Exposure to dietary advanced glycation end-products facilitated allergic response in peripheralblood mononuclear cells from children at risk for atopy

L. Paparo[1,2], C. Bruno[1,2], E. Punzo[1,2], L. Voto[1,2], S. Coppola[1,2], A.F. de Giovanni di Santa Severina[1], M. Lettieri[1], L. Carucci[1,2], R. Berni Canani[1,2,3,4]

[1]University of Naples "Federico II", Department of Translational Medical Science, Naples, Italy, [2]University of Naples "Federico II", CEINGE Advanced Biotechnologies, Naples, Italy, [3]Universityof Naples "Federico II", European Laboratory for the Investigation of Food-Induced Diseases, Naples, Italy, [4]University of Naples "Federico II", Task Force on Microbiome Studies, Naples, Italy

Objectives and Study: The increased consumption of ultra-processed foods, rich in advanced glycation end-products (AGEs), has been linked to the increased prevalence of food allergy (FA) in western Countries. We aimed to assess the direct effects of AGEs on peripheral blood mononuclearcells (PBMCs) from children at risk for atopy.

Methods: Peripheral blood samples were obtained from children (n=4, all Caucasian male, aged 48- 60 months) and isolated by Ficoll density gradient centrifugation. PBMCs were stimulated with 200 µg/mL of AGE-bovine serum albumin (BSA) or BSA alone for 48 hours. Cell apoptosis and proliferation rate were measured using Annexin V Apoptosis Detection Kit FITC and Cell-Trace CFSEProliferation Kit, respectively, and analyzed using flow cytometry. The production of TNF-α, IL-6, IL-4,IL-5, IFN-γ, IL-13 and IL-10 were measured with specific human enzyme immunoassay kits.
Mitochondrial metabolism in PBMCs were assessed by the Seahorse XFp analyzer using the Cell MitoStress Test kit.

Results: Through a direct interaction with human PBMCs, the AGEs are able to inhibit cell proliferation and to induce cell apoptosis, and to increase the release of pro-inflammatory (IL-6, TNF-α, IFN-γ) and Th2 (IL-4, IL-5, IL-13) cytokines. No modulation was observed for the tolerogenic cytokine IL-10. An alteration of mitochondrial metabolism was observed in AGEs-stimulated PBMCs,with a significant decrease of the basal and maximal respiration, ATP production and the spare respiratory capacity.

Conclusions: These data supporting the link between the consumption of ultra-processed and FAprevalence, strongly suggest the importance of campaigns focused on healthy dietary habits in protecting against the occurrence of FA.

Contact e-mail adress: paparolorella@gmail.com