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Digestomics of raw and roasted hazelnut according to Infogest protocol and characterization of gastric-phase products

Ivana Prodić^{1*}, Katarina Smiljanić², Jelena Mihailović², Karin Hoffmann-Sommergruber³, Tanja Ćirković Veličković^{2,4,5,6}

¹University of Belgrade-Innovation Centre of the Faculty of Chemistry Ltd, Belgrade, Serbia; ²University of Belgrade-Faculty of Chemistry, Centre of Excellence for Molecular Food Sciences, Belgrade, Serbia; ³Dept. of Pathophysiology and Allergy Research, Medical University of Vienna, Vienna, Austria; ⁴Department of Environmental Technology, Food Technology and Molecular Biotechnology, Ghent University, Global Campus, Incheon, South Korea; ⁵Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium; ⁶Serbian Academy of Sciences and Art, Belgrade, Serbia.

Brief introduction: Stability to gastric digestion represents a very important parameter of food protein allergenicity. Usually digestion experiments are carried out on purified proteins or protein extracts; however, use of solid food is far closer to the *in vivo* situation, taking into account food protein interactions with other food components, such as polyphenols and lipids.

Objective: The aim of this study was to investigate and compare digestion stability and allergenicity of large and small peptides released after pepsin digestion of whole raw and roasted hazelnut kernels under standardized and physiologically relevant *in vitro* conditions.

Methodology: *In vitro* simulated oral and gastric phase digestion was carried out with ground raw and roasted hazelnut kernels. Digested proteins were extracted from the mixture and analyzed by SDS-PAGE, 2D-PAGE, and compared with Image Master 2D Platinum 7.0. Western blot probed with allergic patients' sera and specific antibodies for Cor a 8.

Main findings: Several important hazelnut seed storage digestion resistant proteins and peptides have been identified and characterized. Most abundant hazelnut allergens were resolved on a 2DE map, for instance acidic and basic chains of Cor a 9, and Cor a 11. Digestion-resistant peptides of Cor a 11 and Cor a 9 were able to bind IgE. Lipid transfer protein (Cor a 8) was highly resistant to gastric proteolysis. **Conclusion:** To conclude, roasted hazelnut is more prone to gastric digestion than raw, and cause milder IgE response in patients. Gastric phase digestion of raw and roasted hazelnut kernels results in partial extraction and digestion of Cor a 11 and Cor a 9 into digestion-resistant peptides with preserved IgE-binding epitopes. These results demonstrate substantial resistance of raw and roasted hazelnut allergens to gastric digestion since they remained mostly intact after 2 h of gastric (pepsin) digestion and retained their allergenicity.

Keywords: hazelnut allergens, digestion, food matrix

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