific Institute of Tuscany / Italy)

WG 3: Process optimisation and new developments (WG leader: Dr. E. Shimoni, Technion – Israel Institute of Technology / Israel)

WG 4: Absorption and physiological effects (WG leader: Prof. Dr. K.H. Wagner, University of Vienna / Austria)

WG 5: *In vitro* transformations and maintaining health (WG leader: Dr. K. Sebeková, Slovak Medical University Institute of Preventive and Clinical Medicine / Slovakia)

From these activities, a much clearer understanding of the chemical nature and the health risks and benefits of heat-induced compounds in various foods is expected.

The main topics addressed on the occasion of the last COST 927 Workshop held in Naples, Italy, from May 24<sup>th</sup> to May 27<sup>th</sup> are summarised in this Special Issue. First, the role of dietary Maillard reaction products (MRPs) and some of their structural analogues formed in the human body, named Advanced Glycation End Products (AGEs), was discussed with special emphasis on the progression of various diseases, such as diabetes mellitus or chronic inflammation.

The results presented in this context mostly indicated harmful effects when high doses of MRPs or AGEs were used in *in vitro* assays or administered in human trials. On the other hand, from several studies investigating antioxidant effects as well as antimutagenic effects health beneficial effects were concluded. The question, whether a diet low in MRPs, containing mostly raw or at most mildly heat-treated foods, such

as, e.g. steamed rather than fried vegetables, poses a lower risk for certain diseases and enables us to live longer in better health, has not been solved yet. However, several intervention studies addressing that key question are ongoing and we expect some results to be presented at the upcoming 9<sup>th</sup> International Symposium on the Maillard Reaction held in Munich/Germany from September 1<sup>st</sup> until September 7<sup>th</sup>, 2007 (<http://maillard.congress-services.com/>).

In addition to the knowledge about the health effects of the complex food matrix, we need to understand what kind of MRPs are formed during food processing and how to control the formation of harmful as well as beneficial compounds. For instance, contributions in this issue deal with the formation of acrylamide or lysinoalanine, both of which are formed upon heat treatment of foods and have been demonstrated to cause harmful health effects in animals when ingested at very high doses. An example of heat treat-

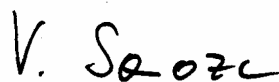
*“The main objective is to improve the nutritional quality and safety of heat-processed foods”*

ted foods containing health beneficial compounds might be those with a high content of lupin, which has been shown to contain bioactive peptides which are effective in lowering blood cholesterol, even when ingested in diet-representative doses.

The formation of AGEs in the human body was another topic presented at the last COST 927 Workshop in Naples. Here, not only *in vivo* effects of AGEs, but also formation pathways and novel analytical techniques for measuring AGEs in biological samples were presented.

In summary, all of these contributions only cover a very small part of the research which still needs to be done. But

with the interdisciplinary European approach of COST Action 927, an excellent scientific basis is provided to improve the quality and safety of thermally treated foods.

A handwritten signature in black ink, reading 'V. Somoza'.

Veronika Somoza  
Vice Chair of COST Action 927