Editorial

The Maillard reaction in food and medicine: Current status and future aspects

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

From January 2004 until April 2009, a total of 28 European countries joined this Action to exchange and discuss their latest news in ten workshops and three meetings of the International Maillard Reaction Society (http://imars.case.edu/). Fifty-seven young scientists completed Short-Term Scientific Missions (STSMs) that allowed them to study at another institution or laboratory in another COST country. Overall, this COST Action 927 supported scientists from all over Europe, and even the USA and Australia, working in the field of the Maillard reaction in their networking activities to contribute to the knowledge on the formation of Maillard reaction products in foods, as well as in living organisms, and their biological implications.

Analytical protocols for the chemical characterisation and quantification of novel and already known compounds generated upon thermal treatment have been developed and the health effects of these compounds were studied *in vitro* and *in vivo*.

The main topics addressed in this issue of *Molecular Nutrition & Food Research* are first novel analytical techniques for the evaluation of heat-treated dairy foods and for quantification of heterocyclic amines in plasma and urine. The second part of this special issue is focused on two putatively harmful compounds found in heat-treated foods: furanes and acrylamide (AA). Scientists from the University of Stockholm first described the formation of AA in heated, protein- and carbohydrate-rich foods in 2002 [1]. Since high dietary AA intake has been demonstrated to cause neurotoxic effects, initiate several types of cancers and exhibit a genotoxic potential, AA mitigation in thermally processed foods is one of the key targets food companies are trying to meet worldwide [2].

However, health implications of AA ingested with a mixed diet are still controversially discussed. From a recently published study that included more than 120 000 men and women, Dutch researchers reported that they found no association between lung cancer and AA exposure in men and an unexpected 18% lower risk in women for a 10-μm/day average intake of AA [3].

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On the following pages, results from colleagues who joined the COST 927 Action on the formation and mitigation of AA in different model systems and biscuits are presented. Also, the effect of sulforaphane, a well-known chemopreventive component in *e.g.* broccoli, on glutathione *S*-transferase-dependent detoxification of AA in Caco-2 cells is demonstrated. Last but not least, one contribution is focused on the effect of dietary Maillard reaction products on iron bioavailability in male adolescents.

Although all these contributions cover only a very small part of the research, which still needs to be done to fully elucidate the key question whether the dietary intake of Maillard reaction products poses a health risk to humans, with the interdisciplinary European approach of COST Action 927 an excellent scientific basis has been provided to improve the quality and safety of thermally treated foods.

V. Somoza

Veronika Somoza
Vice Chair of COST Action 927

References

[1] Tareke, E., Rydberg, P., Karlsson, P., Eriksson, M., Törnqvist, M., Analysis of acrylamide, a carcinogen formed in heated food-stuffs. *J. Agric. Food Chem.* 2002, *50*, 4998–5006.

[2] Seal, C. J., de Mul, A., Eisenbrand, G., Haverkort, A. J. *et al.* Risk-benefit considerations of mitigation measures on acrylamide content of foods – a case study on potatoes, cereals and coffee. *Br. J. Nutr.* 2008, *2*, S1–S46.

[3] Hogervorst, J. G. F., Schouten, L. J., Konings, E. J. M., Goldbohm, R. A., van den Brandt, P. A., Lung cancer risk in relation to dietary acrylamide intake. *J. Nat. Cancer Inst.* 2009, *1*, 651–662.

